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STUDY REGARDING THE HEAVY METAL CONTAMINATION OF CERTAIN NATURAL MINERAL WATERS IN AN ORE EXPLOITATION ZONE IN ROMANIA

Sidor Anca-Mihaela*[1]

Keywords*: drinking water, river, heavy metals, contamination level, maximum permissible dose*

ABSTRACT

The aim of this study is to investigate the contamination level with a serie of heavy metals (aluminum, cadmium, chromium, copper, mercury, nickel, zinc and uranium) in the water samples drawn from an ore exploitation zone and to compare the obtained results with the obligatory drinking water standards. The water samples were taken from three rivers: Rău and Chiril Rivers from Crucea village and Călimănel River from Paltiniş reservoir, in Bucovina region, Romania. The analysis was performed using the mass spectrometer with inductively coupled plasma ICP-MS Agilent Technologies 7500 Series, after a prior preparation of the samples. The presence of all these heavy metals in the mentioned rivers, some of them in extremely high amounts, is a worrying fact given that these rivers are sources of drinking water for residents of the forenamed localities, and one of them (Călimănel River) is the source of water for a company that treats, bottles and sells drinking water.

INTRODUCTION

Natural mineral water is the microbiologically pure water, which originated in a groundwater or an aquifer underground reservoir and that comes from a source tapped at one or more natural emergings or bore exits (HG1020/2005).

Except for occupational diseases because of heavy metals (Pb, Cr, Hg, Mn, Cd, As,), man may be contaminated with heavy metals in unprofessional conditions, i.e. by ingesting contaminated food, water, and by air polluted by heavy metals (Amariei et al. 2014). Metals for which we have sufficient data to prove their toxicity are: Hg, Pb, Sb, Cd, Zn, Cu, Sn, Ag, Au, Ni, Cr, V, and Al. Some of them are are toxic at higher doses than acceptable daily intake DAI (Shahbaz et al. 2013).

All metals can cause disease through excess. Toxic effects are dependent upon the amount of metal ingested, entry rate, tissue distribution, concentration achieved and excretion rate. Mechanisms of toxicity include inhibition of enzyme activity and protein synthesis, alterations in nucleic acid function, and changes in cell membrane permeability (Proudfoot 2009).

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In this current research, it is considered the problem of water contamination with seven of those heavy metals plus one radioactive metal (uranium) in the rivers of an ore exploitation zone in Bucovina, Romania.

The increasing exposure to *aluminium* has been linked with the development of different human pathologies (e.g. breast cancer, myofasciitis, neurodegenerative diseases) (Ligi et al., In Press). *Cadmium* has been implicated in the pathogenesis of various chronic diseases, including age-related macular degeneration (AMD) and hearing loss (Chantarawong et al. 2014). Water-insoluble chromium (III) compounds and chromium metal are not considered a health hazard, while the toxicity and carcinogenic properties of *chromium (VI)* have been known for a long time (Barceloux & Barceloux 1999). Although lung cancer has been established as a consequence of hexavalent chromium exposure, some cancers of other tissues of the gastrointestinal and central nervous systems have also been noted (Costa & Klein 2006). Acute symptoms of *copper* poisoning by ingestion include vomiting, hematemesis (vomiting of blood), hypotension (low blood pressure), melena (black "tarry" feces), coma, jaundice (yellowish pigmentation of the skin), and gastrointestinal distress (Curtis et al. 2008). Chronic (long-term) effects of copper exposure can damage the liver and kidneys (DES Environmental Health Program 2005). The toxic effects of the *mercury* include damage to the brain, kidneys and lungs (Clifton 2007). Mercury poisoning can result in several diseases, including acrodynia (pink disease), Hunter-Russell syndrome, and Minamata disease (Davidson et al. 2004). Among the known health related effects of *nickel* are skin allergies, lung fibrosis, variable degrees of kidney and cardiovascular system poisoning and stimulation of neoplastic transformation (Denkhaus & Salnikow 2002). *Zinc* is considered to be relatively nontoxic, particularly if taken orally. However, manifestations of overt toxicity symptoms (nausea, vomiting, epigastric pain, lethargy, and fatigue) will occur with extremely high zinc intakes (Fosmire 1990). Referring to *uranium*, the renal toxicity is a major adverse effect of this radioactive metal, but it has toxic effects on the cardiovascular system, liver, muscle, and nervous system as well (Taylor & Taylor 1997).

Considering the specifics of the mentioned area, the aim of the presented study was to investigate the contamination level with these specified metals in the water samples drawn from the selected rivers in the ore exploitation zone and to compare the obtained results with the obligatory drinking water standards.

MATERIAL AND METHODS

Location of the research

In order to obtain the required data for developing this study, we chose to take water samples from three rivers in an ore exploitation zone in Bucovina region, Romania: Rău and Chiril Rivers from Crucea village and Călimănel River from Paltiniş reservoir.

Crucea is a village located in the Bistriţa Valley, in Suceava county. The Uranium National Company has a central structure based in Bucharest, and four directly subordinate units in the territory whereof one of them is located in the Crucea village. The company conducts the following activities: exploitation of uranium deposits, ore processing and uranium concentrates production, refining the concentrates and capitalization of pure nuclear UO_2, conservation, closure and ecologization of the objectives with ceased activity (www.cnu.ro).

The natural mineral water reservoir Păltiniş is situated at the southern limit of the Dorna Depression, on the eastern rim of the Călimani Mountains, at approximative 45km distance away from the uranium mine in Crucea.

Materials

The analysis of the heavy metals contamination in the three samples drawn from the two rivers in the ore exploitation zone Crucea and from the river located at about 45 km away from the uranium mine, in Păltiniș, was performed using the mass spectrometer with inductively coupled plasma ICP-MS Agilent Technologies 7500 Series, after a prior preparation of the water samples.

Methods

The water samples preparation was performed by homogenizing, in a 50 mL volumetric flask, 5mL of the analysed water sample with 0,736 mL 69% concentration HNO_3 and 44,264 mL deionized water, so that the concentration of the nitric acid in the resulting solution into the volumetric flask to be 1%. Then, the analysis of samples could be performed. This was done using atomic emission in plasma coupled with mass spectrometry technique with ICP-MS Agilent Technologies 7500 Series device with a detection limit of 10^{-12} (Li et al. 2013).

Concentration (C) of heavy metals in samples is expressed in mg/L sample and calculated by the formula:

$$\boldsymbol{C = a \cdot \frac{V}{m}}\ , [\boldsymbol{mg/L}] \qquad (1)$$

where: a – measured concentration, in sample's solution [ppb];
V – volume of acid which was dissolved in the sample [mL];
m – taken working volume of the sample [mL].

RESULTS AND DISCUSSIONS

For each of the samples taken from the Chiril River, Rău River and respectively Călimănel River, it was determined the level of heavy metals contamination for several elements: aluminum, cadmium, chromium, copper, mercury, nickel, zinc and uranium. The processed and correlated data are rendered in chart form so that it could be achieved a rapid interpretation of contamination degree compared to the maximum allowable dose approved by Romanian legislation for each metal element separately (figure 1, figure 2, figure 3).

After the centralization of the data resulting from the analysis of water samples taken from the Rău River it can be easily observed an exceeding of the maximum dose allowed by the legislation in the case of two metals: chromium (concentrations 20 times higher than the maximum permissible dose) and mercury (concentration 5 times higher than the maximum permissible dose). With regard to the other heavy metals considered in the study (aluminum, cadmium, copper, nickel, zinc, uranium), their levels in the water samples drawn from the Rău River were lower than the concentration allowed by law, but still present in the spring waters (figure 1).

In the case of the Chiril River, the data resulted following the centralization of the concentration values found in the water samples taken from this source, the limits permitted by law are surpassed for four of the metals taken into consideration in this study. Like in the case of the Rău River, the mercury and the chromium levels are much higher, with approximately the same values for the waters of both rivers. An additional exclamation mark appears past the copper, whose concentration in this river is 0.142 mg/L compared to

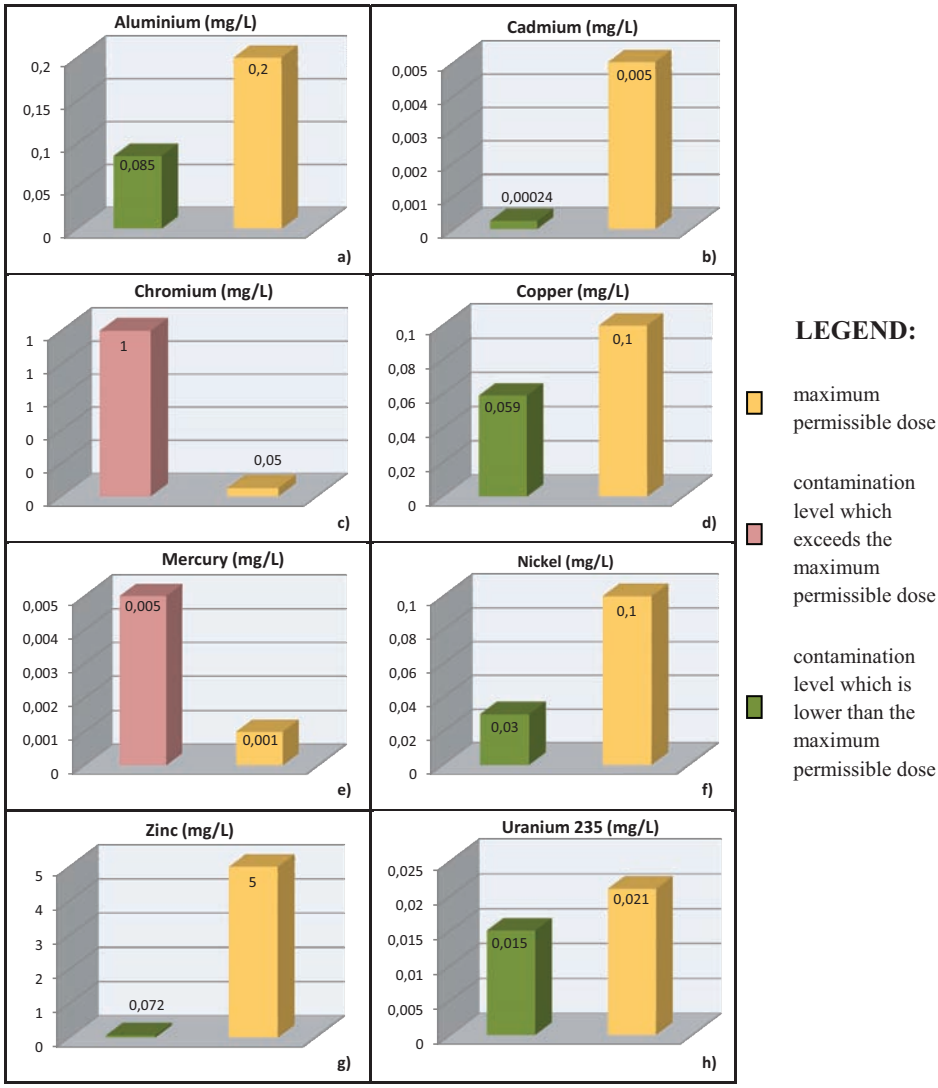

Figure 1. The heavy metal contamination (mg/L) in Rău River: a) aluminium; b) cadmium; c) chromium; d) copper; e) mercury; f) nickel; g) zinc; h) uranium 235

the permitted value of 0.1 mg/L. It is also worrying the level of uranium here, 2.5 times higher than the dose allowed by legislation (0.05 mg/L compared to 0.021 mg/L). The concentration levels of metals such as aluminum, cadmium, nickel and zinc are below the maximum dose allowed by law in Romania (figure 2).

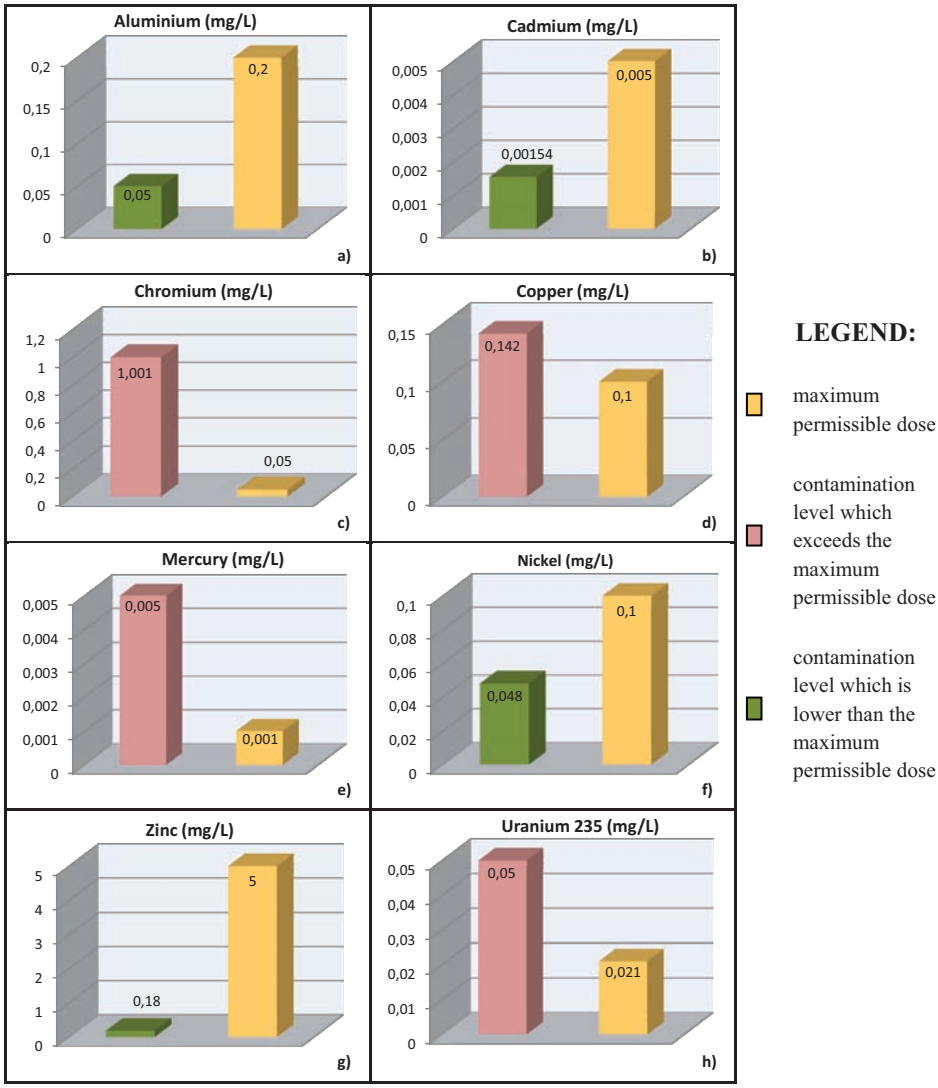

Figure 2. The heavy metal contamination (mg/L) in Chiril River: a) aluminium; b) cadmium; c) chromium; d) copper; e) mercury; f) nickel; g) zinc; h) uranium 235.

Although the farthest as distance from the uranium mine in Crucea, the Călimănel River has the highest level of uranium in its waters comparing to the other analysed samples. The concentration of this metal in this water sample is 3.3 times higher than the limit allowed by law, which is a worrying fact given that this river is the water source for a large Romanian company whose domain of activity is treating and bottling of drinking

water. Comparing to the other two rivers mentioned, there were found here higher amounts of aluminum (0.205 mg/L). The chromium and mercury concentrations are also high, so it could be summarized that the contamination of the waters, especially with these two metals ions, is a characteristic of the ore exploitation zone in question. Ions of cadmium, copper, nickel and zinc are less present in the analyzed waters of the Călimănel River (figure 3).

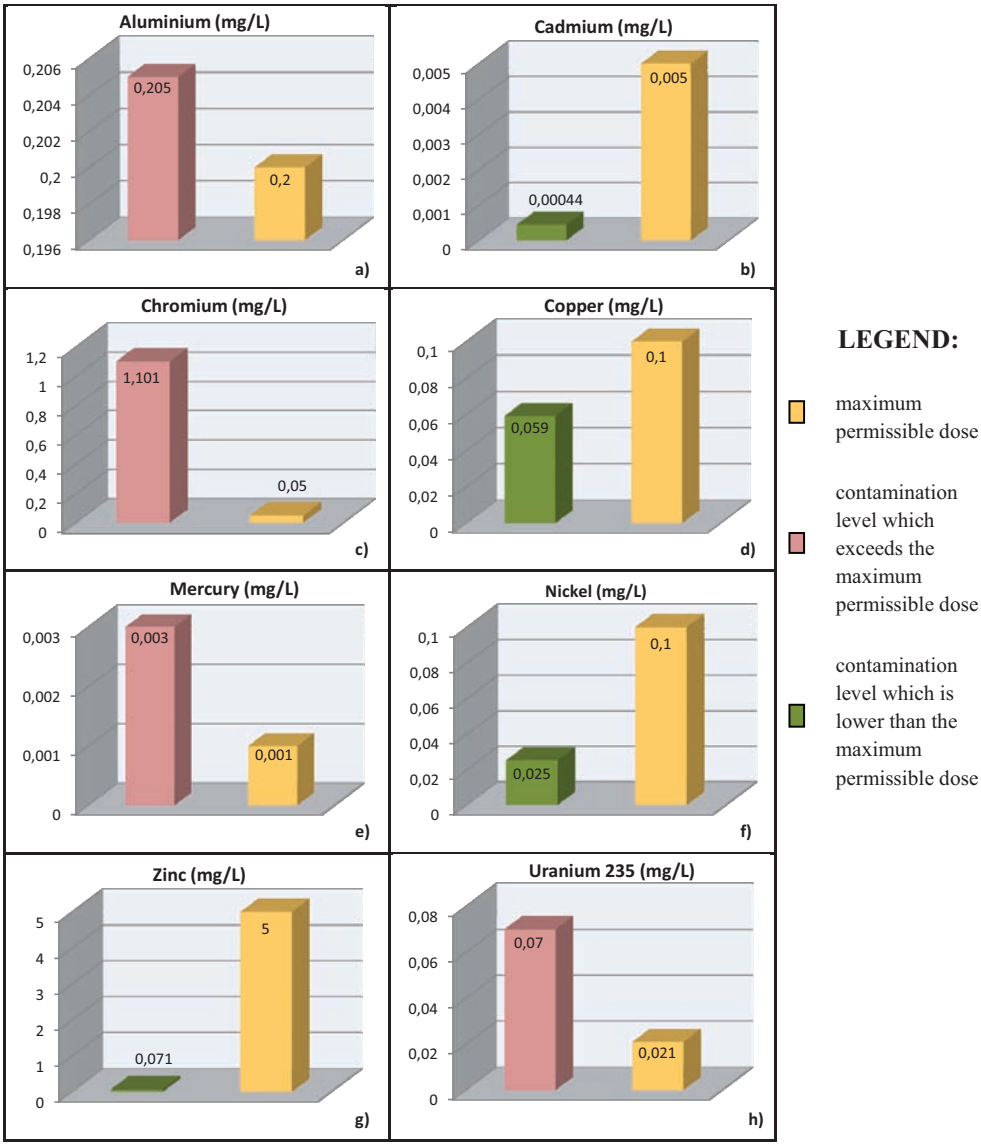

Figure 3. The heavy metal contamination (mg/L) in Călimănel River: a) aluminium; b) cadmium; c) chromium; d) copper; e) mercury; f) nickel; g) zinc; h) uranium 235.

CONCLUSIONS

In conclusion, it can be noted the presence of all targeted heavy metal in the analysed waters: Rău River, Chiril River and Călimănel River. The chromium and the mercury ions are present at levels that exceed the maximum dose permitted by law in all three water samples. In two of the mentioned rivers (Chiril and Călimănel) the uranium is found in very high concentrations, more than twice greater than the amount allowed by the regulations. In addition, other heavy metals which are present in amounts higher than the permissible dose are copper in the Chiril River and aluminum in the Călimănel River. However, there should be mentioned that the other metals targeted in this study (cadmium, nickel and zinc) are existent in the analyzed water samples, although they not exceed the allowed limits.

The presence of all these heavy metals in the mentioned rivers, some of them in extremely high amounts, is a worrying fact given that these rivers are sources of drinking water for residents of the forenamed localities, and one of them (Călimănel River from the Păltiniş reservoir) is the source of water for a company that treats, bottles and sells drinking water.

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*** http://www.cnu.ro

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WATER DISTRIBUTION UNIFORMITY OF DRIP IRRIGATION SYSTEMS IN OLIVE TREES FOR IZMIR PROVINCE OF TURKEY

Acar Bilal[1]*, Yunus Cicek[1], Ramazan Topak[1]

Keywords*: drip irrigation, emitter discharge, uniformity, olive trees.*

ABSTRACT

*This study was performed to determine water distribution uniformities of 10 different drip irrigation systems in olive plantations at Izmir province, Turkey. Uniformity coefficient, UC and emission uniformity, EU were researched. The UC was greater than 80% in 3 drip irrigation systems and water distribution was **Good** in those systems. Those distributions were **Moderate**, **Poor** and **Very Poor / Unacceptable** for other two, two and three drip irrigation systems, respectively. The maximum EU was obtained from drip irrigation system at olive garden number 7 as 82% (**Good / Acceptable**) and the lowest one was obtained from drip irrigation system at olive garden number 4 as 23% (**Poor / Unacceptable**). In all drip irrigation systems, pressure head varied from 12 to 20 m (higher than optimum level of 10 m). In general, there was a great difference between emitter flow rates.*

INTRODUCTION

Drip irrigation system has increased gradually in farm lands due to some advantages such as easy irrigation, low labor cost, high irrigation efficiency, suitable for various soil, crops and topography, higher and qualified production (Acar 2007). In comparison to any other irrigation techniques, drip irrigation results higher water distribution uniformity under well management. There is a close relationship between maximum fruit production and uniform water distribution as well as remaining the soil moisture content as optimum level through the root zone depth.

In general, olive production is performed in areas having rough topography, water shortage and higher temperature in Turkey. Rain fed farming is very common and plants are exposed to the water stress in case rainfall doesn't fall within long period. Nowadays, due to some advantages, drip irrigation system is preferred mostly in irrigation of olive plants.

It is known that even small amount water has resulted increase in olive production so that studies have focused on the effect of different irrigation regimes on olive fruit yield and olive quality in costal parts of Mediterranean. Attalla et al. (2011) researched the irrigation effect on mature olive tree, cv. Manzonilla, yield at North-Western parts of Egypt during the periods 2008-2009. They performed nine different irrigation treatments from May to December in an expected 'ON' year of 2008 and an expected 'OFF' year of 2009.

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The irrigation treatments were as follows: rain fed (no irrigation), 60 mm once a month, 80 mm once a month, 100 mm once a month, 120 mm once a month, 30 mm twice a month, 40 mm twice a month, 50 mm twice a month and 60 mm twice a month. The rainfall for 2008 and 2009 were 92 mm and 115 mm, respectively. They suggested 60 mm twice a month during May to September was more efficient in increasing yield and fruit quality. Similarly Cicek et al., 2014, reported that fruit yield was as about two fold greater in irrigated trees by comparison to the no irrigation (rain fed) olive production within the Mediterranean Coastal parts of Turkey.

There is a direct relationship between production and uniform water distribution through the field. Uniformity is the most important criteria to evaluate the system performance (Letey et al. 1990). Uniformity is affected from the field topography, hydraulic design of the system and partial or complete clogging of emitter (Mofoke et al. 2004, Yildirim 2007). Acar et al. (2011) researched the uniformity at 11 green houses of Antalya province. They classified the water distribution uniformity using a graph developed by Goyal (2007). They found the UC between 56% and 90%. The water distribution class was in the ranges unacceptable and perfect. Similarly, they calculated the emission uniformity as 41% (poor/unacceptable) and 92% (perfect/good). Valiahary et al. (2014) studied the emission uniformity at 5 different drip irrigation systems in Sattarkhan-Azerbaijan. They calculated the EU values in the ranges about 48% and 83% and classified the water distribution as poor and good in accordance of those values.

The study was performed to evaluate the water distribution uniformity of drip irrigation systems for olive gardens at Izmir province of Turkey.

MATERIAL AND METHODS

Water distribution uniformity was researched at 10 different drip irrigation systems that are used to irrigate the olive plants in Izmir province of Turkey. Olive is the second rank according to the cultivated lands in such province. Izmir province is situated at Aegean region and has the characteristics of Mediterranean region having average annual rainfall of 700 mm. There are different types of olive plants in studied farms (Table 1).

Table 1

Types of olive plants in research farms

Farm No	Species	Cultivation land, ha	Planting, m	Ages of olive, Year
1	Trilya	0.80	6x6	8
2	Trilya	0.50	5.5x5	9
3	Trilya	0.40	6x6	9
4	Domat-Memecik	0.40	7x7	28
5	Trilya	0.30	6x6	28
6	Trilya	0.30	5.5x5.5	10
7	Trilya	0.90	5.5x5.5	10
8	Trilya	1.00	6x6	14
9	Domat	1.50	6x6	38
10	Domat	0.25	5x5	6

The shadow diameter of olive plants in research farms varied from 2.25 m to 3.65 m and some characteristics of drip irrigation systems were presented at Table 2.

The basic methodology to measure the volume of water is to use the catch cans for evaluation drip irrigation system performance. Emitter flow rates were measured at the

beginning, mid, and end of each lateral on sub-main. It was determined by measuring discharged volume of water in each emitter for a definite time as suggested by Mostafa and Thörnmann (2013).

Table 2

Characteristics of drip irrigation systems

Farm No	Lateral Length, m	Lateral Diameter, mm	Emitter Discharge, L/h	Emitter Spacing, cm	Pressure Head, m	Water Supply/ Well Depths, m
1	48	16	4	30	20	Deep Well/100
2	60	16	2	20	14	Deep Well /100
3	36	16	2	20	15	Deep Well /100
4	74	16	2	33	12	Deep Well /225
5	31	16	2	20	16	Deep Well /225
6	31	16	4	25	18	Deep Well /120
7	33	16	4	25	18	Deep Well /120
8	39	16	2	20	15	Deep Well /148
9	39	16	2	50	14	Deep Well /76
10	60	16	4	33	13	Deep Well /100

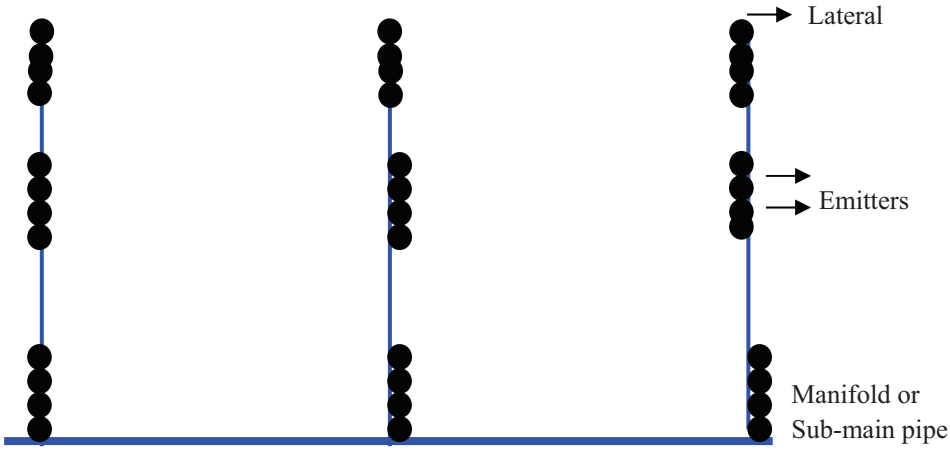

Figure 1. Layout of the drip irrigation system

For that purpose, 36 different measurement points were considered in each farm (Fig 1). For each measurement, a small area in the bed or ridge was excavated, and a catch-can was placed under the emitters. The volumes of water within the catch cans were divided to total test time and then emitter discharge rate was determined by that way (Hornbuckle et al. 2007).

Uniformity coefficient, UC, and emission uniformity, EU, for localized irrigation systems can be calculated as (Christiansen, 1942):

$$UC = \left[(1 - (\frac{\Delta q}{q_{avr}}) \right] \times 100$$

Where, UC: Uniformity coefficient, %, Δq: Average of absolute deviation from the average emitter discharge rates, L/h and q_{avr}: Average emitter discharge rates, L/h. Results were evaluated by Tuzel (1993) as seen in Table 3.

Table 3

Water distribution class in accordance of UC

UC, %	Water Distribution
> 90	Perfect
80 – 90	Good
70– 80	Moderate
60 – 70	Poor
< 60	Very Poor or Unacceptable

Emission uniformity, EU, is another indicator showing the water distribution uniformity in micro irrigation systems such as in drip system. It was calculated by Merriam and Keller, (1978):

$$\%EU = \frac{q_{\%25}}{qavr} x100$$

Where; EU- Emission uniformity (%), $q_{\%25}$- Average of the lowest quarter of the emitter discharge rates, L/ h, and q_{avr} - Average emitter discharge rates, L /h. EU was evaluated using Table 4.

Table 4

EU, and water distribution class

EU, %	Classification by Merriam and Keller (1978)	Classification by Anonymous (1983)
<70	< Poor	Unacceptable
70–80	Acceptable	Poor
80–86	Good	Acceptable
86–90	Good	Good
90–94	Perfect	Good
>94	Perfect	Perfect

RESULTS AND DISCUSSIONS

The soil characteristics were presented in Table 5. Those soil samples were taken only from three olive gardens namely farms of 1, 4 and 5 in the soil layers of 0-30 cm and 30-60 cm. In those samples, bulk density, soil texture, field capacity (FC), permanent wilting point (PWP) and available water capacity (AWC) of soil were determined (Table 5, 6).

Table 5

Bulk density and texture of soils

Farm No	Depth (cm)	Bulk Density (g/cm^3)	Sand, %	Clay, %	Silt, %	Soil Texture
1	0-30	1.45	48.80	19.20	32.00	Loam, L
	30-60	1.42	38.80	23.20	38.00	Loam, L
4	0-30	1.58	72.80	10.48	16.72	Sand-Loam, SL
	30-60	1.62	86.80	6.48	6.72	Loam-S, LS
5	0-30	1.51	62.80	19.20	18.00	Sand-Loam, SL
	30-60	1.52	56.80	22.48	20.72	Sand-Clay-Loam, SCL

Table 6

FC, PWP and AWC of Soils

Farm No	Depth (cm)	Bulk Density (g/cm^3)	FC (Weight %)	PWP (Weight %)	AWC (Weight %)	AWC, (mm/30 cm)
1	0-30	1.45	20.31	10.18	10.13	44.07
	30-60	1.42	24.10	10.43	13.67	58.23
4	0-30	1.58	14.40	7.11	7.79	34.55
	30-60	1.62	9.49	4.86	4.54	22.06
5	0-30	1.51	20.62	10.41	10.21	46.25
	30-60	1.52	23.73	12.40	11.33	51.66

In water quality analysis, pH values of water samples were found between 6.71 and 7.32. In examine the pH values of water supply, moderate clogging may be seen since

pH value varied from 7.0 and 8.0. In examine the electrical conductivity, EC, or salinity level of irrigation water, EC value was lower than 750 micromhos/cm in four farms while it varied from 750 to 3000 micromhos/cm in other six farms. Water supplies in four farms namely 1, 4, 7, 8 may result low or none hazardous effect for plants, but it can result moderate hazard for plants in other six farms. In results, irrigation water was second class (C_2) in four farms and third class (C_3) in other six farms. Water quality was found first class in accordance of alkalinity hazard in all water supplies.

The UC and EU values and water distribution uniformities in accordance of those values were presented at Table 7 and Table 8.

Table 7

EC values with water distribution class

Farm No	UC, %	Water Distribution
1	73	Moderate
2	83	Good
3	55	Very poor/ Unacceptable
4	52	Very poor/ Unacceptable
5	52	Very poor/ Unacceptable
6	87	Good
7	89	Good
8	62	Poor
9	60	Poor
10	74	Moderate

UC values were found greater than 80% in three gardens and they had **good** water distribution uniformity. In general, emitter flow rates were greater in the beginning of the lateral than end of the lateral even, none volume of water was recorded in some emitters at the tail of the lateral. The possible reason might be that pressure head was lower in end of the lateral or poor system design.

Duzgun (2009) tested two drip irrigation systems for two different apple gardens in Aksaray province of Turkey. The UC values for garden 1 and garden 2 were about 44% - 77% and 75% - 83%, respectively. The low water distribution might be resulted from old drip irrigation system, low pressure head, partial and complete clogging of emitters and poor system design. The present study result is almost inline with Duzgun (2009).

In examine the Table 8, the highest and the lowest EU values were obtained from farm 7 as 82% (**good** / **acceptable** water distribution) and farm 4 as 23% (**poor** / **unacceptable** water distribution), respectively.

Acar *et al.* (2011) tested to the 11 drip irrigation systems under greenhouse conditions in Antalya province of Turkey and they calculated to the EU values in between 41% (**poor** / **unacceptable** water distribution) and 92% (**perfect** / **good** water distribution).

Table 8

Water distribution class in regard to the EU values

Farm No	EU, %	Water Distribution Uniformity (Merriam and Keller, 1978)	Water Distribution Uniformity (Anonymous, 1983)
1	56	Poor	Unacceptable
2	71	Acceptable	Poor
3	41	Poor	Unacceptable
4	23	Poor	Unacceptable
5	30	Poor	Unacceptable
6	77	Acceptable	Poor
7	82	Good	Acceptable
8	50	Poor	Unacceptable
9	27	Poor	Unacceptable
10	53	Poor	Unacceptable

Duzgun (2009) reported to the EU values between about 44% - 78% and 77% - 83% for two drip irrigation systems at apple gardens in Aksaray province of Turkey. Our present study findings are partly inline with Acar *et al.* (2011) but in general lower than the Duzgun (2009). The possible reason might be that poor system design and poor management of the drip irrigation systems as well as poor maintenance-repair works in systems at our present study.

CONCLUSIONS

Izmir province of Turkey has one of the most important olive fruit production centers in Turkey. It has the similar environmental characteristics of Mediterranean region of the world. Olive fruits have consumed both as table olive or olive oil. Irrigation is one of the most important factors in improvement of crop production especially in arid and semi-arid regions of the world such as Izmir province of Turkey. There is a direct relationship between yield or quality of olive fruit and uniform water distribution within the crop root zone depth. Although there was differences between emitters flow rates, emitter discharges were found greater than the values recommended by firm guides, since pressure head in test systems were higher than the 10 m. As the pressure head increased, but not economical, flow rates of emitters also increased. In general, water distribution uniformity was found far from the expectations. The study revealed that flow rates should be measured in a lot of emitters to obtain more accurate uniformity. Following recommendations should be addressed for better drip irrigation system performance: correct design of the drip irrigation system is needed, water quality should be determined before the system building up, since emitter flow rates are highly affected from the water supply with low quality, and maintenance and repair works should be performed regularly.

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ŞTEFĂNEŞTI 24 NEW TOMATO VARIETY WITH INDETERMINATE GROWTH AND INCREASED BIOLOGICAL RESISTANCE, OBTAINED FROM INCDBH ŞTEFĂNEŞTI

Bădulescu Adriana[1], Tiţa I.[1]

Keywords*: new variety, morphological characters, physiologically ripe, tomatoes, biological resistance*

ABSTRACT

Lately consumer demands quality vegetables and tomatoes in particular experienced a pronounced orientation towards sensory seeking and appreciating as much red specific taste and aroma even at the expense of an irreproachable commercial aspect of the fruit. Variety presented in this paper was obtained from INCDBH Ştefăneşti Arges, after repeated research papers in several years and was approved in 2013. approved the INCDBH tomato varieties were a revival of vegetable research in the area, which were discontinued a period of over 20 years and vegetable sector been missing for 8 years. Tomatoes can be eaten in a variety of ways: fresh as a salad simple or mixed with other vegetables, or cooked in soups, pot, sauces, stuffed tomatoes, industrially processed form of paste, canned broth, juice regular or spicy. Tomatoes have high food value of fruit due to the content of vitamins, minerals, sugars, organic acids and amino acids.

INTRODUCTION

Climate change turn upside agriculture. Vegetables and grains are suffering from drought, but also large temperature differences. Therefore, researchers are trying to obtain new varieties of tomatoes, peppers or cucumbers to withstand sun burned our fields (Dumitru I., Apahidean AS, 2004). Meanwhile, Israel farmers received from tomato seeds that have adapted to our difficult climate, but the taste of tomatoes not the same as many years ago. The tomato fruit is consumed physiological maturity, and those that do not reach this stage (green tomatoes) for the preparation of pickles (Ciofu Ruxandra et al., 2003). The importance of food special tomato is the fact that they are consumed in a variety namely fresh as a salad plain or mixed with other vegetables, sauces, pot, tomatoes filled with different compositions etc, prepared industrially form paste, broth, canned, juice etc. regular or spicy (Chilom Pelarghia, 2002; Măniuţiu D, 2006, 2008). The provisions of the World Organization for Food and Agriculture (FAO) recommend the consumption of vegetables in varying amounts depending on the age of consumers: up to 12 - 100 g / day over 12 years - 350 g / day, the annual consumption reaching 120 kg vegetables (Cărbunaru M.C. Domuta, 2006).

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MATERIAL AND METHODS

The variety was obtained from INCDBH Ştefăneşti by autofecundation hybrids of F1 and F2. The plants obtained verification productivity was achieved for several years (Badea Rodica, V. Locksmith, 2005).

Through visual analysis over the years 2009-2012 were identified four biotypes tomato that had cultural advantages and who deserved to be studied to apply DUS test: distinctness, uniformity and stability varietal genetic lineage. The first stage of the test was run in all 4 biotypes is distinct from the plants from which they originated.

Biotype has studied undetermined growth, large fruit, which looks pleasant shopping. It continued verification productivity and stability through the maintenance of characters positive F2 obtained in biotypes. Followed harvesting seed from representative biotypes (selected) for DUS testing by ISTIS 2010.

Tomato crop was established on experimental variants: plants of F1, F2 plants, plants from F3 to identify characters and segregation of the biotypes agronomic characters intercomparable results with those of a witness in F1. He attended one year of study to verify genetic stability and uniformity characteristics. The variety has been approved and patented in 2013, with plant variety patent Nr. 00286 of 22.01.2013.

RESULTS AND DISCUSSIONS

Description of the variety:

The variety of tomato Ştefăneşti 24

Morphological characters: anthocyanin coloration of hypocotyl seedling stage, present and has medium intensity. The type of plant growth is determined. The length of the leaf is medium to medium width is narrow and language is pinnate division. Pubescens style and color of the flower absent flower is yellow. Abscisic area of the stem is absent. The fruit is very high and the height / diameter is East. Fruit shape in longitudinal section is rectangular.

The pericarp is thick and number of seminal lodges in equal proportion is three and four. No fruit green cap and green color intensity before maturity is light yellow. The color of the fruit at harvest maturity, the vivid red and seminal cavity is medium red. The fruit is firm.

Physiologically: the beginning of flowering is early and late maturity for harvest is very late.

Destination: fruits destined for fresh consumption.

Figure 1 - Tomato crops, new varieties


Figure 2 - Plants of the variety Ştefăneşti 24

For a better determination of the variety of cultural biometric measurements were made. These were the determining average plant height, number of flowers per plant, average number of fruits per inflorescence, the average size and average weight of fruit (Diane M. Barrett, 2006). Variety cultural Ştefăneşti 24 has the following characteristics:
- undetermined growth;
- average inflorescence, 6-8 fruit with deep red skin color; very large fruits and flattened;
- average fruit weight is 290.3 grams;
-average diameter, measured at the middle of the fruit 87.5 mm;
- height (length) of 68.8 mm average fruit.

Laboratory tests were the determination of water content total dry matter, ash, total polyphenols, flavonoids, anthocyanins, pigments carotenoids by refractometry and by the titrimetric method to determine the total acidity (Apahidean A.S. et al., 2009).

Table 1

Laboratory tests variety Ştefăneşti 24 and Rila

Variety	Total acidity (g/l)	Dry substance	Soluble carbohydrate	Total polyphenols	Anthocyanins
Ştefăneşti 24	4.8	28.1	4.8	405.5	142.30
Rila (Mt)	2.1	17.0	4.0	384.2	130.92

From these analyzes revealed the following (table 1):
- the total acidity, measured in g / l malic acid. Acidity studied biotype (4.8) is higher compared to the control Rila (2.1). The acidity gives a pleasant taste what they should eat fresh;
- the solids content, based on the amount of soluble sugars calculated in grams per 100 grams fresh fruit sugars show that the studied biotype, its value is higher compared to the control Rila (17.0%). The content of soluble carbohydrates impart a sweet taste and high yield production of tomato paste;

- dry matter content, calculated as a percentage comparable to witness Rila (4.0%). The dry matter content firming fruit and high yield production of tomato paste;
- total polyphenols content ranged from 405.5 to Ştefăneşti 24 at 384.2 variety Rila. Polyphenols are designed to accumulate in the fruit's natural resistance against specific pathogens varieties with particularly important for organic crops;
- anthocyanins gives fruit-food nutritional value, given that the organic compounds are antioxidants role in reducing free radicals accumulate in the human body. The most important accumulations were recorded compared to the control cultivar studied.

CONCLUSIONS

New tomato variety Ştefăneşti 24 recommended for introduction in culture in Romania, it has the genetic value of Romanian origin.

Ştefăneşti 24 resistant variety of fruit to transport and storage. Ştefăneşti variety of tomato fruit 24 sweet and intense flavor specific varieties of tomatoes in old Romanian;

Variety shows feature postmaturation - picked ripe fruits reach commercial maturity (dark red color and sweet taste) without defects.

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*** Catalogul oficial al soiurilor de plante de cultura din România, 2013

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STUDY OF QUALITATIVE AND QUANTITATIVE CHARACTERS OF TOMATO VARIETY ARGES 11

Bădulescu Adriana[1]

Keywords*: new variety of tomatoes, quantity, quality*

ABSTRACT

Directions improvement tomatoes for fresh consumption require obtaining new varieties and hybrids with high yield potential, earliness, high qualitative value and corresponding physiological characteristics. Tomatoes are one of the main vegetables used fresh food, having the largest share in canning vegetables. Worldwide, the tomato crop ranks first as a share of the total area planted with vegetables, and in the main culture systems. In this paper is present a new variety of tomato approved in INCDBH Ştefăneşti - Arges 11. The research was conducted over three years, ie 2012-2014. Lately consumer demands quality vegetables and tomatoes in particular experienced a pronounced orientation towards sensory seeking and appreciating as much red specific taste and aroma even at the expense of an irreproachable commercial aspect of the fruit.

INTRODUCTION

Current concepts about balanced nutrition, granted use tomato prioritized, primarily because they provide the body a wide range of vitamins, minerals and vital water, so necessary for the physiological activity of normal human body (Butnariu et al. 1992). The provisions of the World Food and Agriculture Organization (FAO) recommends the consumption of vegetables in varying amounts depending on age consumers. Thus for people up to 12 years, the average stands at 100g / day, and for those older than 12 years, 350g / day, representing an average annual consumption of 120 kg of vegetables (Mihalache, 1998, 1999). The tomato fruit is consumed physiological maturity, and those that do not reach this stage (green tomatoes) for the preparation of pickles (Rubatzky, 1997). The importance of tomatoes is given special food that they consumed a variety: fresh as simple salad or mixed with other vegetables, sauces, pot, stuffed tomatoes etc., industrially processed form of paste, broth, canned, juice or spicy ordinary etc. In addition to the high demand of the population for current consumption required much industry tomatoes canned vegetables, meat and fish, and is also an important export product. They are required to export especially greenhouse tomatoes, the early and industrialized products (Măniuţiu, 2006).

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MATERIAL AND METHODS

At INCDBH Ştefăneşti by visual analysis identified several biotypes tomato that had cultural advantages and who deserved to be studied to apply DUS test: distinctness, uniformity and stability varietal genetic lineage. After completing the first stage of the test, biotypes were distinct from the plants from which they originated. It should be noted that these only occurred in the greenhouse culture. The variety has studied the growth came from hybridization determined and variety Notorius F3 fruit and elongated and uniform baking early, and the variety Heinz 2274 with pear fruit. Marked plants that showed some changes to identify segregation phenological characteristics and agronomic characters biotypes intercomparable results with those of the witness F1.Soiul was approved in 2012 and patented. In the experiment placed Ştefăneşti variety Arges 11 it was studied in comparison with the variety Cristina witness. To ensure diversification tomato varietal assortment proceeded to biometric measurements, laboratory determinations of the biotypes studied biochemical composition (Badea Rodica, V. Locksmith, 2005). Of the approved variety biotypes studied in this paper was marked by high production quality and beautiful appearance of the fruit, to the witness studied the variety Notorius.

RESULTS AND DISCUSSIONS

During the 3-year study, 11 Arges variety performed very well both in the culture field and in the greenhouse, compared to the control.

Thus in Table 1 we can see the variety biometric measurements recorded during the three years studied, compared to control.

Table 1

Biometric measurements recorded during the 2012-2014 crop field

Determinations	2012		2013		2014	
	Argeş 11	Mt.	Argeş 11	Mt.	Argeş 11	Mt.
Plant height (cm)	75	70	80	76	82	75
Inflorescences number	4	3	4	3	5	3
Number of fruit blossom	10	7	9	6	10	8
The average fruit diameter (mm)	70.9	65.2	69.6	64.6	70.5	65.1
The average length of fruit (mm)	76.3	60.4	77.0	60.8	76.5	60.5
Average fruit weight (g)	160	130	158	128	163	125

Table 2

Biometric measurements made during 2012-2014 in the greenhouse culture

Determination	2012		2013		2014	
	Argeş 11	Mt.	Argeş 11	Mt.	Argeş 11	Mt.
Plant height (cm)	75	70	80	76	82	75
Inflorescences number	4	3	4	3	5	3
Number of fruit blossom	10	7	9	6	10	8
The average fruit diameter (mm)	70.9	65.2	69.6	64.6	70.5	65.1
The average length of fruit (mm)	76.3	60.4	77.0	60.8	76.5	60.5
Average fruit weight (g)	160	130	158	128	163	125

Biometric measurements were the determining average plant height, number of flowers per plant, average number of fruits per inflorescence, the average size and average weight of fruit (table 1 and 2).

Measurements and determinations played a role in establishing the cultural value of each biotype in setting the direction for production of the retention period, and the removal from the production of seed plants atypical or low productivity (Apahidean A.S. et al., 2009). These records shall be carried out periodically, according to phenophase (early flowering, early ripening, in full production, the harvesting and deforestation culture).

Separately we made records on the degree of infestation by pests, tolerance to certain pathogens, treatments performed and their effectiveness. Be pursued and appreciated resistance or tolerance to specific pathogens whereas organic crops are difficult to maintain when using very sensitive varieties. Resistance to specific pathogens is far more important to the maintenance of seed lots having regard to the maintenance of fruit on the plant longer than for recovery as fresh fruit or for industrialization.

During experimentation biological control of pathogens was performed by three preventive treatment with dilute solutions of macerated plant after its own recipe for achieving organic production. Were carried out, in addition, two treatments pellets (undiluted) with effect insecticide to combat aphids attack carried out in the precincts of Plataea infested attack. Culture, both field and greenhouse ecological state of vegetation had a particularly vigorous and healthy and good even under the conditions of unfavorable vegetation period.

Were harvested plants from spontaneous local flora: leaves of castor (*Rhus typhyna*) for the alcoholic extract effects insecticide and repellent, Horsetail (*Eqvisetum arvense)* used as a soak and infusion against aphids and mites, Nettle (*Urtica dioica*) used as a soak fermented for insect repellent effect and fortification of plants. For the first time we purchased C*lematitis aristolochia* plants and have been used for the control of pathogenic fungi in the family.

Table 3

Variety denomination Argeş 11

No. crt.	No. CPVO	Characteristics	States of Expression	Note
1.	2	Plant: growth type	determinate	1
2.	10	Leaf: division of blade	pinnate	1
3.	23	Fruit: size	very large	9
4.	25	Fruit: shape in longitudinal section	rectangular	4
5.	34	Fruit: number of locules	three or four	3
6.	35	Fruit: green shoulder (before maturity)	absent	1
7.	39	Fruit: colour at maturity	red	5
8.	45	Resistance to Melodogyne incognita	resistant	3
9.	46	Resistance to Verticillium sp. (Va and Vd) Race 0	present	9
10.	47	Resistance to Fusarium oxysporum f. sp. Lycopersici	present	9

By ISTIS, 2013

Laboratory tests were the determination of water content total dry matter, ash, total polyphenols, flavonoids, anthocyanins, pigments carotenoids by refractometry and by the titrimetric method to determine the total acidity (Sima R.M., at al., 2010).

Following these analyzes revealed the following:

- the total acidity, measured in g / l of malic acid, 3.5 g / l, as compared to the control: 2.8. Fruits acidity gives a pleasant taste what they should eat fresh;
- the solids content, based on the amount of soluble sugars calculated in grams per 100 grams fresh fruit sugars 28.1% versus 25.9% control. The content of soluble carbohydrates impart a sweet taste and high yield production of tomato paste;
- the solids content, in percentage terms, 4.1% for the variety Arges 11 vs. 3.9 witness. The dry matter content firming fruit and high yield production of tomato paste;
- polyphenol content between 400.5 and 405.0 varied. Polyphenols are designed to accumulate in the fruit's natural resistance against specific pathogens varieties with particularly important for organic crops;
- flavonoids, anthocyanins and carotenoids gives fruit pigments and food nutritional value, given that all these organic compounds are antioxidants role in reducing free radicals accumulate in the human body. The most important accumulations were recorded respectively 22.2 Arges 11 variety; 227.65; 37, from the witness that lower values.

Photo 1- Plants/fruit of variety Arges 11

Table 4

Total production in the varieties studied, field crops

Indicators	2012		2013		2014	
	Argeş 11	Mt.	Argeş 11	Mt.	Argeş 11	Mt.
Production per plant (kg)	4.5	3.2	4.1	3.5	4.2	3.7
Production per hectare (t)	135	96	123	105	126	111

Total production in kg / m^2 for the years of study occurred between the date of 10.07 - 10.09 culture in greenhouses and between 25.07 - 25.09 for culture field. The average of three years are experimental planting density unilateral influence. It's the same meanings Record output gap for density of 40 000 plants / ha, stressing the importance of

adopting a planting density suitable for obtaining high yields (Dumitru I., Apahidean A.S., 2004). Table 3 presents production by year and area.

Photo 2 is shown in production in kg / m2 each year in those studied, such as is observed in year 2012 variety has the highest production (4.7 kg/plant), and in 2013 the smallest production respectively 4.0 kg/plant.

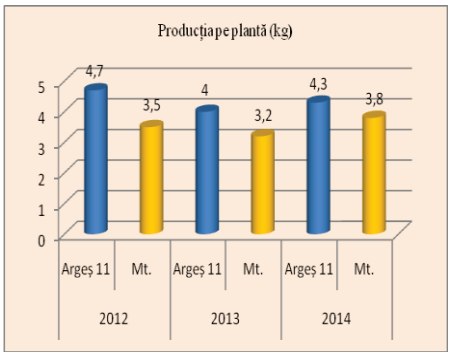

Photo 2 - Production per plant varieties studied under glass

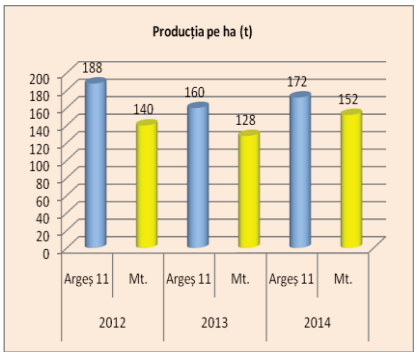

Photo 3 - Production per unit area in the varieties studied under glass

Photo 3 is shown in production in to/ha each year in those studied, such as is observed in year 2012 variety has the highest production (188 to), and in 2013 the smallest production respectively 160 to.

Planting distances were those recommended in the literature, namely: 40 cm between plants in the row and 70 cm between rows, the culture field, which resulted in 30,000 plants / ha and 30 cm between plants in the row and 60 cm between plant in rows under glass, where they resulting 40,000 plants / ha (Popescu V., N. Atanasiu, 2001; Voican V., V. Locksmith, 1998).

CONCLUSIONS

Variety Arges 11 has total acidity, measured in g / l of malic acid 3.5 g / l versus 2.8 witness such a pleasant fruits what they should eat fresh.

The dry matter content, in percentage terms was 4.1% for the variety Arges 11 vs. 3.9 Cristina variety. It gives fruit firmness and high yield production of tomato paste.

The dry matter content, based on the amount of soluble sugars calculated in grams per 100 grams fresh fruit sugars was 28.1% versus 25.9% control. The content of soluble carbohydrates import a sweet taste and high yield production of tomato paste.

Registered production / plant cultivar studied was between 4.0 and 4.7 kg, and production per unit area between 160 and 188 t / ha (total production).

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PROPOSED DEVELOPMENT DIRECTIONS IN ORGANIC GRAPE PRODUCTION IN ROMANIA

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Keywords: *organic production, development, grape production*

ABSTRACT

Organic farming involves the use of diverse cultural practices aimed at protecting the environment, maintaining and enhancing soil fertility, obtaining unpolluted quality food products, thereby promoting sustainable agriculture. Organic production system is based on specific and precise standards of production, which aim at achieving optimal agrosystems, defensible in terms of social, environmental and economic. In this paper, based on international statistics on organic production of grapes, we appreciated the tend to follow by our country till 2025, for achieving a production of grapes nearest vine-growing countries such as Spain, France, or Italy. The results indicate that it would need a growth rate faster if we want to reach a production level near other organic vine growing countries.

INTRODUCTION

Referring to year 2013, we can say that from 2004, when the first data were collected on land use and crops, the area cultivated with vineyards increased by more than 3.5 times (figure 1). Part of the increase, however, is not real, being attributed to the availability and continuous improvement of data collection.

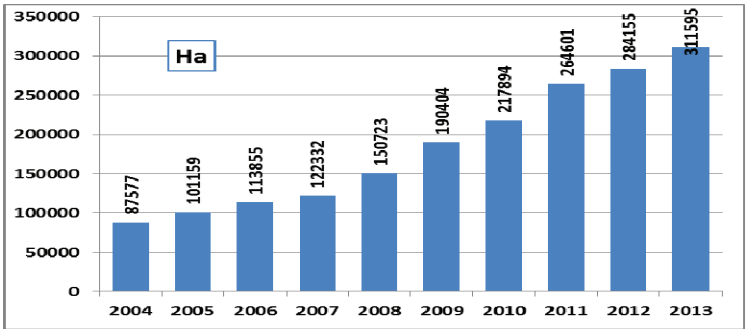

Figure 1. World organic grape area, 2004-2013, Ha
(http://www.statista.com/statistics/265869/vineyard-areas-in-selected-countries-worldwide/, 2015)

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A large part of the total area (about 30 %) is still in-conversion, meaning that in the future, may be expected a considerable increase in organic grapes area.

MATERIAL AND METHODS

The top five most important grape growers in the world are Spain, Italy, France, China, and Turkey and the top three countries with the largest organic grape areas are, like above, Spain, Italy, and France.

Table 1

Organic grape area, 2010-2013

Specification	Organic area, ha	Organic area, %	Area fully converted, ha	Area under conversion, ha
2010				
Spain	57231	5.2%	17665	39566
Italy	52273	6.5%	30342	21931
France	50268	6.3%	21403	28865
Hungary	1314	1.7%	533	781
Romania	894	0.5%	604	290
2011				
Spain	79016	7.9%	33014	46002
France	61055	7.8%	28662	32394
Italy	52812	6.8%	34077	18735
Hungary	1207	1.6%	453	754
Romania	842	0.5%	553	290
2012				
Spain	81262	8.4%	49365	31897
France	64801	8.5%	40449	24351
Italy	57347	7.9%	36937	20410
Romania	1649	0.9%	762	887
Hungary	1206	1.6%	856	350
2013				
Spain	83932	8.9%	53421	30511
Italy	67937	9.8%	44174	23763
France	64610	8.5%	49262	15347
Romania	1649	0.9%	762	887
Hungary	1207	1.7%	559	649

Source: Willer, Helga, Lukas Kilcher, 2012, The World of Organic Agriculture, Statistics and Emerging Trends 2012, FiBL-IFOAM Report, FiBL, Frick and IFOAM, Bonn; Willer, Helga, Julia Lernoud, Lukas Kilcher, 2013, The World of Organic Agriculture, Statistics and Emerging Trends 2013, FiBL-IFOAM Report, FiBL, Frick and IFOAM, Bonn; Willer, Helga, Julia Lernoud, 2014, The World of Organic Agriculture, Statistics and Emerging Trends 2014, FiBL-IFOAM Report, FiBL, Frick and IFOAM, Bonn; Willer, Helga, Julia Lernoud, 2015, The World of Organic Agriculture, Statistics & Emerging Trends 2015, FiBL-IFOAM Report, FiBL, Frick and IFOAM, Bonn.

In year 2013, in Europe, about 258000 ha (6.6 % of the harvested grape areas) are organic.

For this study, as well as Romania, we took into consideration, besides the top three countries, two countries neighboring Hungary, a country with tradition in producing wine, as seen in table 1. We took into account statistics (http://www.organic-world.net/statistics.html) on organic grape production, especially those related to France. We considered France as the reference country for Romania, because there were many similarities in the time between the two countries and because it is one of the countries involved in particular in the production and marketing of organic products.

For forecasting calculations we used trendline that offered a coefficient R-square as close to a value of 1 (as we know this factor indicates how close the data are to the fitted regression line). As regression line were tested the first degree (linear), quadratic (polynomial), exponential, logarithmic and power. The nearest 1 value of R-square was obtained from polynomial function, so, to not aggravate the calculation, we remain at quadratic equation. Also, at the forecast calculations, we used 2nd degree polynomial function.

The resulting function enabled calculation of the forecast; these values are then used to determine the function of growth needed to Romania.

RESULTS AND DISCUSSIONS

We realized a survey of the current situation, calculating the growth rate required to be conducted by Romania, in 2025 to achieve the current level of France. France has an area of 549970 sq km, divided in agricultural land: 52.7%, arable land 33.4%; permanent crops 1.8%; permanent pasture 17.5%, forest: 29.2%, other: 18.1%. Romania has an area of 229891 sq km, divided in agricultural land: 60.7%, arable land 39.1%; permanent crops 1.9%; permanent pasture 19.7%, forest: 28.7%, other: 10.6%. Surfaces of the two countries differ, so we applied a coefficient of 2.39 for the values that were calculated.

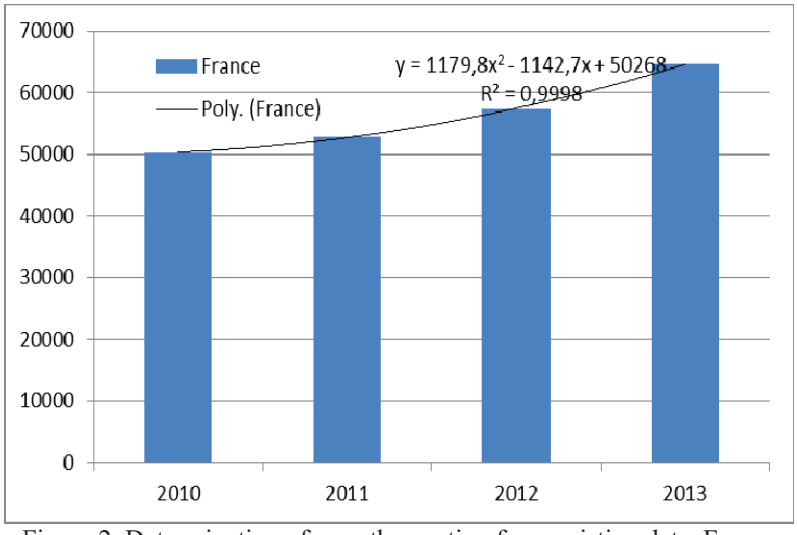

Figure 2. Determination of growth equation from existing data, France

Mathematical equation for the increase of total organic area converted was established as 2nd degree polynomial function, the correlation coefficient was 0.99 in the first case (France) (figure 2), namely 0.72 in the second (Romania – because of the value from year 2011), which is high enough to be close to reality (figure 3).

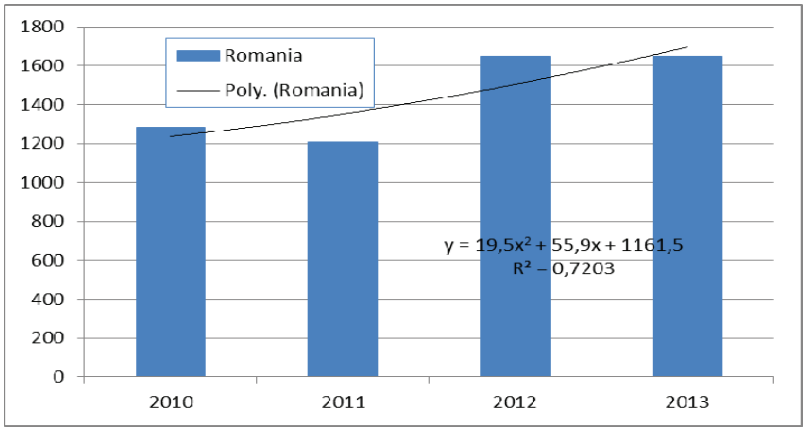

Figure 3. Determination of growth equation from existing data, Romania

Following the obtained results, we made two forecasts (till 2025), one for an extension of current growth for our country and the other for an extension of current growth for France (figure 4).

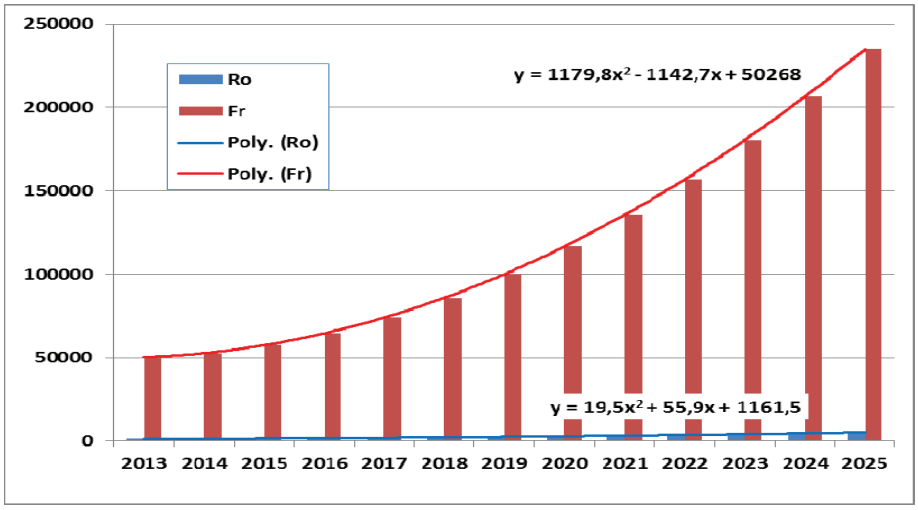

Figure 4. Forecasts, red – France, blue – Romania

As seen, if the current trend continues, the differences between the two countries are more and more pronounced. To catch up France, the current trend in organic land conversion should be increased.

Starting from Romania's existing values in year 2013 (organic area, hectares), we estimated the growth required to reach in year 2025 at half of the estimated value for France (figure 5). The estimation was made by a second degree equation (y=-151,7463889*x^2+5510,889444*x-4122,243056), based on starting point the value of Romania in 2013 and final point the estimated value for France 2025. In this case we speak of a fairly rapid growth, growth that is less likely to be supported by the Romanian producers.

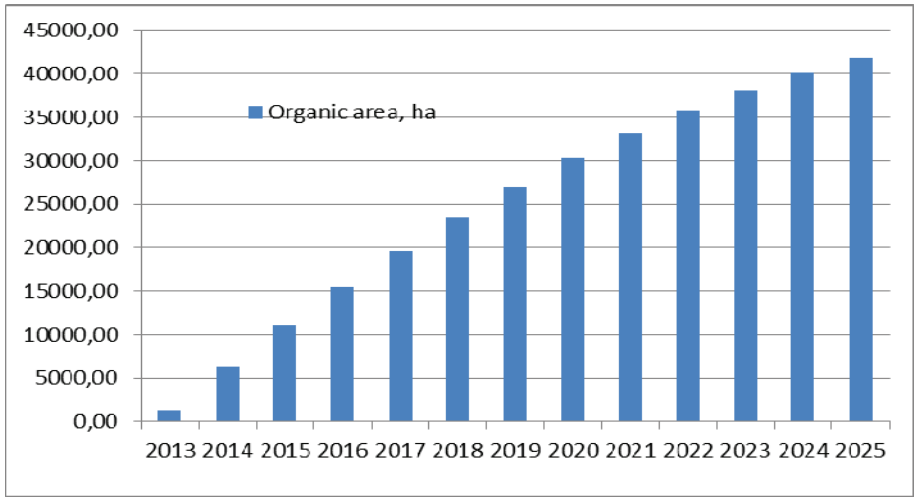

Figure 5. Growth estimation for Romania, to reach half estimated value of France

Using the same method, we determined the growth trend for Hungary, based on data until 2013. Hungary recorded approximately the same trend as Romania, with a decrease in 2011 compared to 2010. The resulting quadratic equation was $y = 13,25*x^2 + 64,05*x + 777,75$, with R-squared $R^2 = 0,7383$ (figure 6).

Of course, because the areas of the two countries differ, we applied a coefficient of 0.31 for the values that were calculated.

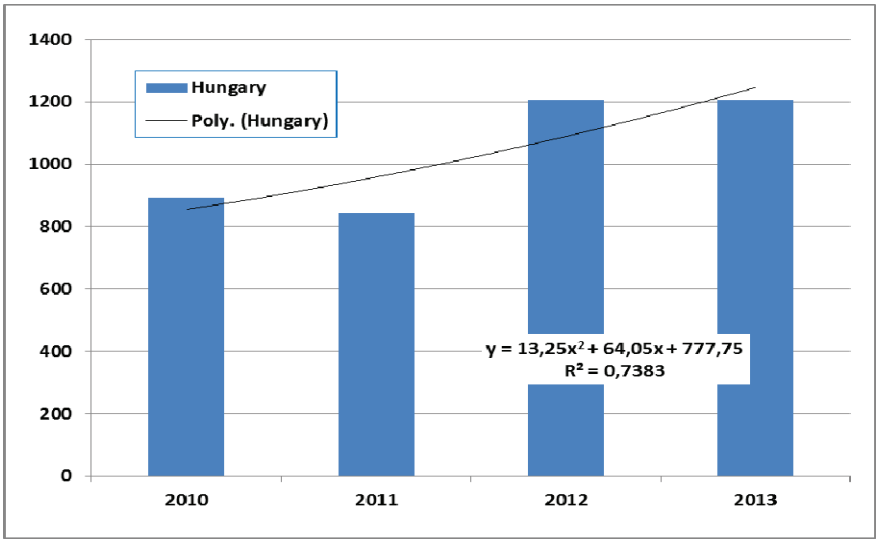

Figure 6. Determination of growth equation from existing data, Hungary

So for Romania to reach the expected and correlated value of Hungary, it has to increase the current organic area about 5 to 6 times. Not too distant target, considering that to reach half the area of France, we should increase the current area about 32 times (figure 7).

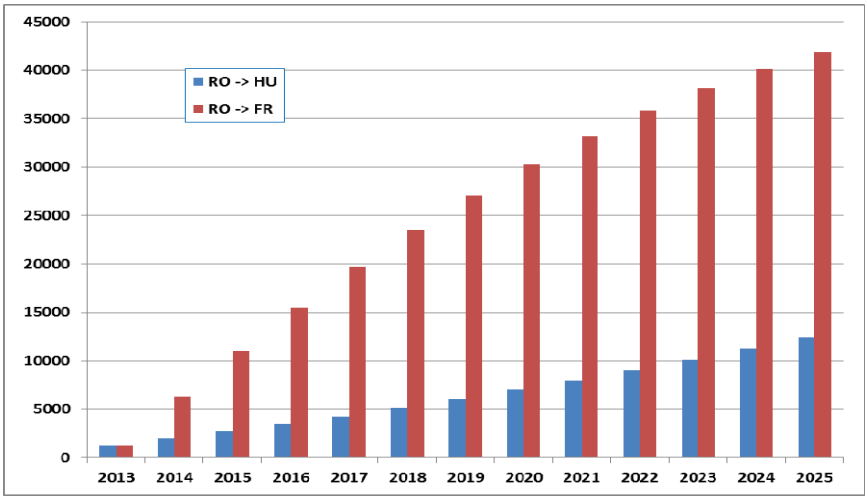

Figure 7. Growth estimation for Romania, to reach half estimated value of France (red) and estimated value of Hungary (blue)

CONCLUSIONS

To be certified organic it takes a certain period of time, about two-year monitored conversion period, before the land gains organic status. Once this conversion period is complete, the next crop planted into the organic soil can be sold as organic. In year 2013 Romania had 887 ha of organic grape area under conversion, so at present, this land should be fully converted, virtually doubling the organic land.

To catch up countries such as Spain or France, it is a beautiful dream, but unfortunately less feasible. However, as shown in the previously submitted data to achieve the neighbor's results is not an unattainable target. Basically, doubling every 3 years the current organic acreage (about 1%), in 10 years we will reach to surpass neighboring countries like Hungary or Bulgaria, which currently have an organic area of 1.7 to 5%. Of course, to achieve these values, every year we have to have the ground prepared, or in conversion, at least as one already as organic.

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STUDY ON THE INFLUENCE OF SOME SUMMER PRUNING TREATMENTS ON MISKET KAYLASHKI VARIETY GRAPES AND WINE QUANTITY AND QUALITY

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Key words: *Misket Kaylashki, vine, green pruning treatments, grapes, wine.*

ABSTRACT

The effect of green pruning treatments – shoot topping (June and July), cluster ratio control and clearing the cluster area on vines of Misket Kaylashki variety was investigated. The study covered a three year period - 2011, 2012 and 2014. All vine treatments had an impact on yield quantity and quality. Shoot topping and reducing the number of clusters proved to be necessary green pruning treatments for the studied variety. Differences in the composition and characteristics of grapes and subsequently made wines were observed as a result of the undertaken treatments. The highest sugar accumulation rate was accounted in the variant with cluster ratio control because of the lower yield per vine and the smaller number of clusters. More significant differences were found in the samples composition concerning their sugar-free extract, titratable acidity and total phenolic compounds content. Wines from all experimental variants were superior compared to the control in their organoleptic qualities.

INTRODUCTION

Vine green part treatments referred to the most difficult and unresolved issues in viticulture, due to the contradictory results obtained from researches in this area. The carried out studies laid down the fundamentals for the correct approach to the significance and applying of green pruning in viticulture. Kliewer and Bledsoe (1986) found that topping at the 14th to the 16th node between buds bursting out and early maturation slowed down the accumulation of sugars and acids, and increased pH. Solari et al. (1988) established that topping accelerated berry growth and increased the titratable acidity in the juice. Koblet (1985) stated that topping to the 14th node improved maturation, resulting in more sugars and more acids. According to Amati et al. (1994 a, b) thinning out of clusters could significantly affect vine physiology and its growth and yield as the reduced number of clusters was partially compensated by the greater berry mass.

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After many years of researches by thinning out the clusters Kondrya (1974) concluded that the berry and cluster mass as well as the yield per vine were higher; the sugar content was increased and acids in grape juice were reduced and the glucoacidimetric index went up; grapes organoleptic qualities were better; its biochemical composition was enriched. Koblet (1986) found that the basic leaf removal enhanced sugar content; reduced the acids and the risk of attack by fungal diseases. Zoecklein et al. (1992) pointed out that the removal of 2 to 4 leaves around the area of the cluster had little effect on the must composition, but improved the control of grapes decay in regions with relatively humid climate.

The **objective** of the study was to investigate the impact of the summer pruning treatments – shoot topping, retaining the number of clusters and thinning out in the cluster zone on the composition and characteristics of grapes and wine of Misket Kaylashki variety.

MATERIAL AND METHODS

The study was carried out at the Institute of Viticulture and Enology (IVE) – Pleven including three vintages (2011, 2012 and 2014). The objects of the study were vines of Misket Kaylashki variety, selected by interspecies hybridization (Misket Hamburgski x Vilar Blan).

The variety was white wine, late ripening, with increased resistance to mildew, gray mold and low winter temperatures (Zankov et al., 1985). The trial plantation was grown in the Experimental Base of IVE - Pleven. The planting density was 2.50 x 1.30 m, the vines were grown on semi-high training system with stem height 1 m. The rootstock was Berlandieri x Ripariya Selection Oppenheim 4 (SO4), pruning was done at spurs. The loading was 18 eyes per vine. The vines were divided into 5 experimental variants, each comprising 40 vines, with approximately the same average number of flower clusters. The variants were as follows:

V_0 control – without summer pruning treatments;

V_1 shoot topping (June) – on 28.06. (2011);

V_2 – retaining (thinning out) the clusters – 1/3 (30 – 35%) of the clusters were removed totally for the variant on 28.06. (2011);

V_1 – shoot topping (June) – on 19.07. (2011).

V_4 – thinning out in the zone of the clusters

In retaining the number of clusters in 2011 there were left on the average 19 clusters per vine, in 2012 – 18 clusters while in 2014 – 23 clusters per vine.

The analysis of variance was made by Fisher at confidentiality level of the differences (Student's criteria) p = 5.0 %, p = 1.0 %, p = 0.1 % (Dimova and Marinkov, 1999).

Upon reaching technological maturity, the grapes from the experimental variants were harvested and processed in the experimental winery of IVE under the conditions of micro- vinification by the classical method for white wine making (Yankov, 1992). The alcoholic fermentation was conducted with pure culture of dry wine yeast *Saccharomyces cerevisiae*, in an amount of 20 g/hl, at a temperature of 20ºC. After completion of the process the samples were decanted and further sulfated.

The chemical composition of grapes and the wines per variants was determined by the conventional methods in enology (Ivanov et al., 1979). For evaluating the organoleptic characteristics (color, flavor, taste) it was used 100-score tasting scale (Tsvetanov, 2001; Prodanova, 2008).

RESULTS AND DISCUSSIONS

The quantitative changes of the main indicators characterizing the yield from Misket Kaylashki variety for the studied period are presented in Table 1.

In 2011, the highest yield was obtained from variant V_0 (6.266 kg), due to the greater mass per cluster. The lowest yield had variant V_2 (4.804 kg), as a result of the reduced number of clusters. The differences between variant V_2 and the control (V_0) were statistically proven. The highest average mass per cluster had variant V_2 (209.51 g), as 1/3 of the clusters were removed, while the lowest mass was obtained for variant V_1 (187.98 g). The analysis of variance for this indicator showed that the differences between the variants were not proven. The average mass per 100 berries varied within the ranges from 264.59 g (V_0) to 280.13 g (V_1). The differences between the variants were not statistically proven.

Table 1.

Qualitative changes of the main indicators, characterizing the yield per vine, Misket Kaylashki variety

Variants	Vintage	Indicators			
		Yield per vine (kg)	Number of clusters	Mass per cluster (g)	Mass per 100 berries (g)
V_0 (control)	2011	6.266	30.80	203.24	264.59
	2012	3.690	22.80	161.84	217.12
	2014	4.023	30.90	129.12	326.85
	Average	**4.660**	**28.177**	**164.733**	**269.520**
V_1	2011	5.331	28.36	187.98	218.13
	2012	3.950	26.47	149.23	221.87
	2014	4.585	33.03	138.60	324.35
	Average	**4.622**	**29.287**	**158.603**	**254.783**
V_2	2011	4.804	22.93	209.51	271.57
	2012	3.087	18.55	166.42	210.22
	2014	3.456	22.78	149.71	308.38
	Average	**3.782**	**21.420**	**175.213**	**263.390**
V_3	2011	5.973	30.66	194.81	273.69
	2012	3.781	24.03	157.34	234.91
	2014	3.975	30.00	131.60	323.72
	Average	**4.576**	**28.230**	**161.250**	**277.440**
V_4	2011	6.047	31.09	194.50	239.39
	2012	4.364	26.80	162.84	191.53
	2014	4.905	35.00	139.00	312.04
	Average	**5.105**	**30.963**	**165.447**	**247.653**

It should be paid attention to the data for the yield quantitative changes and the mass of the indicators characterizing it in 2012. In all variants the grapes yield from that vintage was less compared to 2011. The lowest yield had vines with removed one third of the clusters (3.087 kg). The best results in 2012 were also obtained from vines with thinned out cluster zone (4.364 kg). The differences between the variants were statistically proven. It was found a good correlation between yield, number of clusters, mass per cluster and per hundred berries. Smaller clusters and smaller berries corresponded to the larger number of clusters.

The weather conditions in 2014 (cool and rainy summer and autumn) affected unfavorably the quantitative characteristics of yield and grapes quality (Table 1). The highest yield that year was reported for variant V_4 (4.905 kg), due to the greater number of clusters per vine, and the lowest yield – for variant V_2 (3.456 kg), which was a result of the reduced number of clusters. The average mass per cluster ranged from 129.12 g (V_0) to 149.71 g (V_2). The differences between the variants were not statistically proven. The indicator average mass per hundred berries varied from 308.38 (V_2) to 326.85 (V_0). The analysis of variance showed that the variants did not differ significantly. The differences between the variants for this indicator were not proven.

In the three years of the study the yield per vine was the highest in the variant with thinning out (V_4), due to the higher number of clusters. In 2011 and 2012 the differences were statistically proven, while in 2014 they were not however that tendency continued. Also in the three years the mass per cluster was the highest in the variant with clusters reducing (V_2) that compensated the lower number of clusters and the lower yield in this variant.

The differences in the quantitative changes of the main indicators characterizing the yield of Misket Kaylashki variety determined the differences in the grapes composition from the experimental variants. The sugars and titratable acids content in the grape must and the glucoacidimetric index values are presented in Table 2.

During the study period the best parameters had must of V_2, with retained (thinned out) clusters. That variant was distinguished by optimal values of the investigated indicators - the highest sugar content, the lowest acidity and GAI showing that by its composition grapes was suitable for the production of quality wines (Table 2).

In 2011 all experimental variants exceeded the control in sugar accumulation. Because of the weather conditions of the year, the grapes vintage was characterized by high sugar content with kept high levels of titratable acidity. The reason was the continuous drying, water evaporation from the berries and respectively the sugars concentration. The tendency was confirmed by the results of the titratable acids analysis. The highest sugar and the lowest acid content were accounted for variant V_2, respectively 25.90% and 8.18 g/dm^3. This was due to the reduced number of clusters and the lower yield (lower loading).

For vintage 2012 the best sugar accumulation in grapes was recorded for V_2. The rest variants did not surpass the control for that indicator (table 2). The lowest titratable acidity in all samples and accordingly the highest GAI values were recorded for that year of the study. It showed that grapes from the experimental variants of this vintage had suitable indicators for the production of wines with optimal chemical composition and organoleptic profile.

The must sugar content in 2014, varied greatly ranging from 22.00 to 23.60% (Table 2). The lowest sugar content had variant V_1, and the highest - variant V_2. Only grapes from V_2 and V_3 were superior compared to the control for this indicator.

Because of the specific weather conditions of the year in spite of the high sugar content of the raw material from the experimental variants higher titratable acids rates were

Table 2.

Chemical composition of grape must, Misket Kaylashki variety

Variants	Vintage	Sugars, %	Titratable acids (TA), g/dm^3	Glucoacidimetric index (GAI) (sugars: TA)	pH
V_0 (control)	2011	22.70	8.55	2.65	3.26
	2012	24.40	7.28	3.35	3.22
	2014	22.60	8.33	2.71	3.10
	average	**23.23**	**8.05**	**2.91**	**3.19**
V_1	2011	23.70	8.85	2.68	3.24
	2012	24.00	7.43	3.23	3.24
	2014	22.00	8.63	2.55	3.03
	average	**23.23**	**8.30**	**2.82**	**3.17**
V_2	2011	25.90	8.18	3.17	3.31
	2012	26.10	7.35	3.55	3.25
	2014	23.60	8.25	2.86	3.13
	average	**25.20**	**7.93**	**3.19**	**3.23**
V_3	2011	24.00	8.85	2.71	3.25
	2012	23.50	7.80	3.01	3.26
	2014	22.80	8.63	2.64	3.09
	average	**23.43**	**8.43**	**2.79**	**3.20**
V_4	2011	24.00	8.85	2.71	3.27
	2012	23.30	7.58	3.07	3.16
	2014	22.20	8.85	2.51	3.03
	average	**23.17**	**8.43**	**2.76**	**3.15**

observed. Their content ranged from 8.25 to 8.85 g/dm^3, as the highest acidity was accounted for variant V_4. That determined the lowest GAI value for the period of the study.

The wine composition made by Misket Kaylashki variety is presented in Table 3. The sugar amount in the experimental samples from the studied vintages varied from 0.94 to 4.80 g/dm^3 that revealed the complete process of alcoholic fermentation in all variants. Wines, vintage 2012, had more residual sugars, due to better sugar accumulation in grapes that year.

Wines, vintage 2011 were characterized by the highest values of sugar-free extract, for the study period, as the experimental variants exceeded its contents compared to the control. The greatest amount of SFE was found in V_1 and V_4, respectively topping in June

Table 3.

Chemical composition of wine of Misket Kaylashki variety for the period 2011 – 2014.

Indicators / Variants	Vintage	Alcohol, vol.%	Sugar, g/dm^3	Total extract, g/dm^3	Sugar free extract (SFE), g/dm^3	Titratable acids, g/dm^3	Volatile acids, g/dm^3	pH	Total phenolic compounds (TPC), g/dm^3	Tasting score
V_0 (Control)	2011	13.13	1.23	21.30	20.07	8.45	0.60	3.17	0.52	74.57
	2012	13.60	2.25	22.00	19.75	7.00	0.66	3.18	0.28	74.89
	2014	12.82	1.07	18.20	17.13	6.38	0.42	3.13	0.24	77.43
	Average	**13.18**	**1.52**	**20.50**	**18.98**	**7.28**	**0.56**	**3.16**	**0.35**	**75.63**
V_1	2011	14.07	1.23	22.60	21.37	8.15	0.60	3.12	0.64	76.71
	2012	13.31	3.45	22.10	18.65	7.25	0.58	3.18	0.29	73.88
	2014	12.54	1.40	18.50	17.10	8.00	0.42	3.02	0.22	74.57
	Average	**13.31**	**2.03**	**21.07**	**19.04**	**7.80**	**0.53**	**3.11**	**0.38**	**75.05**
V_2	2011	15.25	2.29	22.40	20.11	8.08	0.54	3.19	0.57	76.00
	2012	13.89	4.80	24.10	19.30	7.22	0.60	3.23	0.35	73.66
	2014	13.12	1.44	18.40	17.00	7.90	0.48	3.04	0.26	75.86
	Average	**14.09**	**2.84**	**21.63**	**18.80**	**7.73**	**0.54**	**3.15**	**0.39**	**75.17**
V_3	2011	14.40	1.30	22.00	20.70	8.53	0.66	3.15	0.51	76.42
	2012	12.85	3.45	22.20	18.75	7.60	0.52	3.12	0.38	75.88
	2014	12.96	1.00	21.20	20.00	7.80	0.42	3.06	0.25	76.00
	Average	**13.40**	**1.92**	**21.80**	**19.82**	**7.98**	**0.53**	**3.11**	**0.38**	**76.10**
V_4	2011	14.30	1.20	22.30	21.10	8.23	0.66	3.14	0.61	77.85
	2012	12.80	3.20	21.70	18.50	7.40	0.64	3.13	0.39	76.22
	2014	12.73	0.94	20.00	19.06	8.03	0.48	3.04	0.24	75.43
	Average	**13.28**	**1.78**	**21.33**	**19.55**	**7.89**	**0.59**	**3.10**	**0.41**	**76.50**

and thinning out in the cluster zone. Titratable acids remained relatively high – in the range from 8.08 (V_2) to 8.53 (V_3) g/dm3, without affecting negatively the organoleptic profile of wines. In the samples from that vintage the highest content of TPC (0.51-0.64 g/dm^3) was recorded too, as with the exception of V_3 all other exceeded the control. Wine from variant V_1 (mechanical topping in June) had the highest content of phenols, followed by V_4 (Table 3). The organoleptic analysis revealed that wines from the experimental variants surpassed the control in their tasting characteristics. In all samples it was noted more freshness and density of taste due to the higher content of titratable acids and SFE. The best organoleptic profile had V_4 (score 77.85) – as it was distinguished for its pronounced typical aroma, harmonious flavor and long aftertaste.

The experimental samples, vintage 2012, had SFE varying from 18.50 (V_4) to 19.75 (V_0) g/dm^3, i.e. the variants did not surpass the control for that indicator. There was no correlation between the extract content in wines and their tasting qualities. The opposite tendency was observed for titratable acids - V_0 had the lowest acidity and V_3 (shoot topping in July) – the highest. The TPC content in the variants was close (within 0.28 to 0.39 g/dm^3), and all of them exceeded the control. The highest phenol concentration had V_3 and V_4, which were rated the highest during tasting, respectively 76.42 and 76.22 (Table 3).

Significant differences in SFE were observed in the samples from 2014 vintage. Its amount varied widely - from 17.00 (V_2) to 20.00 (V_3) g/dm^3. The highest extractive rates had wines made from the variants with shoot topping in July and thinning out the cluster zone. However, in the organoleptic analysis they were not rated the highest. Significant differences were found in the titratable acids content between the variants – in the range from 6.38 (V_0) to 8.03 (V_3) g/dm^3. The lowest acidity ratio had the control, which was scored the highest during tasting. The TPC amount in wines was almost equal - from 0.22 (V_1) to 0.26 (V_2) g/dm^3. From all variants of vintage 2014, the best organoleptic indicators were found in the control (score 77.43), as it was characterized by a pronounced varietal aroma, good balance and consistency in taste.

CONCLUSIONS

The study results showed that the investigated green pruning treatments applied to grapevines had an effect on the yield quality and quantity and seemed to be obligatory for Misket Kaylashki variety. Therefore it could be summarized that:

- The yield per vine was the highest in the variant of thinning out the cluster zone (V_4), as a result of the greater number of clusters.
- The mass per cluster was the highest in the variant with reducing the clusters (V_2), compensating the smaller number of clusters and the lower yield.
- The best indicators were found in grapes from V_2 (retaining the number of clusters) - the highest sugar accumulation, the lowest acidity and GAI revealing that by its composition it is suitable for producing of quality wines.
- Wines from variants V_2 and V_4, respectively shoot topping in July and thinning out were characterized by the highest average values of SFE and titratable acids, as well as the best organoleptic profile.

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✓*Ingineria mediului*

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THE USE OF ENZYMES MACERATION IN THE TECHNOLOGY OF AROMATIC WHITE WINES

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Keywords*: maceration; pectolitic enzymes, selection yeast*

ABSTRACT

The researches were performed in 2013 year, in the cellar of research, using aromatic white grapes Muscat ottonel from Murfatlar vineyard. The aim of the research was to study the main effects of the maceration enzymes use on: the improve degree of flavor precursors extraction, the yield of the must, the must clarification and filterability, the dynamics of alcoholic fermentation and the resulting wines composition. The use of maceration enzymes and selected yeasts in the winemaking, creates many technological advantages as: the optimizing of transformations occurring in the stages of obtaining, formation and evolution of the wine, the increases of the equipments efficiency and their use. All these caused changes in the wine composition, leading to increase their quality.

INTRODUCTION

Enzymes are used in winemaking to supplement the deficiency of enzyme activity from must and wine. They are used as enzyme preparations, extracted from yeasts cells, malolactic bacteria and molds that grow on grapes. The reactions catalyzed by enzymes are: reverse, of the type $E + S \rightarrow ES \leftrightarrow P+E$, or irreversible of the type $E + S \rightarrow ES \rightarrow P+E$. The yeasts as microorganisms have a very complex enzyme equipment. More than twelve enzymes coming from the yeast and, are involved in the alcoholic fermentation (hexokinase, aldolase, dehydrogenase, pyruvate-kinase, pyruvate decarboxylase, aldo-dehydrogenase, and so on (Tardea, 2007). The enzymatic activity refers to the amount of active enzyme in must, wine or enzyme preparations (Cotea, 2009). The must may be treated with various proteolytic and pectolytic enzyme preparations. The addition of exogene enzymes together with the natural ones, leading to a more rapid hydrolysis of the pectic and protein macromolecules substances that are transformed from colloidal molecule in small substances. It produces a juice fast release from cells and of colour and aromatic[1] compounds, a decrease in must viscosity, therefore is improved the quality, degree of leakage and must yield.

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MATERIAL AND METHODS

Experiments were carried out on the Muscat ottonel grapes variety in climate conditions of 2013 year, using pectolytic enzymes from pectinase category, Lallzyme Cuveé Blanc and Lallvin selected yeasts from Saccharomyces cerevisiae–QA23 species. The enzyme Cuvee Blanc was applied on the grapes before the pellicular maceration. This preparation contains only granular pectinase with beta-glucosidase activity. Lallzyme Cuvée Blanc has the role to accentuate the aromatic complexity of white wines. Parameters (temperature/time) 5-12^{0}C /2-12 hours. Is recommended the dose of 2 g enzyme preparation /100 kg of grapes. It worked only on the first must what flow (without pressing the grapes).

Experimental variants and the winemaking technology were:

- **Variant 1**- The first must, clarified by static sedimentation and fermented spontaneously under the action of wild microflora;
- **Variant 2** – the first must, treated with maceration enzymes, Lallzyme Cuvee Blanc 2g/100 kg directly on the grapes and fermented spontaneously under the action of wild microflora;
- **Variant 3** - the first must treated with maceration enzymes, Lallzyme Cuvee Blanc 2g /100 kg directly on the grapes and fermented with selected QA23 yeasts.

Determination of free and bound terpenes

It was used the method developed by Doneva-Šapceska & al., 2006. The identification and quantification of free terpenes was made by gas-chromatographic method.

Physico-chemical characterization of the wine

- Ethanol concentration was determined by distilling wine samples and measuring the concentration of alcohol by pycnometric method;

- total dry extract (g/L) was done using the formule Tabarie;
- reducing sugars (g/L) is performed by Schoorl method;
- total acidity (g/L) was done in conformity with *SR 6182-1: 2008;
- volatile acidity (g/L) was done in conformity with *SR 6182-2: 2008;
- SO_2 (mg/l) was determined in conformity with *SR 6182-13:2009;
- glicerol determination (g/L), is based on the reaction Malaprade consisting of glycerol oxidation with periodic acid in excess to formaldehyde and formic acid;
- acetaldehyde (mg/) was done by the enzymatic method by which the presence of the enzyme aldehyde dehydrogenase (Al-DH), the acetaldehyde from the wine is quantitatively oxidized to nicotinamide dinucleotide (NAD);
- PFT content (total polyphenols mg/L). The method is based on using Folin Ciocalteu reagent.

Sensory analysis of the wines, was made by a panel of 10 people, all individuals being certified as autorised tasters in Tasters Association members Certified from Romania. For the aromatic wines the descriptors chosen for analysis were: olfactory intensity, aromatic purity, fruity, floral, vegetable and mineral character, bitterness, intensity bouquet, unctuosity, balance taste, taste persistence. The maximum score was: 5 points awarded for excellent grade, 4 points for a very good rating, 3 points for good qualifier, 2 points for poor rating, 1 point for insufficient qualification.

RESULTS AND DISCUSSIONS

Effect of maceration enzymes on content of compounds involved in the flavors of the wines. Data specified in the table 1 show the quantities of free and bound terpenes in the untreated first grapes must (which are flowing, without pressing) and in the first grape must treated with enzyme preparation Lallzyme Cuvee Blanc (2 g /100 kg grapes).

Table 1

The quantity of free and bound terpenes (mg/L) in the first must, untreated and treated with enzymes

Terpene type	Untreated must (V1)	Treated must with Lallzyme Cuvee Blanc (V2)
Free terpenes	0.490	0.649
Bound terpenes	2.140	3.142
Bound terpenes/free terpenes	4.36	4.84

The reports of free and bound terpenes between the control sample (V1) and the enzymatic treated (V2) were 4.36 and 4.84 for the V1. By enzymatic treatment with the enzyme preparation Lallzyme Cuvee Blanc the content of terpenas increased.

The free terpene (table 2) quantity in the two samples were evaluated by gas chromatography coupled with mass spectrometry: V1-must without pressing the grapes untreated, and V2- the same must but treated with Lallzyme Cuvee Blanc enzyme (2 g /100 kg grapes) .

Table 2

The free terpenes must content for V1 and V2

Terpenes compounds (µg/L)	V1- first must (without pressing the grapes) untreated	V2- first must (without pressing the grapes), treated with Lallzyme Cuvee Blanc enzyme
Linalool	146.3	186.4
Hotrienol	80.6	95.2
α Terpineol	34.9	47.7
Citronelol	5.9	7.9
Nerol	80.1	100.3
Geraniol	60.1	129.8
Acid geranic	79.2	100.5
Total compuşi terpenici	487.1	667.8

Effect of the maceration enzymes on the must extraction from the grapes and the yield in must. The obtaining of a bigger must quantity is influenced by wine-making technology, by grape content in pectin substances and their rate of hydrolysis (fig. 1).

The speed of pectin degradation by using the maceration enzymes depends of the contact time between enzyme and substrate, thus the time of enzyme addition. This speed is maximum, when the enzymes are adding on the grapes in the hopper of masher and after this, their distribution in the must is better.

The use of maceration enzymes whose pectolytic activity is enhanced by cellulases, hemicellulases, and sometimes proteases, it realises an advanced and rapidly degradation of the cell walls as well as a reduction of the must viscosity, which determines a great rate of the first must extraction. For Muscat ottonel, the yield of the first must (without pressing) increased from 49.8% to 60.1 % (fig. 2).

Effect of the maceration enzymes on the must clarify, filterability and on the alcoholic fermentation dynamics. Was studied the effect of pectolytic enzymes on the

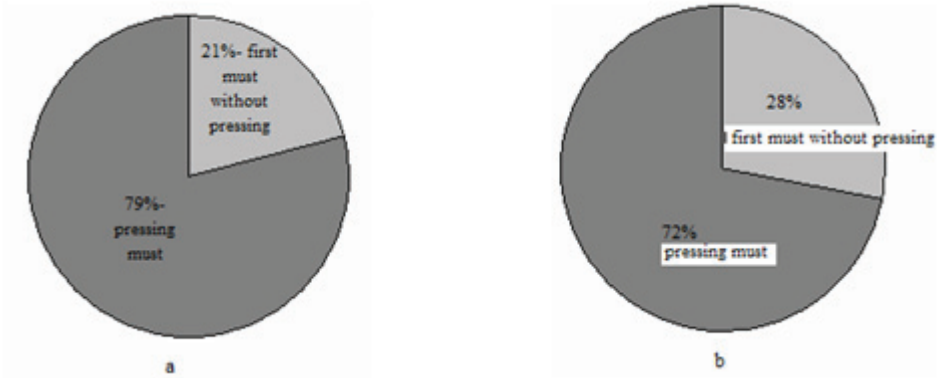

Figure 1. The influence of the maceration enzymes on the quantity of first must and pressing must for the variants V1 (a- untreated with enzymes) and V2 (b- treated with enzymes)

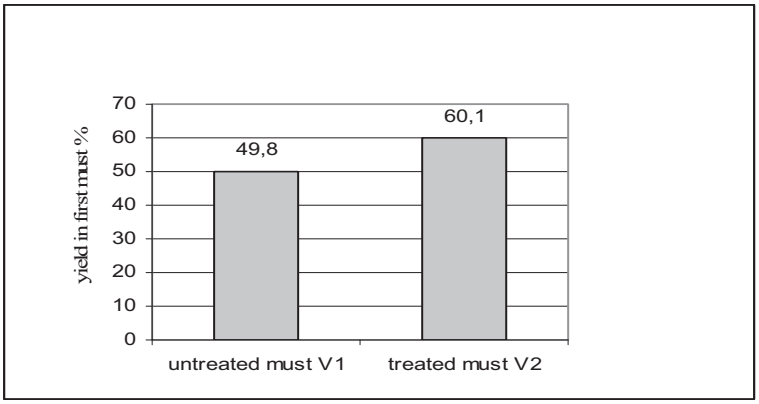

Figure 2. The influence of the maceration enzymes on the yield of first musts (unpressing must V1 and V2)

must clarify, filterability and on the alcoholic fermentation dynamics and found that: in the first must what flowing (without pressing the grapes), which has a small load of pectin substances, but high solid suspensions, the sediment duration for V1 is comparable to that of must treated enzymatically V2 (fig. 3), because the pectolytic enzymes have not too much substrate on which to act. But the duration for clarification of V1 (untreated must) is greater than to variant V2, treated with enzymes, which indicates that under action of pectolytic enzymes the particles in suspension it can be quickly deposited. Pectolytic enzymes effect on must clarifying, is also reflected in his filterability (fig. 4).

The doses of enzyme preparations must be judicious choice related to the effect of clarifying for not to make a clarification too advanced, which could delay the start of the must fermentation.

The effect of maceration enzymes on the wines quality. In order to study the influence of maceration enzymes on the physico-chemical and sensorial composition of wines, it were determined their main parameters (table 3).

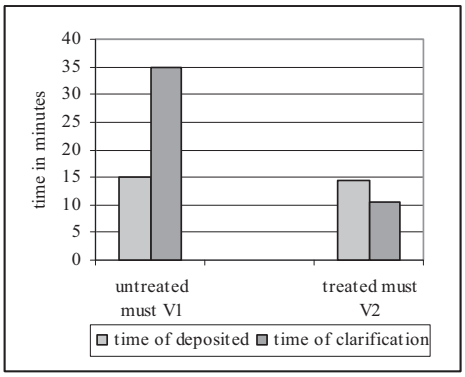

Figure 3. The influence of maceration enzymes on the must sedimentation and clarification

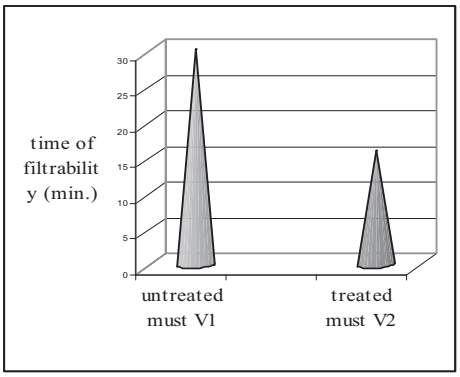

Figure 4.The influence of maceration enzymes on the must filterability

Table 3

Physico-chemical composition of Muscat ottonel wine- harvest year 2013 in Murfatlar vineyard

The variant	SO2		Alcohol % vol	Total acidit g/L	Volatile acidity g/L	Reduced extract g/L	Sugar g/L	Gly-cerol g/L	Ace-tal-deh. mg/L	PFT mg/L
	free	tot.								
V1-untreated must	17.1	89.6	12.0	4.82	0.47	17.1	2.23	6.2	43.5	250
V2-enzymatic treated must	21.4	83.7	12.1	4.98	0.38	18.9	2.59	8.9	30.6	220
V3- must + enzymes + selected yeasts	24.9	76.9	12.4	5.1	0.30	20.5	0.98	9.5	22.7	180

Analysing the data from the above table, it is observed that the ratio of sulfur dioxide combining is the best to the variants fermented with selected yeasts (V3).

It is noted that the wines clarified by enzyme, comparative from the untread wine, has a high concentration of glycerol, this meaning that the formation of secondary compounds during alcoholic fermentation in these circumstances is influenced in a beneficial way. At V3, fermented with selected yeast, was obtained the maximum amount of glycerol (9.5 g/L). The same variant (V3) have a smaller polyphenol content than the enzymatically clarified but spontaneously fermented (V2), probably due to different absorption of these compounds by the yeast cells.

Sensory analysis and aromatic profile of the wines. After sensory analysis the wines aromatic profile resulting from the first must (without pressing the grapes V1-control sample) and the first must treated with Lallzyme Cuvee Blanc (2 g /100 kg grapes) and fermented with selected yeasts (V3) is represented in figure 5.

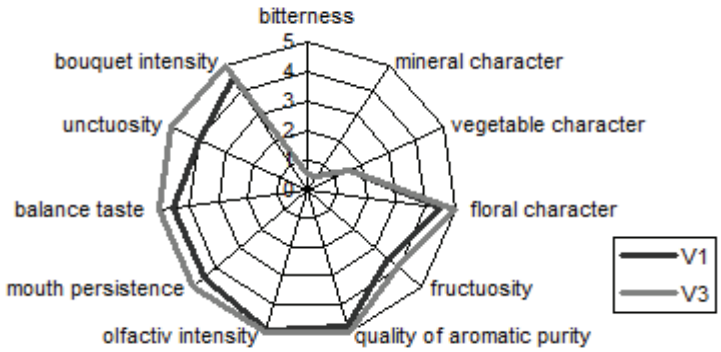

Figure 5. Wines aromatic profile for the variants V1 and V3

It can be seen as, the wines obtained using enzymes of maceration are more harmonious, more expressive, more bodied and proving the best balance, flavor intensity and typicality than the control sample (V1).

CONCLUSIONS

The use of maceration enzymes and selected yeasts in the winemaking creates many technological advantages as: the optimizing of transformations occurring in the stages of obtaining, formation and evolution of the wine, the increases of the equipments efficiency and their use. All these caused changes in the wine composition, leading to increase their quality.

The use of maceration enzymes with pectolytic activity it realises an advanced and rapidly degradation of the cell walls as well as a reduction of the must viscosity, which determines a great rate of the first must extraction. The yield of the first must (without pressing) increased from 49.8% to 60.1%.

Wines produced from musts enzymatically clarified and fermented with selected yeasts have the highest content of glycerol, esters and have very low values of acetaldehyde and phenolic substances.

The wines obtained using of maceration enzymes are more harmonious, more expressive, more bodied and proving the best balance, flavor intensity and typicality than the control sample (V1).

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*** 2008, ASRO: SR 6182-2: 2008 (for volatile acidity);

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MODERN TECHNOLOGIES FOR FOOD PROCESSING

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Keywords*: food, processing, technologies, safety, consumers*

ABSTRACT

In the food industry, the food processing technologies are in constant development, healthy eating becoming a major concern of a growing segment of consumers. The heat treatments (pasteurization, sterilization) are, at present, the main way to ensure the safety and preservation of food. The new trend in the modern food processing technologies is minimize or replacement of the thermal treatment with non-thermal and non-destructive processes, in order to keep the freshness and the nutritional value of food.

In this paper are presented some modern food processing technologies and their importance for consumer safety namely: high pressure processing (HPP), pulsed electric field (PEF) or electroporation, ultrasounds and cold plasma (CP).

INTRODUCTION

The processed foods are defined by nutritionists as the food deliberately processed before it is consumed, either for safety reasons or for convenience (http://www.sfatulmedicului.ro). The food processing methods include the conservation, the freezing, the refrigeration, the dehydration, the aseptic processing or establishing a proper balance between the ingredients and nutrients that they supply. The processed foods include a great variety of food, from the some foods processed in a small measure, up to those that pass through a complex preparation.

When it comes to food and beverage products, one rule of thumb defines a true trend: Real trends don't come and go; they grow – over years, decades or even longer. From an ingredient standpoint, health and wellness concerns offer the best variety of options for processors. A manufacturer developing a product in this market has literally thousands of botanical extracts, antioxidants, phytochemicals, carbohydrate compounds (such as sugars, starches and fibers), protein compounds or fractions and healthy oils from which to choose (http://www.foodprocessing.com).

The changes in technology have been influenced by a variety of factors: substantial increases in the costs of both energy and labor, by public pressure and legislation to reduce negative environmental effects of processing, particularly air or water pollution and energy consumption. The new lines, the production methods quicker and more flexible, interaction more effective and precise with the supply chain and the

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legislation put an enormous pressure on the quality assurance procedures. All food processors have a legal responsibility to produce food that have a rich nutrient content, have the required quality and can be eaten safely (http://www.ro.ecolab.eu).

In the food processing, there are some results concerning the most modern technologies of food processing and benefits, both for the health of consumers and for maintaining unaltered the nutritional quality of foods, such as the pulsed electric field (PEF) or electroporation (Maged and Ayman, 2012, Min et al., 2003, Vorobiev and Lebovka, 2010, etc.), ultrasounds (Kadam et al., 2015, Jambrak, 2012, Chemat et al., 2011), cold plasma (Misra et al., 2014, Niemira, 2012), etc.

MATERIAL AND METHODS

This paper is the result of a documentation study, the sources being the different sites specialized and actual publications in the field.

Are briefly presented some of the newest trends in the modern processing of food, starting with the name of the respective technology, definition, importance, applications, types of food involved, etc. Thus, some of these modern food processing technologies are the high pressure processing (HPP), pulsed electric field (PEF) or electroporation, ultrasounds and cold plasma (CP).

RESULTS AND DISCUSSIONS

According to the Codex Alimentarius (collection of standards recognized internationally, codes of good practice and guidelines for food products at the international level), food safety is "the assurance that food will not cause harm to consumers when they are prepared and / or consumed in accordance with the specifications on how to use" (http://europedirect.centras.ro/siguranta-alimentara).

All food processing involves a combination of procedures to achieve the intended changes to the raw materials. These are conveniently categorized as unit operations, each of which has a specific, identifiable and predictable effect on a food. Unit operations are grouped together to form a process. The combination and sequence of operations determines the nature of the final product. In industrialized countries the market for processed foods is changing, and in contrast to earlier years, consumers no longer require a shelf life of several months at ambient temperature for the majority of their foods (http://www.webpal.org/safe).

The new trend among the consumers is to prefer foods which are processed through modern methods, which ensure innocuity and nutritional quality of the foods. About these modern processing technologies we will discuss in the following.

High Pressure Processing (HPP) is a cold pasteurization technique by which products, already sealed in its final package, are introduced into a vessel and subjected to a high level of isostatic pressure (300–600MPa/43,500-87,000psi) transmitted by water. Pressures above 400 MPa / 58,000 psi at cold (+ 4ºC to 10ºC) or ambient temperature inactivate the vegetative flora (bacteria, virus, yeasts, moulds and parasites) present in food, extending the products shelf life importantly and guaranteeing food safety.

High Pressure Processing respects the sensorial and nutritional properties of food, because of the absence of heat treatment and maintains its original freshness throughout the shelf-life (http://www.hiperbaric.com/en/high-pressure).

Therefore, HPP is an operation which provides a high degree of food safety by destroying bacterial flora without changing the properties of the ingredients; through this modern technology were obtained so called *ready-to-eat* products. In the same time,

extends period of validity by 50%, with no added preservatives or changing product recipe and found maintaining taste, smell and appearance from the time of manufacture.

HPP of foods is of interest to food manufacturers because it permits microbial inactivation at low or moderate temperatures with minimum degradation. The energy required for compression with HPP is far less than that required in the thermal treatment process. HPP can be used not only for preservation but also for changing the physical and functional properties of foods and can be applied to a large number of food products (juices, milk, meat, seafood and many other liquid and solid foods). Some commercial food products such as juices, jams, jellies, yogurts, meat and oysters, which are treated by HPP, are already available in the market in USA, Europe, and Japan (http://www.uniservices.co.nz/).

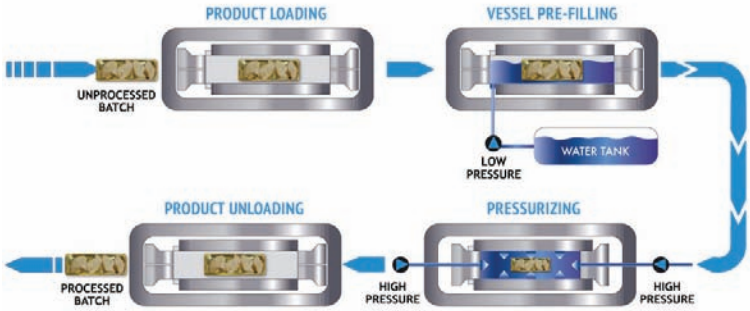

Figure 1. Diagram of operation of a HPP unit (http://www.hiperbaric.com/en/high-pressure)

Figure 2. Examples of *ready to eat* food products obtained by processing under high pressure available on the market in Romania

The microbiological issues concerning the food safety have a high interest for food processors wishing to provide food without preservatives.

Pulsed electric field (PEF) or **electroporation** is a non-thermal method of food preservation, which uses electricity for microbial inactivation having minimum effect on food quality. Electrical pulses destroy the microbial cells membranes. The membrane of plant cells can be permeated by electrical pulses so easily and completely. Applied on liquids and semi-liquids PEF can achieve non-thermal food preservation while maintaining organoleptic and nutritional product quality and freshness. The process is quick, flexible and energy-efficient and because heat it is minimized, products have a longer shelf life while maintaining better nutritional value than with traditional food processing techniques. The PEF modern processing technology is using mostly for the pasteurization of the liquid foods or pasty and extraction of fruit and vegetable juices; very important to note is that through this process, the foods retains nutritional value, flavor and aroma.

Pulsed Electric Field (PEF) processing or electroporation works by puncturing the cell membrane, whatever the size of cell. The process is targeted, gentle and clean. As a result, we measure dramatic increases in yield and the preservation of pigments, antioxidants and vitamins. PEF makes healthy products last longer. A cell dimension can be 20-100 micrometer (µm), a bacteria dimension 2-10 micrometer (µm). Pores can have a size of 50-100 nanometer (nm) each. These small pores will be more stable pores when the cell membrane is subjected to more pulses. Pulsmaster's Conditioner can run up to max 1000 pulses per sec (a pulse repetition rate of maximum 1000Hz) (http://www.pulsemaster.us/pef-pulsemaster/faq).

The flow chart of modern PEF technologies is shown in figure 3 and the puncturing the cell membrane is shown in figure 4.

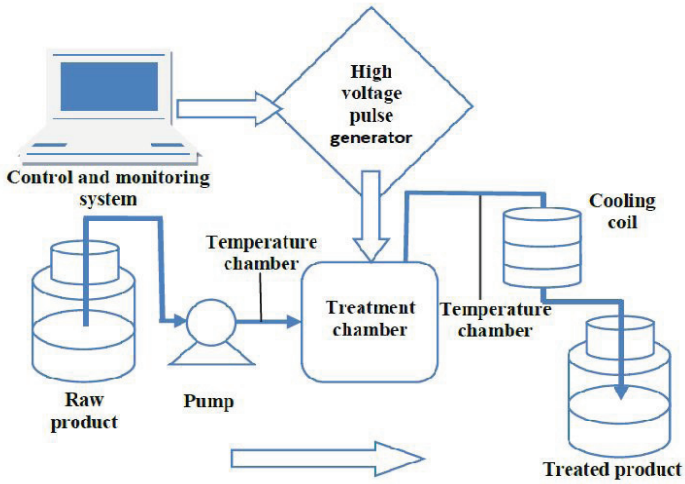

Figure 3. Flow chart of a PEF food processing system with basic component (Maged and Ayman, 2012)

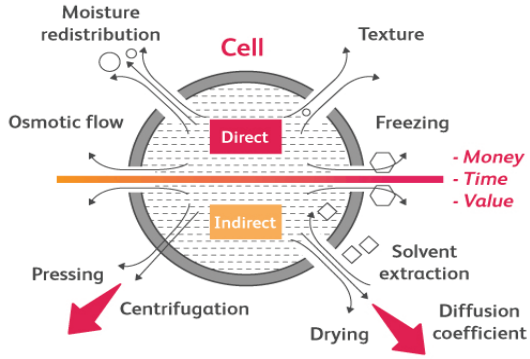

Figure 4. Puncturing the cell membrane by modern PEF technologies (http://www.pulsemaster.us/pef-pulsemaster/how-it-works)

Different types of food (solid, semi-liquid and liquid foods) can be treated with the PEF technologies depending on the aim of application. Thus, the treatment of plant or animal tissue aiming on cell disintegration has practically no size limitations. It can be

applied to whole fruits, vegetables and potato tubers, fruit or vegetable pieces and fruit or vegetable mashes, prior to separation processes.

Apple and orange juices are among the foods most often treated in PEF studies. The sensory attributes of juices are reported to be well preserved, and the shelf life is extended (Maged and Ayman, 2012). Other PEF-processed foods include milk and tomato juice (Min et al., 2003). Also, some of the products for which efficiency of electroporation has been shown are alfalfa, apples, carrots, peppers, potatoes and sugar beet (Donsi et al. 2010; Vorobiev and Lebovka 2010). According to the recent reviews (Donsi et al. 2010; Vorobiev and Lebovka 2010; Puertolas et al. 2012; Kalamiza et al., 2014), it has been demonstrated that applying electroporation treatment prior to extraction enhances the release of chlorophylls, carotenoids, betalains and flavonoids, especially anthocyanins.

There are some limitations to the pulsed-light system. For example, food composition affects the efficacy of the decontamination by pulsed light (Elmnasser et al., 2007). The authors show that the high-protein or oily foods are not suitable for decontamination by intense light pulses. Also, the authors suggest that it is possible that part of the radiation is absorbed by proteins and oil, reducing the effective radiation dose available for microbial inactivation.

In the same vein, the anthocyanin content in juices after pulsed electric fields (PEF) treatment has shown contradictory results. Some researchers report a minimum effect on the pigment content after processing, while others show that there is degradation in anthocyanin content after pulsing (Tiwari et al., 2009). As the authors show, anthocyanins are considered phytonutrients and they not only are responsible for color, but also have an important antioxidant effect on human health.

Ultrasounds. Acoustic energy as a form of physical energy has drawn the interests of both industry and scientific communities for its potential use as a food processing and preservation tool. Currently, most such applications deal with ultrasonic waves with relatively high intensities and acoustic power densities and are performed mostly in liquids (Kentish, 2014).

The use of ultrasound in the food industry has proved utility not only for improve the rheological properties of food (emulsification), as well as in the inactivation of microflora. The effect of ultrasound on the microbial cell is specific and complex depending upon frequency, intensity, duration, cell density, etc. The ultrasounds at a high frequency (1.000 kHz) can induce physical destruction of the cell due to ultrasonic cavitation and thermal effects associated.

Ultrasound which is a novel, robust, green and rapid technology suitable for scale up, can enhance the efficiency of protein digestion, extraction, production and drug delivery of bioactive peptides. Ultrasound principally acts by generating bubble cavitation in the biological matrix. It has been extensively reported for extraction of proteins and peptides from natural products facilitating higher yields and rates of extraction (Kadam et al.,2015).

Using ultrasound, full reproducible food processes can now be completed in seconds or minutes with high reproducibility, reducing the processing cost, simplifying manipulation and work-up, giving higher purity of the final product, eliminating post-treatment of waste water and consuming only a fraction of the time and energy normally needed for conventional processes. The advantages of using ultrasound for food processing, includes: more effective mixing and micro-mixing, faster energy and mass transfer, reduced thermal and concentration gradients, reduced temperature, selective extraction, reduced equipment size, faster response to process extraction control, faster start-up, increased production and elimination of process steps (Chemat et al., 2011).

High power ultrasound can be applied using sonication baths or ultrasonic immersion probes with different lengths, diameters and tip geometries depending on applications. These effects are promising in food processing, preservation and safety (Jambrak, 2012).

Cold plasma (**CP**) is a non-thermal processing method that uses electricity and a carrier gas (air, oxygen, nitrogen or helium) for the inactivation of micro-organisms which contaminate food (meats, poultry, fruits, and vegetables) and do not require antimicrobial chemical agents. Work time may vary from 3s to 120s, depending on the treated food product and conditions of processing.

The primary modes of action are due to UV light and reactive chemical products of the cold plasma ionization process. A wide array of cold plasma systems that operate at atmospheric pressures or in low pressure treatment chambers are under development. Reductions of greater than 5 logs can be obtained for pathogens such as *Salmonella, Escherichia coli O157:H7, Listeria monocytogenes* and *Staphylococcus aureus*. Key limitations for cold plasma are the relatively early state of technology development, the variety and complexity of the necessary equipment and the largely unexplored impacts of cold plasma treatment on the sensory and nutritional qualities of treated foods. Also, the antimicrobial modes of action for various cold plasma systems vary depending on the type of cold plasma generated (Niemira, 2012).

However, there are significant results in terms of use of cold plasma for disinfecting certain foods. For example, in an experiment with strawberries treated with the cold plasma, Misra et al. (2014) have demonstrated that the background microflora (aerobic mesophilic bacteria, yeast and mould) of strawberries treated with ACP for 5 minutes was reduced by 2 log 10 within 24 hrs after treatment, without significant impact on fruits with regard to respiration rate, color and firmness. DBD system used for this study reached the desired effects with a power input of only 15-20 W, without increasing the temperature of treated fruits (figure 5).

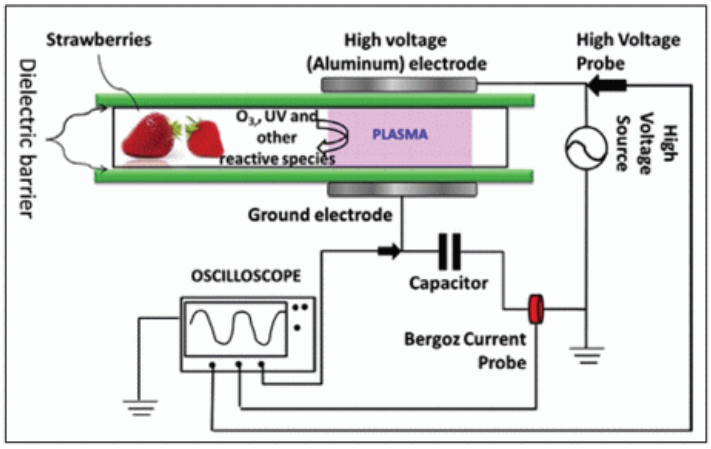

Figure 5. Schematic of the experimental set-up employed for cold plasma treatment of strawberries (Misra et al., 2014)

All the same, cold plasma is not yet realized for the food industry but this technology offers potential applications that could have significant benefits. The most noticeable application is the disinfection of surfaces in particular equipment, packaging,

food contact surfaces or even food itself. Compatibility with food products could allow shelf-life extension or online disinfection of processing equipment to reduce cross-contamination and the establishment of biofilms on equipment (http://www.campdenbri.co.uk/research/cold-plasma.php).

CONCLUSIONS

The food products - processed or fresh - which are sold to final consumers must not impair their health as a result of direct consumption or preparation, according to the destination of each foodstuff. The modern food processing technologies are intended to obtain the following goals: innocuous food; preserving the nutritional value of food product; packaging that keep the natural taste of the food; ensure low power consumption; ecological and responsible solutions in terms of the environment; longer period of depository and low losses.

In the 21st century, new trend in the food processing industry is represented by minimizing or replacement of heat treatments with modern non-thermal and non-destructive processes (as HPP, PEF, CP, etc.). The main objective for using of these modern processing technologies is not only to protect the consumers' health, but also to keep the freshness, natural color, firmness and nutritional value of food.

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***http://www.pulsemaster.us/pef-pulsemaster/how-it-works

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***http://www.sfatulmedicului.ro

***http://www.uniservices.co.nz/

***http://www.webpal.org/safe

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THE MAIN CONSTITUENTS OF RED WINES THAT DEFINE THE LEVEL OF QUALITY AND NATURALNESS

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Keywords*: anthocynins, polyphenols, chromatic characteristics, naturalness*

ABSTRACT

This paper presents the result of the main parameters in red wine which define the level of their quality and naturalness. To complete the wines' characterization (analytical, microbiological, sensorial), in order to certificate their naturalness, it was proposed the interpretation of the physico-chemical parameters with the help of some oenological parameters. These are reports or sums which indicate the values of the chemical characteristics (alcohol, acidity, glycerol, extract, ash and optic density to different wave lengths) that vary between certain limits to normal and healthy wines

INTRODUCTION

Wine enroll among the finished products of vegetable origin one of the richest chemical compositions. It is estimated that several hundred incorporating wine constituents (over 500-600), alone or associated with a complex and inconsistent manner.

Anthocyanins begin to accumulate in skins at veraison and reach a maximum around harvest time. The concentration of anthocyanins mai decrease slightly just before harvest and /or during over-ripening (Jara-Palacios et al, 2014).

Knowledge of the chemical composition of wine and its association with the grape variety/cultivar is of paramount importance in oenology and a necessary tool for marketing. Phenolic compounds are very important quality parameters of wines because of their impact on colour, taste and health properties (Martín Fanzone et al, 2012).

Phenolic compounds and mineral content constitute important quality parameters of wines. It is probably during ageing, that the greatest number of polymerisation and condensation reactions occurs, notably modifying the composition of the wine. Principal components analysis showed differences between the wines, especially in relation to vintage. (Vívian Maria Burin et al, 2010, Muntean et al, 2014).

Holt et al, in 2008, notice that higher wine tannin or wine phenolic concentrations did not result in higher wine astringency, and wine colour measures and phenolic composition were not good indicators of individual wine sensory properties or wine quality. Wine composition was not necessarily directly influenced by berry composition.

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MATERIAL AND METHODS

The study sought to determine the main constituents which define the quality and naturalness of the wines made in Segarcea vineyard in 2013. The varieties included in the study were: Cabernet Sauvignon, Merlot, Cabernet Franc, Pinot Noir, Syrah, Marcelan, Feteasca neagră .

The determinations were made using official methods OIV. In determining phenolic constituents of red wines and definition of their chromatic structures were used spectrophotometric methods.

Substances red anthocyanins in wine is determined spectrophotometrically by difference in pH (method Ribereau-Gayon-Stonestreet).

Dosage anthocyanins in wine is made using the property, due to their structure, namely to change their color depending on the pH. The anthocyanins give different colors depending on the pH of the solution that contains: in an acidic medium is red in color in an alkaline medium is blue.

The difference between the optical density read at 520 nm of a solution at two different pHs, is proportional to the amount of anthocyanin that contains wine.

The color of red wine (method Glories) is determined with spectrophotometer in the visible range, at wavelengths of 420, 520 and 620 nm. To determine total polyphenols, anthocyanins monomers and polymers was used spectrophotometric analysis.

The method used to determine tannins is to use property these substances to transform into anthocyanins by heating under acidic and oxidizing. The tannins in the form of procyanidins from samples for analysis of anthocyanin using heat processed (acidic pH) was determined colorimetrically by measuring the extinction at a wavelength of 550 nm.

RESULTS AND DISCUSSIONS

On the basis of chemical analyzes were determined dosed alcohol content, glycerol, mineral and non-reducing dry extract at wines taken into consideration.

With these data were calculated relationship between the weight of alcohol dosed and glycerol, relations between the weight of dry extract non-reducing and ashes and relations between the yellow pigments (D0420 nm) and red pigments (D0520 nm) expressing quality coloration of red wines with parameter called tonality or color tone.

For determining the ratio alcohol - glycerol, alcohol degree is multiplied by 10 to obtain the alcohol by volume. The amount of alcohol by volume are then multiplied by 0.79 (the molecular weight) to obtain the alcohol by weight. Then, the mathematical calculation is determined the ratio of the weights of the two elements. For determining the ratio extract - ash extract is considered 100% and ash is as a percentage of extract.

To determine the color tone by spectrophotometric analysis extinctions were measured at the wavelengths 420 nm and 520 nm.

These ratios are taken into particular consider in determining the degree of naturalness of wine products and compositional balance.

It is noted that the degree of naturalness of wine and physicochemical balance - normal are made when the proportion of glycerol to alcohol and ash (mineral) than non-reducing extract are closer to 10%.

The main parameters of the composition of red wines studied are entered in the Table 1.

Considering that 2013 was a year with favorable climatic conditions production red wines with long duration of sunshine, degree alcoholic registered, there was in any case below 13 vol% (Marcelan and Feteasca neagră) is over 14 vol% for Cabernet Sauvignon wine.

Table 1

The main characteristics of the composition of red wines

Varieties	Alcohol %vol.	Total acidity g/L H_2SO_4	Volatile acidity g/L H_2SO_4	Glycerol g/L	Extract non-reducing g/L	Ash g/L	Glycerol × 100 / alcohol	Ash × 100 / extract nonred.
Cabernet Sauvignon	14.2	4.12	0.40	12.03	26.61	2.59	10.72	9.73
Merlot	13.6	3.96	0.39	10.90	26.43	2.61	10.14	9.87
Cabernet Franc	14.0	4.24	0.42	11.90	25.60	2.29	10.75	9.31
Pinot Noir	13.9	3.82	0.40	10.98	26.91	2.58	9.92	9.59
Syrah	13.5	4.30	0.41	9.98	26.35	2.52	9.35	9.56
Marcelan	13.2	4.16	0.43	9.41	26.22	2.48	9.16	9.46
Fetească Neagră	13.1	4.10	0.41	9.55	26.72	2.64	9.22	9.88

Total acidity is above 4 g / L. except varieties Pinot Noir and Merlot, which are slightly deficient in this parameter.

The glycerol component with vital role in red wines in modeling roughness buds printed tannin, which prints the wines finished and softness, have values of over 9 g /L to all wines being consistent with the degree alcoholic components formed in parallel with the fermentation, both fermentable carbohydrates depending on the content of the must. The proportions of glycerol recorded at the 7 wines analyzed, it is a valuable factor analysis sensorial and chemical composition.

The report alcohol - glycerol recorded the highest values for the Cabernet Sauvignon. Cabernet Franc and Merlot wines at between 10.72 and 10.75, and the wine produced from the variety Marcelan, recorded the lowest value 9.16.

Extractivity over 26 g / L to 6 of the 7 varieties of wines is able to confer attributes to be classified in the categories of high quality.

Ash, with levels between 2.29 g /L (Cabernet Franc) and 2.64 g / L (Fetească neagră), keeping the proportions specific follow the extract non-reducing contents.

As a whole varieties studied the relationship between glycerol / alcohol and ashes / extract stands around 10%, or very close to this level.

The anthocyanins of red wine are fundamental constituents that distinguish these products from other types of wine. Their importance is considerable, both compositionally and in terms of hygienic food. They enrich evident in the composition of wines that are found.

Values optical density at 420 nm wavelengths, 520 nm and 620 nm specific to different types of pigments used to calculate the qualities chromaticity wines, listed in

Table 2 reveals differences in some cases quite important. They are mostly of the genetic nature of variety and less of primary winemaking technology.

At yellow component lowest value registered at wine Pinot noir, and the largest of the wine of Syrah at Red Component first is the wine of Cabernet Sauvignon, and the last wine of Syrah and blue component comes first wine the Syrah, and the last of Pinot noir wine.

An accurate image of the quantity and quality of material colored wine is obtained from: content absolute anthocyanins, the participation percentage of different types of

pigments and values qualities chromaticity for their definition being considered optical density values (referred to in table 3).

Table 2

The optical densities of red wines varieties

Varieties	DO 420 nm yellow pigment	DO 520 nm red pigment	DO 620 nm blue pigments
Cabernet Sauvignon	0.471	0.798	0.193
Merlot	0.459	0.796	0.169
Cabernet Franc	0.455	0.720	0.118
Pinot Noir	0.258	0.544	0.075
Syrah	0.488	0.398	0.203
Marcelan	0.457	0.835	0.188
Fetească Neagră	0.435	0.758	0.156

The content of anthocyanins has the highest value to Cabernet Sauvignon wine. 802 mg /L, and the lowest in Pinot Noir.

Table 3

Chromatic composition of red wines

Varieties	Antocyans mg/L	Pigments participation %			Ic	Tc	dA%
		Yellow pigm. DO 420 nm	Red pigm. DO 520 nm	Blue pigm. DO 620 nm			
Cabernet Sauvignon	802	32.2	54.6	13.2	1.462	0.590	58.39
Merlot	692	34.1	53.5	12.4	1.345	0.637	56.53
Cabernet Franc	622	34.9	53.5	11.6	1.017	0.652	56.42
Pinot Noir	402	35.3	54.5	10.2	0.730	0.648	58.05
Syrah	714	32.0	54.7	13.3	1.526	0.585	58.58
Marcelan	783	32.6	54.0	13.4	1.403	0.604	57.37
Fetească Neagră	640	33.8	54.1	12.1	1.287	0.625	58.92

Data on participation of various types of pigment in composition of coloring matters and levels of characteristics chromatic of complex anthocyanins, show structures chromatic very favorable to all wines and proportions of different types of pigments are able to provide levels of color corresponding total over the claims current.

Phenolic compounds in much higher quantities in red wine compared with white ones are those which confer specificity, general posture, firmness and "robustness". Along with anthocyanins in red wine play a significant role tannins and polyphenols. Besides the complexing of chemical composition of red wines, polyphenolic constituents have essential influence on organoleptic characteristics.

Polyphenolic composition is presented in Table 4.

Table 4

Polyphenolic composition of red wines

Varieties	Total polyphenols g/L	Tanin g/L
Cabernet Sauvignon	3.48	2.97
Merlot	3.41	2.80
Cabernet Franc	3.96	2.75
Pinot Noir	2.97	2.55
Syrah	3.41	2.98
Marcelan	3.54	3.07
Fetească Neagră	3.20	2.96

Analyzing the data obtained reveals that the polyphenols content was between 2.97 g/ L was Pinot Noir wine and 3.96 g / L Cabernet Franc (which explains the astringent taste of wine). Tannin contents were quite close to all wines, ranging between 2.55 g / L Pinot Noir and 3.07 g /L to Marcelan.

CONCLUSIONS

Red wines, meet the terms of the main characteristics of the composition. the attributes set for top quality wines with denomination of origin: - Alcohol content between 13.0% vol. and 14.2% vol .; - The contents of acidity of between 3.82 g /L and 4.30 g /L (in H2SO4); - To extract the contents of the non-reducing variable values between 24.6 g /L and 26.91 g /L; - proportions ash between 2.29 g /L 2.64 g /L. - Ratios glycerol × 100/alcohol and ashes x 100 / extract non-reducing approaches than the 10% threshold, they achieve and even exceed it.

Physico-chemical components of red wines are accompanied by chromatic characteristics lie in the similar products obtained in the most reputable vineyards in the country and abroad.

Anthocyanins content between 402 mg / L (Pinot noir) and 802 mg / L (Cabernet Sauvignon), within which occupies yellow pigments proportions between 32 and 34.9%, red pigments varies between 53% and 55%, pigments blue values between 10% and 13.6%. Firmness and general attire of red wines are supported by the polyphenol content (between 2.97 g /L and 3.96 g / L) and tannins (ranging between 2.55 g / L and 3.07 g /L).

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RESEARCH ON THE INFLUENCE ON FRUIT QUALITY ASSORTMENT CORNICHON CUCUMBERS IN SOLARIUM

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Keywords*: cucumbers, fertilization, soil, quality*

ABSTRACT

Cucumber is a vegetable plant that is grown both in the field and in greenhouses, solariums.

The fruits are consumed both fresh and processed as. Thus, fresh, cucumbers are eaten alone with salt, as salad, plain or mixed with other vegetables. Those processed cucumbers as cook pot stew etc. or preserved by pickling or marinating (Popescu and Atanasiu, 2000). Given all this, the production used a large number of varieties and hybrids, the following specific methods of culture and diversity that has production destination. The research was conducted on 5 cornichon cucumber cultivars with three types of fertilization 0.1% Ferticare V1, V2 Irifert 0.1% V3 0.1% Rezistevo. The cucumbers were harvested in three sizes: 3-6cm, 6-9cm, 9-12cm for checking the chemical and biochemical composition to determine their quality for consumption.

INTRODUCTION

Maqsood A. Abdul H. and Zarqa A. (2004) performed a study on the growth and development of six hybrids of cucumber under the influence of several agro-climatic regions of the country, including Kashmir. The performances of local and exotic hybrids were analyzed in this part of the world culture with particular importance in high quantities that can commercialize on this huge market. The authors conclude that in addition to native forms, can have a satisfactory production and exotic varieties such as Market More or Poinsett 76, especially in the hilly areas of Kashmir.

F. Rodillas in research conducted in 2008 in Santo Domingo, sought a response of different cultivars of cucumbers grown using for mulching leaves kakawate (*Gliricinia sepium*). Based on four cultivars of cucumbers grown achieved results with significant differences between them, the most productive being Poinsett 76 with a production of 38,047 kg / ha and the most unproductive being Ilocos with 9847 kg / ha. The differences were attributed to experimental variants as all cultivars of cucumber were planted in the same soil in the same climatic conditions effect.

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The evaluation of different cultivars were conducted in many countries, such Shetty studied 18 cultivars and concluded that the best to have for Fresh Blight was Summer Top and Rusty (Shetty & Wehner, 1998).

Resende has conducted a study of 10 cultivars and found that doubt, score, Colonia and Ginga had the best development, growth and the best commercial value (Resende, 1999).

Maturity at harvest is the most important factor that determines the quality of post harvest (Kader, 1996). Cucumbers mature commercial or optimum quality for consumption in a physiologically immature stage (Kays, 1999) and late harvest will tend to lower the quality of the harvest and speed up the rate of deterioration after harvesting (Kader, 1996). Cucumbers Maturity is evaluated subjectively based on color, shape and size appearance (freedom malformation, deterioration and decomposition) (Kader, 1996).

The influence of technology elements work on cucumbers grown in polytunnels Bei Mariana, Apahidean S. and Cărbunar M. (2007) aimed at introducing elements. New technology type cornichon cucumbers grown in greenhouses by identifying hybrids best adapted to the climatic conditions in the northwest of the country. Organic culture was established using Szatmar F1 hybrids, Crispina F1 and Pasalimo F1 and Mirabelle F1 planting at a distance of 40 cm between plants in the row. The best results were obtained from Mirabelle and Szatmar hybrids, significant differences from the control.

In the vegetable basin Isalnita Perișor - Dolj County grower Marian Baronescu in 2008, the cycle I and II cultivated hybrids Kybria F1 and Karaoke F1 and concluded that the two hybrids is a perfect combination to have quality and continuity in production with a yield of more than 3 kg / plant, 75% of which had a size of 6-9 cm and 25% of 9-12 cm size. Since the end of October harvest cucumbers cornichon type basically finished, continue vegetable harvest significant amounts Karaoke F1 hybrid. This hybrid has a great capacity for regeneration, very good fruiting shoots with autotopping and fructifying excellent high temperature conditions in summer. The most unfavorable growing conditions in the area Isalnita Dolj county, the yield was 2.6 kg / plant, of which 40% to 60% measurement 6-9 cm and 9-12 cm in size.

MATERIAL AND METHODS

The main goal of the research is the development of technology elements of type cornichon cucumbers growing in solarium that can help increase production, increase its earliness and improving the quality of fruit harvested.

The experiments were conducted in a solarium at the University of Agronomic Sciences and Veterinary Medicine Bucharest Vegetable Department which is located on reddish-brown soil (Table 1).

Table 1

Analysis of agrochemical characteristics of soil solarium

No.	Specification	pH	Soluble salts, %	N-NH4, ppm	N-NO3, ppm	P-PO4, ppm	K, ppm
1		7.13	0.049	6.64	57.00	16.19	21

General experimental conditions relating to the ground characterized by a humus content of between 2.1 and 2.2%, a physical content of 54-56% clay, and a supply of nitrogen, phosphorus and potassium according to the above .

New assortment behavior in any experience in the field of vegetable growing is vital to achieve the accuracy of the research are expected to deliver competitive.

This requirement is very important because the assortment cucumbers, annual species is changing, positive development in terms of resistance to disease, response to fertilization and good quality production and early debt. Although ecological plasticity of the type cornichon cucumber cultivars is remarkable, it was found over time that the performance of production of the new F1 hybrid, vary greatly depending on local conditions it is grown.

Knowing new cultivars reaction conditions in the area of culture, we can determine the effect of variations of technology on production performance of the latest biological materials (F1 hybrids) which was conducted experimental program.

In our country, culture cucumber greenhouses and solariums classical systems takes place on the ground, substrate thermogenic or bales of straw, pale straw on the ground or directly into the greenhouse.

Experience single factor is reached five cultivars us (table 2). The experimental variants were placed in three repetitions without randomization, in accordance with the provisions experimental technique for shelter.

The recommendations made by the manufacturers for maintenance work on hybrids RZ, specifically on topping and pinching side shoots, must be followed exactly to obtain a production of hybrids characteristic parameters, as follows:

at a height under of 35-40 cm all fruit must be removed and all small shoots side, leaving only leaves per plant;

over 35-40 cm fruit can remain on the plant, but must remove the side shoots;

from 80-90 cm of side shoots pinch commended in the third or fourth leaf;

at height over 110-120 cm hybrids shoots RZ pinching is no longer mandatory but requires better management of them.

For ornamental plants, the seed was sown in the particular substrate to obtain vegetable seedlings, mixture of ± 70% red peat and ± 30% black peat.

Solar planting was performed on April 16, 2015, to 0.8 m / 0.5 m, being 2,5pl / m^2, seedling transplants in pots, aged 30 days. There has been a foliar fertilization with the fertilizer Ferticare 0.2%.

Phasial fertilization is important technological component for many crops, among which, the first places are legumes. Fertilizing correctly executed phasial ensure macro and micronutrients necessary in conjunction with the growth and fruition of culture to which it applies. Phasial fertilization applied to the soil being taken root system of plants or extraroot by spraying nutrient solution from the air (the leaves).

During the growing period were performed three root fertilization 3 variants: 0.1% Ferticare V1, V2 0.1% Irifert, V3 0.1% Rezistevo. Works were carried out specific care that species drip irrigation.

Table 2.

Experimental cultivars

No	Variant	Cultivars	Origine country	Harvest dimensions , cm
1	V1	Ekol Rz F1	Syngenta	3-6, 6-9, 9-12
2	V2	Trilogy F1	Holland Farming	3-6, 6-9, 9-12
3	V3	Kybria F1	Holland Farming	3-6, 6-9, 9-12
4	V4	Lenara Rz F1	RIJk Zwaan	3-6, 6-9, 9-12
5	V5	Ceaikovski F1	Syngenta	3-6, 6-9, 9-12

Culture has required three phytosanitary treatments for spider Envidor 0.05% and 0.03% Nissorun for the greenhouse whitefly Mega Decis 0.05% and Mospilan 0.1% and Movento 0.3% for staining, Antracol 0 2% and 0.1% Topsin 2 treatments.

The experience observations and measurements were performed on growth and fruition cucumber plants, laboratory measurements on soil supply macro, determinations regarding the possible pollution of cucumber fruits with nitrogen, phosphorus or potassium. Chemical and biochemical determinations were performed in the laboratory of University of Agricultural Sciences and Veterinary Medicine - Bucharest. The methods used in the experiments were used to determine nitrate colorimetric method with FDS to determine phosphorus reagent colorimetric method was used to determine potassium Duval and flam photometric method was used.

RESULTS AND DISCUSSIONS

Nitrates analyses were performed on three categories fruits size that 3-6cm, 6-9cm, 9-12cm. The content of nitrate in cucumbers registered high values oscillating between 158ppm and 195ppm at 3-6 cm size. Then at intermediate size 6-9cm have lower nitrates values oscillating between 138ppm at Ekol F1, Trilogy F1and Ceaikovski to 195ppm at Lenar RZ F1. The size of 9-12cm, the maximum size of harvested cucumbers nitrates accumulated decreased from baseline ranging from 152ppm to Kybria F1 and 38ppmN-NO_3.

The results show that the small harvest of cucumbers, pickled cucumbers harvesting conducted for analyzes should be performed more often in order to know their nitrate content and avoiding their marketing for exceeding specified by Romanian Law 5/2005 of CMA 400ppmN-NO_3.

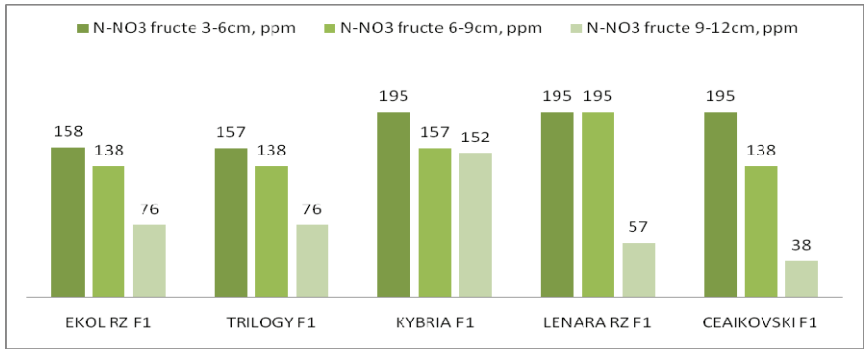

Figure.1.Nitrates content from cucumbers of five experimental cultivars

In the case of investigator analyzed all kinds of cucumbers and all cultivars had a low content of nitrates in vegetables CMA characterizing consumer good.

Phosphorus, an element that ensures the quality of the cucumbers varied within wide limits depending on the cultivar and the harvesting size.

In Ekol RZ F1 phosphorus has accumulated more cucumbers smaller fruit 274.1ppm of 3-6cm and in smaller quantities larger fruits 214.4ppm to 9-12cm.

Trilogy F1 cultivar close values regardless of smaller fruit size limits ranging from 9-12cm and 174.2ppm 147.4ppm at 6-9cm.

At Kybria F1 phosphorus content is high but close between classes cucumbers to size values range between 93,8ppm and 100.5 ppm.

Lenar cultivar RZ F1a phosphate accumulated in good quantities, the accumulation was in time from small quantities to the larger cucumbers.

The same phenomenon can be observed at Ceaikovski F1, phosphorous values from 134.0ppm size of 3-6cm increasing to 201ppm at 6-9cm.

The phosphorus content in all cultivars fall within this element ensuring optimal cucumbers optimum quality for consumption.

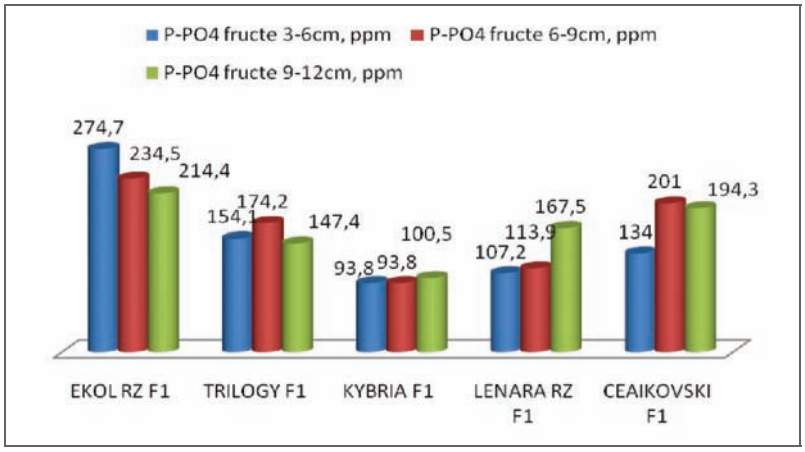

Figure.2. Phosphorus contents from five cucumbers cultivars

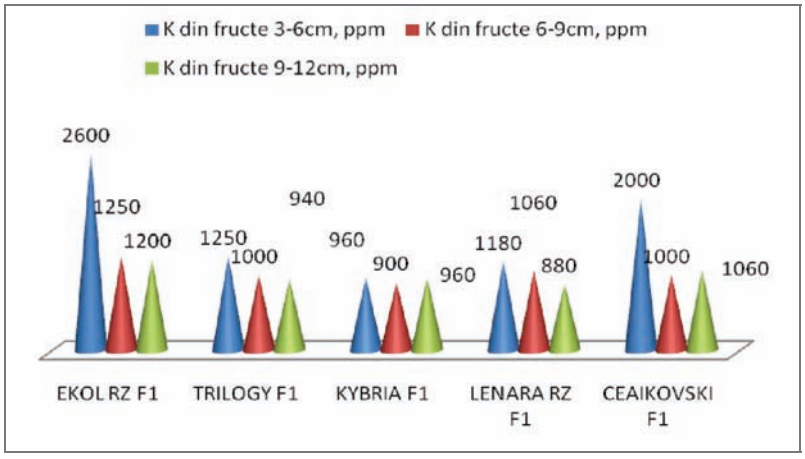

Figure.3. Potassium content in cucumbers from five cultivars

Potassium, the third element that provides quality consumer and commercial (storage, transport) of the cucumbers had a different fruit accumulation. Thus most potassium was accumulated cultivars Ceaikovski F1 and Ekol RZ F1 and the least potassium was accumulated Kybria F1. Potassium levels are within the specified 1000-2000ppmK scientific literature accumulations varying according to cultivar.

Biochemical analyzes the content of carbohydrates. Vitamin C and acidity are part of the normal cucumbers and characterizes good fruit consumption (Table 3).

Table 3.

Biochemical characteristics of cucumbers

Cultivar	Glucide, %	Vitamin C, mg/100g fresh product	Acidity, NaOH 0,1n/100g fresh product
Ekol Rz F1	1.2	12.5	0.98
Trilogy F1	1.8	11.3	1.2
Kybria F1	2.1	10.7	0.82
Lenara Rz F1	1.9	13.2	1.1
Ceaikovski F1	2.2	11.2	0.87

CONCLUSIONS

The research conducted in the solarium at five cornichon cucumbers cultivars show:

- the fertilization system was well conducted because the contents of nitrates, phosphorus and potassium were in admitted limits presented by the scientific literature;
- nitrates content were higher in the smaller cucumbers so because there were used in pickles could be a problem if there were not analyze before processed.

ACKNOWLEDGMENT

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STUDY ON FOOD OILS OBTAINED BY PRESSING AND REFINING

Căpruciu Ramona[1*], Vlădulescu Carmen

Key words*:sunflower oils, cold pressed, rafined, quality indices*

ABSTRACT

Choosing a food oil is very important. Oil is critical to Romanians when preparing a large variety of dishes. Nevertheless, during the last centuries, researchers in the food industry have noticed the contribution of vegetable oil resulted from oleaginous raw materials to the health improvement, if consumed moderately.

Sun-flower, the main oleaginous raw material in our country, is suitable for obtaining both cold-pressed crude-oil and refined oil with nutritious and sanogenetic qualities. This study makes a detailed analysis on the quality of the crude cold-pressed sunflower oil as well as the refined sunflower oil.

INTRODUCTION

In our country, food oils can be obtained by several methods, such as: pressing the raw material by physical methods, without the intervention of solvents (cold-pressing) and extraction of lipids by warming process, by the help of some solvents together with applying certain techniques for filtering, clarification, boiling-over, etc. (warm-pressing). The best known method refers to refining the crude-oils obtained by pressing which are generically called refined oils (Ramona Căpruciu 2011).

Pressing is the operation by which the oil is separated from the oleaginous raw material due to some external forces. Consequently it results the crude-oil and granulation.

The presses currently used in the pressing processing scheme followed by solvent extraction are: for moderate preliminary pressing – ensures the separation of 75 - 80% of the oil and 18 - 22% oil in granulation; for advanced pressing – it assured 12-14% oil remaining in granulation (acc. to Racolța Emil et al., 2007).

Unrefined oils (especially the cold-pressed ones) are a vital component of a balanced nutrition. They contain unsaturated fatty acids that the human body cannot synthetize.

Additionally, omega-3 fat acids reduce inflammations and may reduce the risks of chronical diseases (breast cancer, prostate and colon cancer; arthritis). Moreover, omega-3 fat acids protect the skin and are involved in healing psoriasis symptoms (Mayser P. and col. 2002) helps in cases of ocular disorders, renal insufficiency and hepatic cirrhosis. One

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of the essential roles that the fat acids have for the human health is to ensure a normal functioning of the heart.

There are acknowledged the papers of many researchers, among which it stands out De Lorgeril M. and col., 1999, Kris-Etherton P. and col., 2001, Bigget J.T. et al.., 2001, Demaison L. et al., 2002.

The composition of the unsaturated fat acids differ from one cold-pressed oil to another. In addition to that, it is recommended for our health to use several cold-pressed oil varieties**.**

In order to improve the quality of such oils and assure the commercial aspect expected by consumers, crude-oil are refined.

The refining operations are gathered together in the processing schemes; the most complex of all is the refinement of edible vegetarian oils (acc.to Banu Constantin, 1999).

Besides the main effect, most of the refining operations also have complementary effects acting over certain categories of accompanying substances (Boeru Gh. et al., 1980).

MATERIAL AND METHODS

In order to perform the study, the material used was sunflower oil samples, as follow:

Sample 1 was made of refined sunflower oil taken from the market.

Sample 2 was made of cold-pressed sunflower oil (after determining the moisture and content of botanic sunflower-seeds oil).

The acidity index refers to the quality of potassium hydroxide, in mg, needed for neutralizing the free fat acids from a gram of fat. For the analysis, it was titrated the oil dissolved in ethanol with solution of NaOH 0.1 n in the presence of phenolphthalein. The acidity was expressed in % oleic acid. The saponification number (LS) - represents the number of milligrams of potassium hydroxide required to saponify 1g of fat.

In order to measure it, the sample is neutralized by an alcoholic solution of KOH in excess (known volume) and the unfractionated amount is determined by titration with HCL.

Normally hydroxide from the blank sample is titrated with HCL and the volume of KOH is taken as the difference between the sample determined and blank. Since 1 ml of HCl 0.5 N KOH is neutralized with 28.052 mg, the saponification number is determined from the amount of acid consumed for the titration.

The iodine indicates the degree of unsaturation of oils and fats and is expressed in g of iodine absorbed per 100 g product. This method applies to oils and fats containing no system of conjugated double bonds.

The iodine value is calculated as mg of I2 fat per 100 mg and is represented by a dimensionless number.

The organoleptic determination was achieved for both oil types studied and consisted of: determination of color; determination of the general appearance and consistency; determination of taste and smell.

RESULTS AND DISCUSSIONS

Getting oils with superior organoleptic and physico-chemical properties is done through a proper conduct of all stages that form the technological manufacturing process, whether it's just cold pressing or especially the refining process.

By performing an organoleptic comparison of the oils resulted after applying the two processing methods, there are noticed substantial differences in the color, consistency, smell and taste (Table1).

The organoleptic analysis was performed in normal laboratory conditions at a constant temperature of 20 ° C and daylight. Thus, by analyzing the comparative data for the two types of oil, it was found that the refined sunflower oil has a lighter consistency than sunflower oil obtained by cold pressing.

The appearance is that of a fatty mass with an average degree of suspension after shaking for cold-pressed sunflower oil, and without suspension for the refined oil. Moreover, when tasted, both the cold-pressed and the refined sunflower oil had the aroma of the raw material from which they were obtained (more intense to the cold pressed one). In order to analyze the smell, the method used was to inhale rapidly from covered pots for a few seconds.

The conclusions drawn up were that both oil types have the smell of the raw material, the odor of the cold-pressed oil being more intense. The colour of the refined oil is lighter than the cold-pressed one. None of the oil types presented colour spots in the analyzed oil mass (Table1).

Table 1

The main organoleptic indices on sunflower oil by cold-pressing after production and refining

Sunflower oil	Organoleptic indicators			
	Aspect	Taste	Smell	Colour
Cold-pressed oil	To slightly sediment. The mass suspension in oil ligts semnals Medium fluid consistency	Sweet, intense flavor of sunflower seeds It has no rancid or bitter taste	Pleasant, specifically with shades of sunflower seeds Without foreign smell	Dark yellow, withouy observing othet spots or shades of color
Rafined oil	Not sediment. There are reported in weight of the oil suspension. Fluid consistency	Pleasant, sweet, characteristic flover on sunflower slightly perceptible. It has no rancid or bitter taste	Pleasant, characteristic. Without foreign smell	Light yellow, pleasant, without spots or shades of color

Both the cold-pressed and the refined sunflower oil were analyzed from the qualitative point of view by means of some physico-chemical indicators registered in STAS: acidity index; saponification number and iodine.

In Table 2 there are presented the main physico-chemical indicators which significantly influence the quality of the analyzed oil.

Depending on their values it was drawn up the storage duration and method. There can be noticed significant differences between the quality indicators of the two analyzed categories of oil (cold-pressed sunflower oil and refined sunflower oil).

Table 2

The determination of main physico-chemical indicators by sunflower vegetable oils

Physico-chemical index	Sunflower oil	
	Cold-pressed	Rafined
I.A. (%oleic acid)	0.8	0.4
I.S. (mg KOH)	198	186
I.I (g)	114	153

I.A.- acidity index; I.S.- saponification index; I.I – iodine index

In the case of the crude sunflower oil resulted from cold-pressing, it is observed that the acidity indicator exceeds by 0.5 % the oleic acid, being double of the indicator registered for the refined oil (0.4 % oleic acid compared to 0.8 % oleic acid). This shows that, in terms of acidity content, the two oil types will have different preservation terms.

When talking about the saponification number of the analyzed oil types, major differences were noticed from one type of oil to another (Figure 1). Thus, the saponification

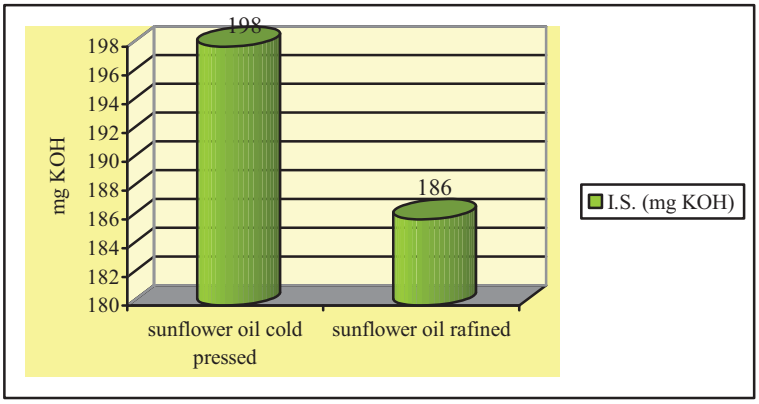

Figure 1 Determination of the saponification index at vegetable oils studied

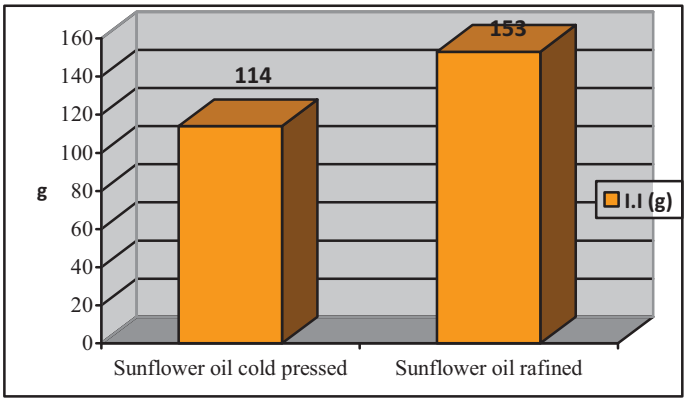

Figure 2 Determination of the iodine index at vegetable oils studied

number for the cold-pressed sunflower oil was superior to the blank taken from the refined sunflower oil (198 mg KOH compared to 186 mg KOH for the refined oil).

The determination of iodine has highlighted the unsaturation degree, less in cold-pressed sunflower oil than in the refined sunflower oil.

In figure 2 it can be noticed a clear difference between the two types of oil. Thus, the crude sunflower oil shows a iodine of 114 g compared to the refined oil where the iodine was 153 g.

The physico-chemical analysis of the two analyzed oil types emphasizes the quality character of each of them.

CONCLUSIONS

From the organoleptic and physico-chemical point of view, the two oil types resulted from the same raw material (sunflower) leads to the following conclusions:

In terms of organoleptic analysis, both cold-pressed sunflower oil and refined sunflower oil showed differences of consistency, colour, taste and smell.

One could say that the two analyzed oil types are considered edible, being used as such for salads and dressings (cold-pressed sunflower oil) and subjected to heat treatment (refined sunflower oil) complying with the applicable requirements from STAS:

– clear, no suspensions or sediments (for the refined oil);

– yellow colour (refined oil) or brownish yellow (for the cold-pressed oil), without spots or differently colored layers;

- the taste and smell are pleasant, specific, without strange scent (bitter or rancid);
- fluid consistency (refined) and semi-fluid (cold-pressed oil).

Consequently to analyzing the quality indicators it is therefore noticed that the cold-pressed sunflower oil presents certain inconveniences compared to the refined sunflower oil in terms of preservation period. One could say that it is unstable (it oxidizes in contact with the air and at high temperatures, allowing the rancidity to appear gradually. It also presents sedimentations (which does not represent a fault of the product). It is the result from the precipitation of salts and proteins which, under improper conditions, may lead to the depreciation of the oil.

The determination of iodine for the two analyzed oil types highlights the unsaturation degree which is less in the cold-pressed sunflower oil compared to the refined sunflower oil. The cold-pressed sunflower oil has a higher free acidity compared to the refined sunflower oil. This fact leads to shortening the preservation time of the crude oil. It is to be noted that the indicators for the sunflower oil obtained by cold pressing point out that it is not suitable for long-term storage. Furthermore, it requires taking measures against the oxidation process. It is recommended to be used during the first days after manufacturing maintaining the bottle filled as much as possible or under conditions of temperature and light specific to this type of oil.

For consumption, it is recommended both the crude sunflower oil obtained by cold-pressing and the refined one provided that the cold-pressed oil is used as such and not cooked, as this is specific only to the refined oil, which can be used in both ways.

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ANALYSIS OF THE BIOTHECHNOLOGICAL FAULTS OF CERTAIN BREADS

Căpruciu Ramona[1*], Costea D.C.[1]

Key words*: pieces of bread, white and dark bread, hearth oven*

ABSTRACT

The bread faults and diseases are well known to specialists and a part of consumers. The impact of a bread fault over the consumer may be insignificant or may have a major effect which could lead to his further refusal of buying bread. The clear identification of the production stages when the faults may appear and the conditions which lead there may help the technologist in obtaining a quality product. Making breads out of poor quality flour resulted from a batch of wheat from 2014, under conditions of humid climate, is the main subject of this study.

It is hereby intended to accomplish a comparison between two types of bread: white bread (the most demanded by the Romanian consumer) and the brown bread. Besides highlighting the nutritious importance of these two sorts of bread, it is also intended to analyze certain faults which may appear under inappropriate conditions for obtaining the raw material.

INTRODUCTION

Even today, a shortage of bread is synonymous with hard times, while the promise of its service is used as rallying call for better life (M.G. Scanlon and col., 2001).

Fresh bread usually presents an appealing brownish and crunchy crust, a pleasant aroma, fine slicing characteristics, a soft and elastic crumb texture, and a moist mouthfeel (Giannou et al., 2003).

In order to determine the quality of the bread, a special importance resides in its chemical composition, as the substances involved in its componence help in getting the energy needed by the human body, the formation of tissues and regulation of different body processes. Besides the chemical composition, the quality of the bread and its food value depend largely on the taste indexes: flavor and taste, aspect, crumb aeration (porosity) - Mihaela Ionela Luchian 2012.

The quality of flour is assessed by determining the sensory characteristics (colour, taste, smell), physico–chemical (acidity, moisture, ash content, granularity, metallic impurities), technological (wet gluten content, dry gluten content, gluten deformation index, moisturizing ability), infestation level (Banu C. et al., 2000; Bordei D., 2004).

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Following the research, it was concluded that the bread produced from grinded flour using all cereal grains is richer in nutrients, minerals and vitamins than the white bread, refined, bran and understandably of lower quality (acc. to Banu C., 2000, Giurcă V., 2002, Godon B., 2002, Ramona Căpruciu 2013).

The parameters measured during the technological process of obtaining the bread are also essential in getting a quality product. For example, maintaining the dough at a temperature above 35° C, although it leads to an intensification of the fermentation process, stimulates the development of aerobic spore bacteria *Bacillus*, which are in large numbers in flour, so that the bread resulting from that dough may subsequently suffer of stretching diseases (acc. to Felicia Dragomir 2006).

We can say that the bread, the most consumed food at the moment, results from a biochemical process which is based on the fermentative activity of yeasts.

MATERIAL AND METHODS

The bread acidity identification is an index of freshness, varying depending on the sort of bread.

Humidity is one of the basic qualitative indicators characterizing the bakery products. This indicator has a special importance for the bakery industry with regard to the faulty bread. The method refers to appreciating the moisture based on the weight loss of approx. 5g, by maintaining it in the drying chamber at 130 ± 3^0 C for one hour.

The moisture is expressed by a figure followed by one decimal, by rounding the results of two parallel determinations between which the difference is no more than 0.3%. If the difference exceeds 0.3%, two more parallel determinations are performed.

If the difference is still big, it is calculated the arithmetic mean of the four determinations.

The porosity represents the total volume of air holes from the bread-crumb (of the pores existing in 100g of crumb) and proves the aeration level of the product.

The determination of the porosity is based on the method of finding out the specific weight of the crumb without pores.

For that, three cylinders of bread-crumb cut out of two or three slices of bread of 2 cm thickness are weighted.

The height of the cylinder is calculated as arithmetic means of the measured 2-3 heights.

The insufficiently developed porosity and the thick-walled pores usually characterizes the product acquired from insufficiently fermented and afterwards baked dough and generally manufactured carelessly.

The result is calculated with one decimal and is rounded to integer. As a result, it is taken the arithmetical means of two determinations of the same analysis sample.

The difference between two parallel determinations performed by the same operator in the same lab must not exceed two percentages of the volume in absolute value.

RESULTS AND DISCUSSIONS

Getting a quality bread without biotechnological faults is possible only by using high quality raw and auxiliary materials during the manufacturing process.

In this paper it will be analyzed, on the one hand, the faultless traded sorts of white and brown bread (Figure 1).

On the other hand and at the same time what makes the subject of the present paper is the analysis of certain sorts of bread (white and brown) which presents faults resulted from the trade.

Getting the two sorts of bread (under proper or improper conditions) occurred in two respects:

- Getting a white bread (P_1) and a brown bread (P_2) under proper conditions
- Getting a white bread (P_3) and a brown bread (P_4) under improper conditions

The proper conditions for getting the two sorts of bread resided in complying with the parameters and stages of the technological process.

The proper conditions consisted in using a low quality flour (low extraction index, the presence of mold fungi in the product dough and of little fermenting compact yeast).

For the two sorts of bread studied the organoleptic quality indexes were analyzed by comparison. The results were registered in Table 1.

In terms of form, the appreciation was visual, considering the volume proportional to the mass and the presence of certain possible faults (deformed products, flattened, bulged, etc.).

With regard to the bread acquired from low quality flour it has been observed a major crust faults both on sample P_3 and sample P_4. Both samples present faults on the edges of the crust. In addition to that, cracks have been noticed at the brown bread.

a) b)

Figure 1 Dark bread with core defects a) compact core; b) core with lateral cracks

In the case of P_2 samples it was noticed an improper elasticity so that the crumb would raise again approximately 1 minute after the press.

Following the test, the samples P_4 presented an extremely low elasticity and the crumb did not go back to its initial form.

In this case it was visually noticed a more dense crumb, with fine pores which led to an easily crumbling product. The samples P_2 have also presented a crushing crumb but the crushing degree was average.

Following the smell determinations for P_1 and P_2, the samples presented an adequate smell.

Immediately after taking them out of the oven, the samples P_2 had a pleasant smell of roasted bread, with no strange scent (mold, rancid).

Following the cooling and storage, the analyzed samples presented a slightly sour unspecific smell. In the case of P_4 samples, the sour smell was more intense and increased during storage.

No taste defect was noticed in the case of P_1 and P_2 samples. On the contrary, the bread samples made from low quality flour had a sour taste, more intense in the sample P_4, which became improper for consumption 8 hours after being stored at room temperature.

Determining the porosity was the main physical indicator which proved the quality of the analyzed samples. According to the tables, it was noticed a normal porosity at samples P_1 and P_2 (traded white and brown bread), as per Stas.

Comparing the information got for samples P_3 and P_4 (white and brown bread made out of improper raw material), the porosity was much less.

The low porosity of samples P_3 and P_4 shows that the crumb is more compact. Moreover, the analysis prove that it is also more easily crumbled.

That is a fault that the consumers dislike. Just like in the case of the samples with small pores, it was noticed that, after taking it out of the oven, the form of the finite products is more flattened (more obvious in P_4) than the form of the traded products with normal porosity, specific to each analyzed sort of bread.

In Table 1, one can notice normal indexes, specific to the white bread and brown bread. The acidity expressed in °Thörner is higher in the brown bread compared to the white one (6.2 compared to 3.6 °Thörner).

It is noticed the increase of acidity in the bread made of flour resulted from infested cereals and high humidity. This is a fundamental indicator of the fact that the bread is no longer very fresh.

The increase of acidity is obvious in P_3 and P_4 (faulty white and brown samples), which proves that, besides the physical faults (side cracks, compact crumb, flattened form), the analyzed bread sorts also have technological defects due to the use of infested wheat and inadequate moisture in the same manufacturing facility (Table 2).

Tabel 1

The phsyhical and chemical properties of some breads

Breads (0,300kg/pieces)	Type of cooking	Acidity (° Thörner)	Core humidity (%)	Porosity (%)
White bread	Hearth oven	3.6	42.9	72
Dark bread		6.2	45.8	62

When we talk about bread faults, determining the humidity level is another essential indicator. From the data registered in the two tables it is noticed that the samples of traded bread (P_1 and P_2) present a normal moisture level.

Table 2

The phsyhical and chemical properties of some breads with defects

Breads (0,300kg/pieces)	Type of cooking	Acidity (° Thörner)	Core humidity %	Porosity %
White bread with defects	Hearth oven	4.4	46.5	57
Dark bread with defects		7.3	49.2	45

Moreover, the increase of acidity in the bread samples P_3 and P_4 (faulty bread) shows an environment which is favorable for the development of microorganisms that will later on give that sour taste, more obvious in P_4, during storage and immediately after preservation.

The clear difference in moisture between the analyzed bread samples is very well presented in Picture 2, where it is shown that the content is above the applicable standards of 49.2% for P_4 (the sample of faulty brown bread), and P_3 with 46.5 % moisture.

Analyzing the traded samples (P_1, P_2) in comparison with the ones manufactured from inadequate raw material (P_3, P_4) it is noticed a clear difference in terms of quality indicators analyzed (both acidity and moisture), considering that the traded samples have the same indicators as per Stas.

CONCLUSIONS

The study of the four bread sorts (two traded ones and two manufactured from inadequate raw material) has highlighted the need for getting certain sorts of bread which would strictly comply with the technological process; that is first of all using high quality raw material.

Herein, it was acknowledged that the use of low quality flour, both white and brown, has led to bread sorts of questionable quality, despite the fact that the technological process has been rigorously complied with.

The bread samples manufactured from low quality flour presented altered values compared to the traded ones both in terms of acidity and also moisture and porosity, given that the values were not complying with the applicable standards for bakery products.

During storage, the value of the increased acidity, correlated with the increased moisture of the crumb and the low porosity have led to the alteration of the bread taste and smell, which means that, under the influence of storage conditions, of high moisture of the crumb and low quality of the flour, the biotechnological defects emerge.

The coming out of physical and biotechnological faults following the product manufacturing makes that the bread sorts produced from inadequate raw material lose their quality and that is unfavorable for consumption.

Consequently, knowing the quality of the raw material for producing bread is an essential element that should be taken into consideration by specialists nowadays, when quality expectations of consumers have increased.

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AMPELOGRAPHIC AND AMPELOMETRIC DESCRIPTORS OF OLTEAN GRAPEVINE VARIETY

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Keywords*: table grapes*, *morphological characteristics*

ABSTRACT

The aim of this paper is to describe the ampelographic characteristics of the Oltean table grape cultivar. For this purpose 105 ampelographic descriptors, of which 18 ampelometric descriptors, were selected and used. Five morphological descriptors were retained and used for young shoot, thirteen descriptors for shoot, five descriptors for young leaf, thirty descriptors for mature leaf, six descriptors for woody shoot, four descriptors for flower, eight descriptors for bunch and sixteen descriptors for berry.

All measurements were made at different times during the growth cycle, in accordance with the International Office of the Vine and Wine (OIV), International Union for the Protection of New Varieties of Plants (UPOV) and Bioversity.

INTRODUCTION

The description of vine varieties and species of *Vitis* through ampelographic characteristics has been the subject of many studies for a long time. The studies were focused on the role of different organs of vine in the description and recognition of vine varieties: leaf morphology and leaf polymorphism (Viala &Vermorel 1901-1910, Constantinescu et al., 1959-1970, Carneiro &Lima 1987); the use of ampelometry (Galet P. 1985, Martinez & Grenan 1999, Rotaru & Tirdea 2002); grape cluster, berry and seed characteristics (Santiago J.L. et al. 2007).

With the development of knowledge in the molecular genetics field, researches into ampelography recorded a new stage. The researches were directed to grapevine genetic diversity (This P. et al. 2006, Karataş et al. 2014) and to development of a standard set of microsatellite reference alleles for identification of grape cultivars (Thomas & Scott 1993, Bowers et al. 1999, Ibanez et al. 2003, Santiago et al. 2007).

The purpose of this paper is to describe the ampelographic and ampelometric characteristics of the Oltean table grape cultivar.

Oltean is a Romanian table grape cultivar obtained from the controlled pollination of *Dattier de Saint Vallier X Victoria* genitors. It was obtained at the University of Craiova

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by a team of authors including Olteanu I., Cichi Daniela Doloris, Giugea N., Popa Camelia, Costea D.C. and was homologated by ISTIS in 2011 (Cichi Daniela et al. 2012).

MATERIAL AND METHODS

With a view to describe the Oltean cultivar, the following ampelographic descriptors were retained and used: five morphological descriptors for young shoot (codes OIV 001, 002, 003, 004, 005), thirteen descriptors for shoot (codes OIV 006, 007, 008, 009, 010, 011, 012, 013, 014, 015-1, 015-2, 016, 017), five descriptors for young leaf (codes OIV 051, 053, 054, 055, 056), thirty descriptors for mature leaf (codes OIV 065, 067, 068, 069, 070, 071, 072, 073, 074, 075, 076, 077, 078, 079, 080, 081-1, 081-2, 082, 083-1, 083-2, 084, 085, 086, 087, 088, 089, 090, 091, 093, 094), six descriptors for woody shoot (codes OIV 101, 102, 103, 104, 105, 106), four descriptors for flower (codes OIV 151, 152, 153, 155), eight descriptors for bunch (codes OIV 202, 203, 204, 206, 207, 208, 209, 502) and sixteen descriptors for berry (codes OIV 220, 221, 222, 223, 225, 226, 227, 228, 229, 231, 232, 235, 236, 238, 240, 241). All measurements were made at different times during the growth cycle, in according with the *OIV descriptor list for grape varieties and Vitis species* (2009).

Adult leaves were collected in August. The sample consisted of 12 leaves (between the 8th and 11th node on a fruiting branch) from different vine (situated at random). These were pressed and used for ampelometric measurements. Ampelometric variables measured were those mentioned by the OIV (2009) : length of veins N1 (Cod OIV 601), N2 (Cod OIV 602), N3 (Cod OIV 603), N4 (Cod OIV 604), N5 (Cod OIV 611); length petiole sinus to upper lateral leaf sinus (Cod OIV 605), length petiole sinus to lower lateral leaf sinus (Cod OIV 606); angle between N1 and N2 (Cod OIV 607), angle between N2 and N3 (Cod OIV 608), angle between N3 and N4 (Cod OIV 609), angle between N3 and the tangent between petiole point and the tooth tip of N5 (Cod OIV 610); length and width of tooth of N2; length and width of tooth of N4; number of teeth between the tooth tip of N2 and the tooth tip of the first secondary vein of N2 including the limits; length between the tooth tip of N2 and the tooth tip of the first secondary vein of N2 and opening/overlapping of petiole sinus.

Statistical data was used for data collected in 2010 and 2011. Statistical analysis was done using XL STAT- *soft data analysis and statistics*. Values were expressed as mean and standard deviation. Level of significance was taken as $P < 0.05$.

RESULTS AND DISCUSSIONS

The evaluation of morphological descriptors used to describe young shoot, shoot and woody shoot in Oltean cultivar is shown in Table 1.

Shoot is semi-erect before tying, with green internodes on the dorsal side and green with red streaks on the ventral side (table1). Density of prostrate hairs on internodes is medium and low on nodes. Number of consecutive tendrils is 2 or less and length of tendrils is medium. Tendrils have 2 or 3 branches (Figure 1).

Mature leaf. Shape of blade, at mature leaf, is circular- kidney shaped. Blade of the mature leaf is medium-green (Figure 2), with three lobes and without prostrate or erect hairs on main veins on the upper side (shiny appearance). The main veins are green on both sides of the leaf blade.

The petiole sinus is open (22.50 mm, average opening), with base of sinus in **U** – shape (Table 2 and Table 3). Petiole sinus base is not limited by vein (Figure 2).

Length petiole sinus to upper lateral leaf sinus is medium (62.45 mm, on average), Table 3.

The upper lateral sinuses are open, with shape of the base of sinuses in **V-** shaped**.** Mature leaf does not have teeth in the upper lateral sinuses.

Goffering of blade (OIV 072) is very weak, while the undulation of blade between main or lateral veins is present (Figure 2).

Density of prostrate hairs between main veins on lower side of blade is low and density of erect hairs between main veins on lower side of blade is very low. Prostrate hairs and erect hairs are absent on main veins on upper side of blade.

Table 1

Ampelographic descriptors of young shoot, shoot and woody shoot – Oltean table grape variety

Characteristics	OIV	UPOV	IPGRI	Notes	
Young shoot:					
Opening of the shoot tip	001	2	6.1.1	half open	3
Distribution of anthocyanin coloration on prostrate hairs of the shoot tip	002			absent	1
Intensity of anthocyanin coloration on prostrate hairs of the shoot tip	003	4	6.1.2	none	1
Density of prostrate hairs on the shoot tip	004	3	6.1.3	very low	1
Density of erect hairs on the shoot tip	005	5	6.1.4	none	1
Shoot:					
Attitude (before tying)	006	9	6.1.5	semi-erect	3
Color of the dorsal side of internodes	007	10	6.1.6	green	1
Color of the ventral side of internodes	008	11	6.1.7	green and red	2
Color of the dorsal side of nodes	009	12	6.1.8	green	1
Color of the ventral side of nodes	010	13	6.1.9	green and red	2
Density of erect hairs on nodes	011		6.1.10	very low	1
Density of erect hairs on internodes	012	14	6.1.11	low	3
Density of prostrate hairs on nodes	013		6.1.12	low	3
Density of prostrate hairs on internodes	014		6.1.13	medium	5
Distribution of anthocyanin coloration on the bud scales	015-1			basal	2
Intensity of anthocyanin coloration on the bud scales	015-2			medium	5
Number of consecutive tendrils	016		6.1.14	2 or less	1
Length of tendrils	017	15	6.1.15	medium	5
Woody shoot:					
Cross section	101			elliptic	2
Structure of surface	102		6.1.41	striate	3
Main color	103	44	6.1.42	brownish - yellow	2-1
Lenticels	104			absent	1
Erect hairs on nodes	105			absent	1
Erect hairs on internodes	106			absent	1

Table 2

Ampelographic descriptors of young and mature leaf for Oltean table grapes variety

Characteristics	OIV	UPOV	IPGRI	Notes	
0	1	2	3	4	
Young leaf:					
Color of upper side of blade (4th leaf)	051	6	6.1.16	yellow- bronze	1/3
Density of prostrate hairs between main veins on lower side of blade (4th leaf)	053	7	6.1.17	low	3
Density of erect hairs between main veins on lower side of blade (4th leaf)	054		6.1.18	very low	1
Density of prostrate hairs on main veins on lower side of blade (4th leaf)	055		6.1.19	low	3
Density of erect hairs on main veins on lower side of blade (4th leaf)	056	8	6.1.20	very low	1
Mature leaf:					
Size of blade	065	17	6.1.21	medium	5
Shape of blade	067	18	6.1.22	circular - kidney-shaped	4/5
Number of lobes	068	20	6.1.23	three	2
Color of the upper side of blade	069			medium green	5
Area of anthocyanin coloration of main veins on upper side of blade	070			absent	1
Area of anthocyanin coloration of main veins on lower side of blade	071			absent	1
Goffering of blade	072			very weak	1
Undulation of blade between main or lateral veins	073			present	9
Profile of blade in cross section	074		6.1.25	V-shaped	2
Blistering of upper side of blade	075	19	6.1.26	absent	1
Shape of teeth	076	26	6.1.27	both sides straight	2
Size of teeth in relation to blade size	077			medium	5
Length of teeth compared with their width	078	25	6.1.29	medium	5
Degree of opening / overlapping of petiole sinus	079	23	6.1.30	open	3
Shape of base of petiole sinus	080			U-shaped	1
Teeth in the petiole sinus	081-1		6.1.31	none	1
Petiole sinus base limited by vein	081-2*		6.1.32	not limited	1
Degree of opening / overlapping of upper lateral sinuses	082*	22	6.1.33	open	1
Shape of the base of upper lateral sinuses	083-1			V-shaped	3
Teeth in the upper lateral sinuses	083-2			none	1
Density of prostrate hairs between main veins on lower side of blade	084	28	6.1.35	low	3
Density of erect hairs between main veins on lower side of blade	085		6.1.36	very low	1
Density of prostrate hairs on main veins on	086		6.1.37	very low	1

lower side of blade					
Density of erect hairs on main veins on lower side of blade	087	29	6.1.38	very low	1
Prostrate hairs on main veins on upper side of blade	088		6.1.39	absent	1
Erect hairs on main veins on upper side of blade	089			absent	1
Density of prostrate hairs on petiole	090			very low	1
Density of erect hairs on petiole	091			very low	1
Length of petiole compared to length of middle vein	093	30	6.1.40	equal	5
Depth of upper lateral sinuses	094	21	6.1.34	shallow-medium	3/5

Table 3

Ampelometric descriptors of mature leaf- Oltean table grape variety

Characteristics of mature leaf	Cod OIV	Mean value	SD*	Notes	
Length of vein N1 (mm)	601	118.5	12.79	short	3
Length of vein N2 (mm)	602	103.15	8.30	medium	5
Length of vein N3 (mm)	603	75.25	6.71	medium	5
Length of vein N4 (mm)	604	49.95	6.60	long	7
Length petiole sinus to upper lateral leaf sinus (mm)	605	62.45	7.83	medium	5
Length petiole sinus to lower lateral leaf sinus (mm)	606	60.85	7.68	medium	5
Angle between N1 and N2 measured at the first ramification (º)	607	40.55	4.39	small	3
Angle between N2 and N3 measured at the first ramification (º)	608	43.55	5.04	small/ medium	3/5
Angle between N3 and N4 measured at the first ramification (º)	609	47.65	3.72	medium	5
Angle between N3 and the tangent between petiole point and the tooth tip of N5 (º)	610	87.05	12.67	very large	9
Length of vein N5 (mm)	611	31.64	7.33	medium	5
Length of tooth of N2 (mm)	612	12.75	2.21	short/ medium	3/5
Width of tooth of N2 (mm)	613	12.40	2.53	short/ medium	3/5
Length of tooth of N4 (mm)	614	10.15	1.57	short	3
Width of tooth of N4 (mm)	615	11.65	1.47	short	3
Number of teeth between the tooth tip of N2 and the tooth tip of the first secondary vein of N2 including the limits (no.)	616	5.80	0.75	medium	5
Length between the tooth tip of N2 and the tooth tip of the first secondary vein of N2 (mm)	617	38.10	7.66	short	3
Opening/overlapping of petiole sinus (mm)	618	22.50	9.54	open	3

*SD- standard deviation, P <0.05

Table 4

Ampelographic descriptors of the flower, bunch and berry - Oltean variety

Characteristics	OIV	UPOV	IPGRI	Notes	
Flower:					
Sexual organs	151	16	6.2.1	fully developed stamens and fully developed gynoecium	3
Insertion of 1st inflorescence	152			from the 5th node on	3
Number of inflorescences per shoot	153		7.1.3	1 to 2 inflorescences	2
Fertility of basal buds (buds 1-3)	155			very low	1
Bunch:					
Length (peduncle excluded)	202		7.1.5	long	7
Width	203			medium - wide	5/7
Density	204	33	6.2.3	medium	5
Length of peduncle of primary bunch	206	34	6.2.4	short - medium	3/5
Lignification of peduncle	207			at the base only	1
Shape	208			Conical	2
Number of wings of the primary bunch	209			4-5 wings	3/4
Single bunch weight	502		7.1.14	medium/high	5/7
Berry:					
Length	220		6.2.5	long	7
Width	221			narrow - medium	3/5
Uniformity of size	222			not uniform	2
Shape	223	36	6.2.6	ovoid	7
Color of skin	225	37	6.2.8	green - yellow	1
Uniformity of skin color	226			uniform	2
Bloom	227			high	7
Thickness of skin	228	39	7.1.6	medium	5
Hilum	229		7.1.8	little visible	1
Intensity of flesh anthocyanin coloration	231	40	6.2.9	none	1
Juiciness of flesh	232		6.2.10	medium juicy	2
Firmness of flesh	235	41	6.2.11	very firm	3
Particular flavor	236	42	6.2.12	none	1
Length of pedicel	238		7.1.7	medium	5
Ease of detachment from pedicel	240	38	6.2.13	easy	2
Formation of seeds	241	43	6.2.7	complete	3

Regarding the ampelometric descriptors (table 3), the length of vein N1 at mature leaves of Oltean variety is short (118.5 mm). According to the OIV (2009), in relation to the average values of the length of vein N2 (103.15 mm), of the length of vein N3 (72.25

mm) and of the length of vein N5 (31.64 mm), these veins are classified as medium length. With a mean value of the length of 49.95 mm, the vein N4 is classified as long length.

Shape of teeth (OIV 076), between N2 and N3 excluding teeth of N2 and N3, is a both sides straight (Figure 2). In accordance with a mean value of the length of the tooth of N2 (12.75 mm) and the width of the tooth of N2 (12.40 mm), tooth of N2 is classified in notation short-medium (table 3).

a. b.

Figure 1. Oltean grapevine variety (a. young shoot; b. young leaf)

Figure 2. Oltean grapevine variety-mature leaf

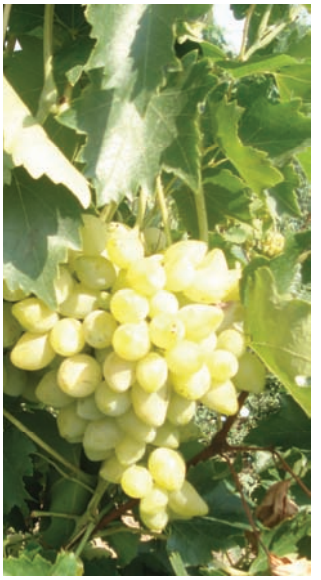

Figure 3. Oltean variety-Bunch

Oltean shows 1 to 2 inflorescences per shoot, inserted from the 5th node up (Table 4).

The *bunch* has conical shape, medium density, with 4-5 wings on the primary bunch (Figure 3). Average length of primary bunch (peduncle excluded) is 215. 00 ±11.40 mm; the length of the peduncle of primary bunch is short-medium (62.5 ± 8.66 mm). Peduncle of bunch is lignified at the base only. Average bunch weight is 545.24±118.90 g.

Berries are big (6.60± 1.40g), long (20.43± 2.08 mm) and have ovoidal shape. The berry skin is medium thick, greenish-yellow and medium pruinose. The flesh is crunchy, with complete developed seeds and adherent to the flesh.

In cross-sectional view, the *woody shoot* (table 1) appears elliptical, brownish-yellow, striate, with medium-sized internodes.

CONCLUSIONS

The ampelographic and ampelometric descriptors shown in this paper are the basis of reference in describing and identifying the Oltean table grape variety.

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PEAR'S ROOT SYSTEM GROWTH AND LOCATION ON THE INFLUENCE OF MAINTENANCE SYSTEM IN OLTENIA'S SOILS

Cichi M.[1]

Keywords: *pear, maintenance system, root system, variety*

ABSTRACT

The maintenance of orchards has an important role in achieving a higher production quality and quantity. There is a close correlation between the development of the root system - raising fruit and yields, which can be influenced by negative or positive ground system maintenance.

The results are different and depend on the particular fruit growing, the rootstocks and the region being connected to the system maintenance. Intercropping between rows of trees shows a horizontal influence on tree roots both at a bigger or a smaller depth.

The vigour of the trees of the two varieties is influenced positively by having a soil maintenance system, worked or cultivated field between rows of onions.

In Oltenia, fruits presented positive qualities especially in the system worked field with onion rows. The maintenance system of fruit trees plantations must be a present fact.

INTRODUCTION

The pear tree species occupy an important place in the world after apple trees, its fruits having superior taste qualities which are very appreciated by consumers. The chemical composition of fruits depends on the climatic conditions of the area, on soil, on variety, and on the maintenance system practiced in culture.

Well-known researchers (Voiculescu N. et al., 2001), indicate that the size of the frame content and its mode of distribution in the soil profile are factors that cause changes in trees, regarding the state of vegetation, the tree trunk thickness, the root distribution and their destruction.

The rootstock has an important role in the vigour of trees, in the way they are planted and in the compatibility of the soil with its variety. Thus (Elkins R. B. et al., 2011) in this respect, they have studied behaviour of five varieties on several rootstocks, the Golden Russet Bosc variety showing no statistical differences on Horner 4 and Pyrodwarf rootstocks. In 2005, (Baciu A., 2005) one states that as to the choice of soil maintenance system one must take into account certain factors, such as the culture system, the land mapping, the soil physical characteristics and the climatic conditions.

It is mentioned that at a planting distance of more than 4.0 m, intercropping has not negatively influenced the development of young trees (Şuta A., 1977). Pear in

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association with quince exploit shallow soils, which are rich in nutrients, but low in lime content (Popescu M. et al., 1992).

An important link to increase the production potential of pear trees is setting an optimal soil maintenance, (Branişte N. et al., 1986). As a result of the research (Daniela Popa et al., 1999), we state that the influence of different soil maintenance systems on the state of fertility can be quantified by adding chemical and biological parameters.

Many authors (Elena Voica et al., 1997), dealt with improving the assortment of pear trees, thus, according to the researches, for the Southern part of Oltenia we recommend the Bella di Giugno varieties, Untoasă Precoce Morettini, Napoca and Williams which can give a productivity of 30-35 t / ha.

As to the maintaining of soil in orchards and environmental issues they were dealt by authors (Sina Niculina Cosmulescu, 2003) who state as the result of their research that the maintenance of soil has an important role in maintaining or increasing the content of organic matter in soil.

As a result of the research (Ciobanu A. et al., 2010), they showed that the influence of rootstock on main phenological phases of growth and fruiting of plum varieties is not very high and the values obtained are quite close on these phenophases. It is important to know the phenophases of the vegetative organs of fruit and of fruit trees, as it may direct the growth and fruiting in order to obtain high yields and high quality.

MATERIALS AND METHODS

In order to determine the most efficient maintenance system in an intensive pear tree plantation, an experimental research was made in Craiova, on autumn, on a red ground in 2004. The varieties of pear trees were “Favorita lui Clapp” and “Untoasă de Geoagiu”, grafted on quince rootstocks with intermediate and run as palmettes at a distance of 4/2 m.

The experience showed the variants:

V1 - worked field at each row and between rows;

V2 - worked field at each row and perennial grass between rows;

V3 – worked field at each row and onion between rows;

V4 - worked field at each row and marrows between rows.

The variants of the experience were placed according to the linear method, in 4 repetitions with 8 trees on a row and 32 trees in variant.

There were made tests and observations during 2012-2014. The profile method was used for the observation of horizontal roots, thickness and their numbers.

The main objectives were achieved:

- Checking the influence of the maintenance system on the development of the root system;

- Checking the influence of the maintenance system on growth, on the development of trees, on fruit yield and on their quality.

RESULTS AND DISCUSSIONS

Well-developed root systems in depth, as well as a larger number of roots influence the growth of the stem, fructifying and fruit production of the researched varieties. Thus, after analyzing the development of the root system, by the profile method (Table 1 and Table 2), we find a certain number of grown roots due to the influence of the maintenance system.

Table 1

How to set the root system under the influence of maintenance system

Nr. crt.	Variant	5-10 cm			11-20 cm			21-30 cm		
		3 mm	4-8 mm	> 8 mm	3 mm	4-8 mm	> 8 mm	3 mm	4-8 mm	> 8 mm
1.	Worked field on rows and between rows				10	6		8	8	1
2.	Worked field on rows and perennial gras between rows	8	3		11	3		5	2	1
3.	Worked field on rows and onion between rows	4			10	3		3	9	3
4.	Worked field on rows and marrows between rows	2			6	3	2	5	8	

Table 2

How to set the root system under the influence of maintenance system

Nr. crt.	Variant	31- 40 cm			41-50 cm		
		3 mm	4-8 mm	> 8 mm	3 mm	4-8 mm	> 8 mm
1.	Worked field on rows and between rows	2	3	1	3	3	
2.	Worked field on rows and perennial gras between rows			1			
3.	Worked field on rows and onion between rows		2			2	
4.	Worked field on rows and marrows between rows	2		2			

A larger number of roots was formed (45) using the maintenance system on the worked field at a row and between rows (V1), where the main mass of roots is inserted between 10 and 50 cm. Between 5 and 10 cm roots do not exist because of the lack of maintenance works of the soil, and the highest number of roots was formed in the range between 21 and 30 cm (17 roots).

In the variant with perennial grass between rows (V2), the roots are planted closer to the surface, between 5-30 cm because the soil is not worked, and the roots need better breathing. After cultivation between rows of onions (V3), 36 roots were grown. A large mass of roots was formed between 10-40-50 cm, with their dominance of 20-30 cm in the soil layer.

The lowest number of roots was formed on V6 version with zucchini between rows, the roots being planted between 10-40 cm. There are many roots between 10-30 cm. As to V1 variant of the table we can see a greater number of 4-8 mm roots in the soil layers of 11-20 cm, 21-30 cm, 31-40 cm. This is due to fertilizing with nutrients that reach the roots of the trees without competition.

The version with perennial grass shows a dominance of 1-3 mm roots between 5-30 cm. the version with onion show the dominance of 4-8 mm roots between 10-50 cm. The last variant V6 with zucchini shows a greater presence of 3 mm roots (15 roots).

The roots were measured according to the method of simplified monolith and various sizes were recorded (Table 3).

Table 3

The influence of maintenance system on root length of pear varieties grafted on quince rootstocks with intermediate

Nr. crt.	Variant	Rulling roots (cm/dm^3)	Transition roots (cm/dm^3)	Absorbing roots (cm/dm^3)	Total length (cm/dm^3)
1.	Worked field on rows and between rows	28	25	17	70
2.	Worked field on rows and perennial grass between rows	20	19	12	51
3.	Worked field on rows and onion between rows	24	22	17	63
4.	Worked field on rows and marrows between rows	18	17	15	50

The variants with a greater length of roots were V1 worked field (70 cm) and V3 with onion between rows (63 cm). From the results we can see that the systems worked field as well as the system worked filed with onion between rows can be successfully used because it provides a good rooting of pear trees varieties.

A shorter length of roots was recorded on the versions with perennial grass (51 cm) and with zucchini between rows (50 cm). The study included conducting roots, transition roots and the absorbing ones. The maintenance system worked field on rows and between rows presented a higher number of ruling roots (28) compared with the other systems.

It is necessary to study this aspect and observe lateral root expansion, the data being useful to direct the maintenance and fertilization works, related to the structural nature of the root system.

The vegetative growths showed on the variants with perennial grasses (V2) and marrows (V4) low values significantly negative, which highlight the competition between crops and trees, regarding water and food supplies. Thus, it is necessary an extra fattening.

A growing efficiency of the large trunk sectional area can be easily noticed with the maintaining of the worked field soil V1 (90 cm^2 / tree) and with the variant when the onion is cultivated between rows V3 (87 cm^2 / tree). Very significant negative values are obtained with V2 and V4 versions, the growing efficiency being low.

The soil maintenance systems have influenced the fruit production, so that, this aspect has a major interest, special values especially with pear species.

First, an efficient maintenance system must maintain and improve the soil physical and chemical properties.

The average yield was 28.0 kg / tree, and higher productions have been recorded with the variants worked field (30.0 kg / tree) and with onion (29.0 kg / tree). Low average yields are obtained with V2 and V4 versions. The systems with perennial grasses and with zucchini between rows negatively affect production.

They got large fruited varieties of 205 -207 g /fruit with V1 and V3 variants and the fruits had values of 15.0 -16.0% in these variants.

CONCLUSIONS

The maintenance system made up of intercropping influences the distribution of the roots both horizontally and in depth.

Horizontal roots are developed more in the depth of the soil at different variations of worked field between rows and with onion and with variants of perennial grasses between rows, the root system tends to rise to the surface.

A maintenance system with perennial grasses can lead to shallow rooting of rootstocks due to competition for food.

The maintenance of a system of worked field between rows helps generally maintain a higher aggressiveness of pear trees.

The presence of perennial grass and of marrows between rows leads to a negative influence on the growth of trees and on production and fruit quality.

The maintenance system of soil must be chosen carefully for any orchard, in order to preserve the land structure and to maintain the biological potential of the variety.

The environmental conditions of Oltenia can provide conditions for expanding the pear tree culture on intermediate quince rootstock in industrial plantations and in orchards.

For the climatic conditions of Oltenia one recommends that in the pear tree plantations, the interval between rows should be kept as a worked field, which can be done by plowing carried out at 10 to 15 cm on autumn, after leaf fall.

The system with perennial grass between rows is increasing the deficit of soil water, so it must be practiced cautiously.

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HEAVY METAL DISTRIBUTION IN DIFFERENT TYPE OF PAPER PACKAGING

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Keywords: *heavy metals, paper packaging, additives, FAAS*

ABSTRACT

Paper is a natural raw material from renewable wood, plants and sustainable recycling paper from waste paper and paperboard. Packaging materials mostly contain paper virgin or recycle. The additional technical demands placed on the paper are normally obtained through the used of chemical additives which are combined with the fibrous raw materials. The materials should maintain without disrupting the structure of the food or preventing migration of food

According to the directive EC/94/62, on Packaging and packing waste, the maximum limit of 100 mg/kg for all Pb, Cd, Cr, Cd and Hg.(3). There are numerous causes metallic migration from food packaging and food containers for food. Therefore it should be controlled to prevent sources of exposure to heavy metals for human health.

The requirements for the paper used for food package are specified in the EU legislation, It is specified very clearly that the migration process from paper and cardboard boxes and food products doesn't have to allow the transfer of dangerous products which can affect the health of the con sumers. Also, there are very strict limits for the heavy metals compounds.

INTRODUCTION

The maximum limits admitted according CE norms (SR EN 12498 and SR EN 12497, respectively SR EN 645 in cold watery extract and SR EN 647 in watery warm extract), being the following Cd<0.5mg/Kg Pb <3.0 mg/Kg, Cr<0.05 mg/Kg, Hg<0.3 mg/Kg (Delphine O.et al.,2004).

A few study investigated on the heavy metals migration from packaging paper boards to food performed by Marcelo Enrique Conti. Performed migration in the 3% acetic acid extraction for Pb and Cd detection of pizza packaging from 100 % virgine cellulose fibres are values 1.22-6.63 μg/dm^2 (0.41-2.37μg/g), 0.1-0.08 μg/g respectively and are higher than 0.01 μg/g Pb, 0.005 μg/g Cd guideline level by European Council 1993 (Conti M.E.,1999).

Also, CastleL. et al. have found mean value of Pb is 2.6 mg/kg for test liner paper and fluting paper is among 2.1-3.5 mg/kg . Cd has an average value of 0.094 mg/kg for test liner and for fluting papers (0.040; 0.060 and 0.129 mg/kg) are lower than Kraft paper used for paper bags, value of 0.3 mg/kg (Castle L. et al., 1997).

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MATERIAL AND METHODS

Sample for analysis. The assay was done on various paper types of different weight and fibrous composition, all of which had a base of natural kraft paper of 80g/m^2, whitened sulfate kraft paper of 80g/m^2 and 60g/m^2.

Seven samples were taken for analysis : bleached kraft paper (P1), bleached coated paper (P2), varnished paper(P3), ordinary wrapping paper (P4), paper covered in PE (P5), parafined paper (P6), parched paper 40-150g/m^2(P7).

The samples were analyzed according to SR EN 12497-98 and directions of the European Directive 94/62/EC regarding the content of toxic, carcinogenic and mutagen substances.

Pre-treatment of samples. Five grame of sample kept in a crucible and carbonized in muffle furnace at 500C for 3hr. The residue was dissolved in 5 ml of nitric acid 0,5N an then dried. The sample was dissolved to a final volume of 25 ml in nitric acid (1N) and filtered.

Measurement. The metals were determined by flame atomic absorption spectrometry (FAAS) with high resolution continuum source (Model ContrAA 300, Analytik Jena, Germany), in the Environmental Research Test Laboratory, Banat's University of Agricultural Sciences and Veterinary Medicine from Timisoara, Romania.

This spectroscopic method was chosen because it is a fast and easy technique with an extremely high sensitivity for elements like Pb, Cd, Cu and Cr. NCS Certified Reference Material-DC 85104a and 85105a (China National Analysis Center for Iron&Steel), were analyzed for quality assurance.

Percent recovery means were: Fe (92%), Mn (95%), Zn (102%), Cu (105%), Ni (99%), Pb (94%), Cd (105%), Co (98%). The variation coefficients were below 10%. Detection limits (μg/g) were determined by the calibration curve method: Fe (0.15), Mn (0.19), Zn (0.43), Cu (0.13), Ni (0.14), Cd (0.01), Pb (0.05), Co (0.07)

RESULTS AND DISCUSSIONS

The heavy metals concentration measured for the/ from different paper types is presented in figure 1,2 and 3.

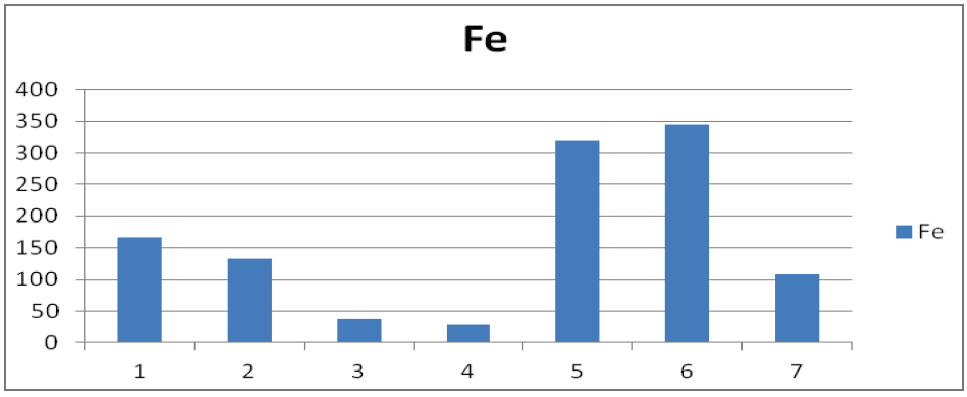

Figure 1. Iron distribution in paper samples

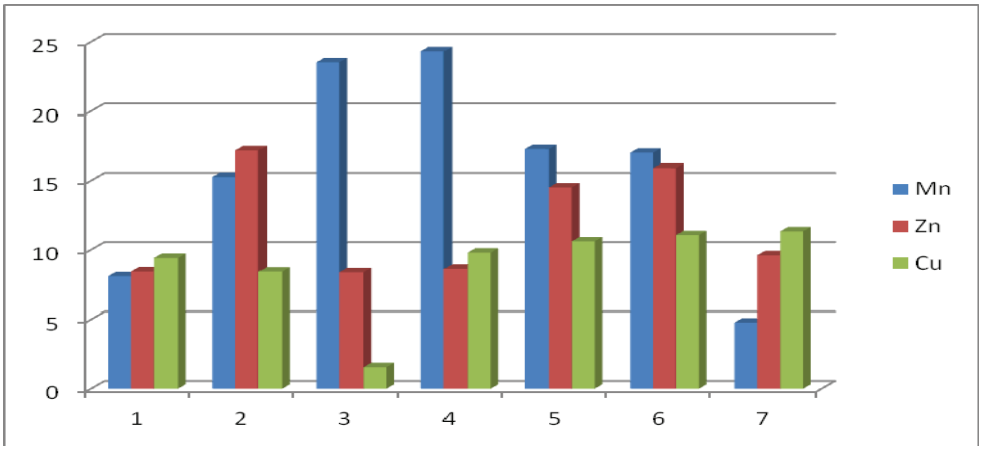

Figure 2. Potential toxic metals Mn, Zn and Cu distribution in paper samples

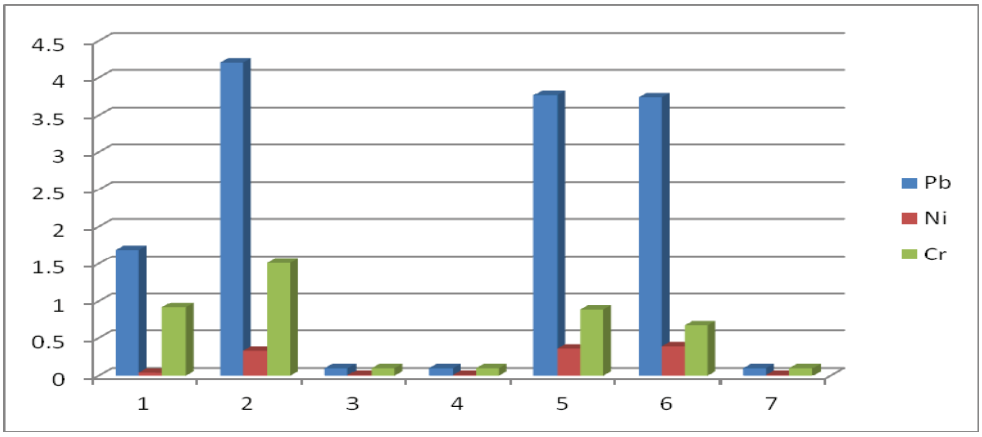

Figure 3. Toxic metals, Pb, Ni and Cr distribution in paper samples

Based on results of the analysis, samples P3, P4, P7 respect the directions of the European Directive 94/62/EC regarding the content of toxic, carcinogenic and mutagen substances. There were no traces of Cd and Co in any sample. Traces of Cr and Pb were detected in different quantities depending on the additives used in the fabrication process. The colored papers (printed in colors) especially show a high content of Cr and Pb.

The level of concentrations of heavy metals in sulfate paper shows the following decreasing order Fe > Mn >Zn >Cu >Pb >Ni >Cr.

The level of concentrations of heavy metals in sulphite paper and glassine shows the following decreasing order Fe > Mn >Zn> Cu> Pb> Ni >Cr.

The level of concentrations of heavy metals in paper covered with PE shows the following decreasing order Fe > Mn > Pb > Zn > Cu > Cr> Ni.

The level of concentrations of heavy metals in paraffin paper shows the following decreasing order Fe > Cu >Mn> Zn >Pb> Cr.

In the case of paper processed with different substances: polimers (paper covered in PE), polymer dispersion, (varnished paper) concentrations of heavy metals was higher than in the case of chemically processed paper (glassine, paraffin paper , wax paper).

The level of Fe has medium concentration from 219.4 to 50.75mg/kg; Mn from 24.305 to 3.029 mg/kg

Zn has medium concentration from 8.68 to 2.28 mg/kg; Cu from 9.79 to 1.58 mg/kg;

Ni was detected in very small quantities.

The level of Pb has concentration from 9.84 to 0.75 mg/kg, while Cr from 0.85 to 0.18 mg/kg above maximum permitted value.

CONCLUSIONS

Paper is a composite with fibrous nature resulted from vegetal paste. This by itself implies a presence of metallic ions.

In the studied stationer products different contents of metallic ions could be observed, depending on the fabriaction process, supplier, and conditions for processing cellulose wrapper.

The contained Pb and Cr is above maximum permitted concentration, depending on the paper composition and used additives.

The contained Cd, Co, Ni, in paper has shown values inferior to those maximum permitted.

In the case of paper packagin chromium may come from additives used during paper production and lead and cadmium may come from inks and colourings used for printing.

Analysis shows that the cellulose used to fabricate paper is a source of contamination with anorganic potentially toxic elements such as Pb,Cr,Ni, as well as ions of Fe, Zn, Mn, considered non-toxic.

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THE INFLUENCE OF CLIMATE CONDITIONS ON THE MICROCLIMATE CREATED BY THE EGGPLANT CROP PROTECTION AND THE IMPACT UPON THE PRODUCTION

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Keywords: *sandy soils, eggplant, protection.*

ABSTRACT

In the period 2012-2014 was studying various temporary protective methods of the eggplant culture. To protect the culture of eggplant was used the polyethylene and Agryl . The climatic conditions of the three years of research were different. By eggplant crop protection early in the growing season there was obtained different conditions of microclimate under depending on the method used to protect the culture and the climatic conditions. They influence different the growth and fruiting with influence on the earliness , total production and its quality. By protecting culture with Agrilia + mulch were obtained the productions of eggplants until at June 15 , which was 1 t / ha and the total production achieved was 65.2 t / ha. The mulching of soil with polyethylene has a significant contribution in terms of both the number of fruit / plant, precocity of the production, and the quantity of production realized.

INTRODUCTION

Due at claims against the temperature, the eggplants find favorable conditions for growth and development on the sandy soils in southern Oltenia area benefiting from a particularly high thermal potential can meet the most demanding claims for heat. (Voinea M. Et all., 1977). Particular attention should be paid to the biological minimum and maximum temperatures. Analysis minimal thermal values recorded in the south of Oltenia in recent decades reveals a drop in their April-May (which might influence the establishment of early vegetable crops) and a slight increase in the period from June to October (Ifrim Aurelia et all., 2003).

Carrying out the processes metabolic normal in plants is performed only if the conditions of environmental for each species are the corresponding.The eggplants grow and develop normally at optim temperatures ranging from 25-30^{o}C and can withstand temperatures of 45^{o}C, ceasing grow at temperatures below 10^{0} C. The plants are destroyed by frost and are affected by periods cold without frost (Ceausescu et al., 1980). Air currents are nefavorabili at Eggplant culture which requires taking protective measures of culture. Insufficient light determine the stagnation of growth, flowers are abortions, and the fruits related to remain small. Eggplants are demanding water girl, the optimal level of water

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supply of the soil being 70% on depth of 50 cm (Marinica Gh., 1989). Getting some early productions from culture of eggplant is done using early varieties (Toma V. et al., 1999) or by protecting culture (Voican & Lacatus, 1998). For the culture of eggplant in greenhouses can be used to varieties specifically adapted (Pochard E. 1974).

Increase precocity in crops of eggplants in the field entails vegetable seedlings planting , much earlier than the optimal era of transplanting the young plants being exposed to many risk factors. Removal or reduction of undesirable effects occurring in the early part of the period from vegetation can be achieved by applying of cultivation technologies adapted to the area. So far have been carried out research concerning protecting the culture of eggplant on all over the vegetation period.In this paper we propose the protection of temporary of eggplants culture for the removal of unwanted effects occurring in the early part of the period from vegetation and speeding up the processes of growth and development and thus increase precocity. Because in the months of iune, iuly and august in the area is a surplus heat to protect plants during this period is not necessary.

MATERIAL AND METHODS

Research has been carried out in the period 2012-2014 at Research-Development Center for Field Crops on Sandys Soils Dabuleni located in the southern Oltenia on a sandy soil. The following variants were studied in culture of eggplant: :V1 - unprotected cultures; V2 - soil mulching with polyethylene; V3 - to protect plants with polyethylene tunnel; V4 - protecting the plants with polyethylene tunnel and soil mulching with polyethylene; V5 - to protect plants with foil type *Agril* and V6 - protect plants with *Agril* and soil with polyethylene mulch. Experience was mono-factorial and was located in the experimental field in 4 randomized blocks. Are used hybrid *Aragon* F1. Planting in the field was done around April 12, with 15 days earlier than the optimal of planting eggplant in zone. At the same time with planting was mounted and the system of protection under the variants. Protection system was maintained until May 20, when there was no longer a risk of temperatures below the biologic threshold of eggplant plants. Was determined the height of the plants at the time of removal protection system, total production and dynamics production. The results obtained were calculated and interpreted statistically. Were determined the microclimate conditions created by methods of protection according to the natural conditions of culture: air temperature, and the humidity, as well as its influence on plant growth and development the eggplant.

RESULTS AND DISCUSSIONS

Three years of research were different in terms of heat (table 1). In the year 2012, in April the average temperature were of 13.9^0C was the maximum of 29.4^0C and minimum of -3.70C and in May was a 31.8^0C maximum and minimum of 7.9^0C on May 2 . The year 2013 was a particularly warm year in April- May with maximum temperatures of 32.2^0C in April and of 32.5^0C in May the average temperatures were of 14.3^0 C in April and 20^0C in May. Year 2014 was cool during April-May the average temperatures were of 12.6^0C in April and of 16.6^0C in May with the maximum 25.5 ^{0}C, respectively 30.2^0C. Analyzing minimum temperatures recorded from the time of planting seedlings in the field and in the removal protection system it appears that in this period were recorded minimum temperatures below the biological of eggplant plants.

Thus, in April 2012, temperatures were below 10^0C in 18 days and in May in 8 days. In 2013 below the biological minimum of plants were recorded within 14 days in April and of 4 days in May. In 2014 May was particularly cool in the studied period in 15 days were recorded minimum temperatures below minimum biological recorded on 7 May.

The microclimate created by the protection system used was influenced by climatic conditions and protection methods used. In 2012, at hour 8 temperature was of 19.9^{0}C in the outside environment and of 24.2 -25.4^{0}C in protected variants (Table 2).

Table 1

The temperature in the period april-may 2012-2014

The period	Temperature	2012		2013		2014	
		^{0}C	No. days with temperatures below 100C between April 12 to May 20	^{0}C	No. days with temperatures below 100C between April 12 to May 20	^{0}C	No. days with temperatures below 100C between April 12 to May 20
April	Average	13.9	18	14.3	14	12.6	11
	Maximum	29.4		32.2		25.5	
	Minimum	-3.7/ 13.04		3.1/ 21.04		2.5/ 12.04	
May	Average	17.2	8	20.0	4	16.6	15
	Maximum	31.8		32.5		30.2	
	Minimum	7.9/ 2.05		6.7/ 15.05		6.3/ 7.05	

Table 2

The temperatures and relative humidity recorded at hour 8 depending on protection system and climate conditions

Specification	2012		2013		2014	
	Air temperature (^{0}C)	Relative humidity (%)	Air temperature (^{0}C)	Relative humidity (%)	Air temperature (^{0}C)	Relative humidity (%)
Exterior	19.9	56.7	20.4	47.3	19.8	60.8
Mulch	19.9	56.7	20.4	47.3	19.8	60.8
In tunnel polyethylene	24.2	76.0	24.0	70.5	20.5	72.2
Tunnel polyethylene +mulch	25.4	72.1	25.0	64.8	22.3	76.8
Under Agryl	24.9	61.1	25.1	50.9	23.0	60.1
Under Agryl+mulch	25.2	60.2	25.5	48.3	23.6	57.3

In year 2013 at hour 8 temperatures were between 20.4-25.5^{0}C and in year 2014 were between 19.8-23.6^{0}C . In all the years the temperatures recorded at hour 8 under Agryl were higher . Adding mulch resulted in slight increases in temperatures. The relative humidity values were lower in year 2013 with higher temperatures and big in year 2014 which was a cool year . Regardless of the relative humidity of the crop year had higher values at hour 8 under polythene tunnel due to condensation that forms below it. Under

Agryl relative humidity it was close to the outside due to the porous nature of this . This allowed the achievement of higher temperatures under Agryl .
Both the temperature and the relative humidity increased progressively reaching a maximum at hour 16 (Table 3).

Table 3

The temperatures and relative humidity recorded at hour 16 depending on protection system and climate conditions

Specification	2012		2013		2014	
	Air temperature (^{0}C)	Relative humidity (%)	Air temperature (^{0}C)	Relative humidity (%)	Air temperature (^{0}C)	Relative humidity (%)
Exterior	27.3	32.0	29.6	31.9	25.6	39.2
Mulch	27.3	32.0	29.6	31.9	25.6	39.2
In tunnel polyethylene	40.0	24.9	39.1	28.5	31.9	50.4
Tunnel polyethylene +mulch	40.0	29.4	38.0	28.1	35.1	48.6
Under Agryl	38.6	26.1	38.2	25.4	34.9	35.2
Under Agryl+mulch	39.0	26.0	38.7	25.4	35.4	27.9

In years 2012 and 2013, at hour 16 maximum temperatures were recorded in condition of protecting with polyethylene tunnel, temperatures have reached 40^{0}C.
The relative humidity had low levels in these conditions of protection. In year 2014 , the maximum temperatures recorded under polythene tunnel were smaller than those recorded under Agryl because under polyethylene film remained high relative humidity (and in the outside environment relative humidity was higher) .

At the time removal protection system was determined the height the plant of eggplant. Microclimate conditions created by the different methods of protecting influenced differently the pace of growth of the plants (table 4).

Unprotected plants, directly subject to the action of the climatic factors have recorded the lowest growth rate. At the removal of the protection system the plants have measured a height of 9.4 cm. Mulch the soil with polyethylene contributed to increased the temperature in and accelerated the pace of growth. In these conditions the plants of eggplant in average have measured 14.9 cm. Microclimate conditions created by protecting the plants with polyethylene tunnel were favourable for the growth of the eggplant plants. Also by protecting plants with Agryl has accelerated the pace of growth. The largest height had the plants protected with mulch + Agryl (28.5 cm). The face of unprotected plants, by protecting with Agryl+ mulch increased with18.9 cm, by protecting with Agryl increased with 16.6 cm and by protecting with Polythylene tunnel increased with 17.7 cm, very significant statistically.

The temperatures in the period between April and May and the method of protection influenced the precocity production of the eggplant (table 5). By 15 June, has been harvested eggplant only in conditions protective with polyethylene mulch and Agril.

The production obtained up to this time was averaged of 1 t/ha. During the period 16-30 June at the protected with mulch and Agril has been harvested

Table 4

The influence of the system of protections upon increases at plants of eggplant

The variant	The plant height (cm):			The average height of plant (cm)	Difference (cm)	Significance
	2012	2013	2014			
Unprotected	11.4	8.0	9.4	9.6	Mt.	
Mulch	18.8	13.6	12.2	14.9	+5.3	
Polyethylene tunnel	22.4	20.6	31.6	24.9	+15.3	**
Polyethylene tunnel+mulch	24.0	26.8	31.2	24.3	+17.7	***
Agryl	26.6	27.8	24.2	26.2	+16.6	***
Agryl+mulch	30.8	31.6	23.0	28.5	+18.9	***

LSD 5% = 7,6 cm
LSD 1% = 10,8 cm
LSD 0,1% =15,65 cm

Table 5

Production of eggplant in dynamics depending on the method of protection
(Average 2012-2014)

The variant	The production (t/ha) obtained in the period:							The total production t/ha
	Until 15.06	16-30.06	1-15.07	16-31.07	1-15.08	16-31.08	After 1.09	
V1	-	-	11.1	17.3	10.9	8.1	6.4	53.8
V2	-	2.2	13.3	19.7	8.3	8.9	7.0	59.4
V3	-	4.5	12.9	18.4	5.6	12.3	5.8	59.5
V4	-	6.4	13.5	17.6	7.1	9.7	6.4	60.7
V5	-	5.9	13.7	16.0	7.4	9.4	6.1	58.5
V6	1.0	8.0	14.2	20.6	7.0	10.4	4.0	65.2

a production of 8 t/ha in conditions of protecting only with Agril has been harvested 5.9 t/ha, at the protected with the polyethylene tunnel and mulch has been harvested 6.4 t/ha, at the protected culture with polyethylene tunnel harvested 4.5 t/ha and only with polyethylene mulch has been harvested 2.2 t/ha At unprotected culture the first harvest have been harvested during the period 16-30 June because low temperatures has determined extending the period of vegetation and the delay in obtaining production. Although the mulch protects only the root of the plant the through the soil mulch with polyethylene contributed to increased production and precocity at eggplant because the mulch heats the ground well, mulch keeps the moisture in the soil, and minerals substances are not lost through leaching. Total production of eggplant was between 53.8 t / ha at the crop unprotected and 65.2 t / ha at the crop protected with Agryl + mulch. Noting the importance of mulch in increasing precocity of the production.

CONCLUSIONS

Microclimate created by protecting plants ensure an increase in height. The largest increase in height to plant of Eggplant was registered in conditions of protecting with mulch and Agril and it was 28.5 cm, with 18.9 cm more than the unprotected.

The climatic conditions and the protection methods used have helped in creating microclimate conditions with the influence upon of both the precocity and total production.

By protecting the plants with polyethylene mulch and Agril was precocity to production first fruits can be harvested up to June 15, with 15-20 days earlier than in unprotected.

The biggest productions were obtain in conditions of protecting the plants with Agril and soil with mulch polyethylene and was of 65.2 t/ha. Adding of mulch to protect the plants under or polyethylene tunnel or Agryl increases the precocity and total production of eggplant.

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THE INFLUENCE OF THE VARIATION OF CLIMATE CONDITIONS OVER THE GROWTH AND FRUIT BEARING OF CABERNET SAUVIGNON VARIETY

Costea D. C.*[1], Căpruciu Ramona[1], Cichi Daniela Doloris[1]

Keywords*: climate, growth, fruit bearing, Cabernet Sauvignon*

ABSTRACT

The quality of viticultural and wine-making products depends to a great extent on environmental conditions that leave their mark on production areas (regions, vineyards, viticultural centres, etc.).Grapevine cultivation with superior productive results requires the continuous appreciation of the ecological favourableness of the space used for this purpose, in order to identify the most appropriate counter measures according to the variation of the pedoclimatic conditions. This paper shows the results regarding the influence of varied climate conditions specific to the crop year over the growth and fruit bearing of Cabernet Sauvignon variety.

INTRODUCTION

Eversince 2007 the GIEC / IPCC (Intergovernmental Panel on Climate Change) report have pointed out the fact that climate changes happen faster than previously anticipated. At the current pace, it is believed that by year 2100 the global average temperature will go up by 4-6 degrees Celsius. According to experts, for each 1 degree Celsius the increase of the average temperature determines the movement of the grapevine growing limit by approximately 160 km North (Seguin B, 2007; GIEC bilan, 2007) . During the last decades the effects of global warming have become more and more noticeable: heavy rains, waves of heat, times of drought and extreme negative and positive temperatures. For this reason the effect of climate changes on the growth and development of grapevines has been subject to several research studies in all grapevine regions; amongst the most representative at national at world levels are those made by the followings: Jones G.V. & Webb L.B. 2010,Schultz H.R. 2010; Mozel Michelle Renée & Thachn Liz 2014, Dejeu L. et all 2008,Căpruciu Ramona et all. 2008, Cichi Daniela et all 2009, Costea D.C. et all 2008, 2013.

Providing increased high quality yields under high efficiency can only be done by continuing research studies in terms of deepening the mutual connections between the plant, climate conditions, technology applied, as well as their influence over the physiological and biochemical processes.

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MATERIAL AND METHODS

Research studies were conducted at Șimnicu de Sus viticultural centre which belongs to the area selected for wine production with the controlled denomination of origin of " Banu Mărăcine" in Cabernet Sauvignon variety with 3 vine training techniques, namely low, semi high and high trained styles. In all 3 techniques the load was 28 buds per plant, respectively 2 canes with length of 12 buds and 2 fruiting spurs with 2 buds. The pruning technique applied was mixed.

In accordance with the research topic proposed, the observations and determinations focused on monitoring climate factors for the evaluation of the favourableness of the study year and on analysing the influence of the varied climate regime characteristic to the study years on bioproductive parameters.

The recording of the climate data was made in the existent meteorological network. The effect of the varied climate regime on the studied varieties (Cabernet sauvignon) was evaluated through the analysis of the following indexes: biological, physiological (the intensity of photosynthesis, sap flow), biochemical (content of sugars, organic acids, anthocyanins) and productive (grape berry weight, yield per trunk).

The assessment of the photosynthesis was performed with the MiniPam equipment. Sap flow was measured with the Greenspan equipment. Other observations and determinations made are specific to the research field.

RESULTS AND DISCUSSIONS

In the year 2014 when measurements were taken, the climate conditions were not the most favourable for grapevine cultivation, which resulted in the growth and fruit bearing of grapevine being affected. Both in June but especially during the maturation of grapes the volume of precipitation was way over the area average (table1).

Table 1

Temperatures and precipitations in July and September 2014*

Date	Maximum temperature	Precipitations
Wed. 04.06.2014	24°	18 mm
Wed. 18.06.2014	23°	68 mm
Thurs.19.06.2014	18°	57 mm
Wed. 25.06.2014	27°	18 mm
Thurs. 26.06.2014	24°	16 mm
Fri. 27.06.2014	24°	12 mm
Mon. 30.06.2014	28°	30 mm
Wed. 03.09.2014	25°	49 mm
Thurs. 04.09.2014	21°	25 mm
Fri. 05.09.2014	17°	88 mm
Mon. 15.09.2014	19°	21 mm
Tue. 16.09.2014	16°	18 mm
Mon. 22.09.2014	26°	12 mm
Tue. 23.09.2014	16°	28 mm

*From www.accuweather.com

The varied environment conditions have determined deviations from the average rate of increases specific to a certain variety which eventually reflected in the different length and maturation of the cane depending on the favourability of the ecoclimatic conditions.

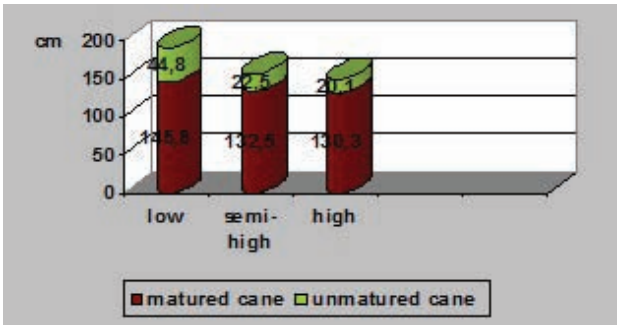

Figure 1. The length increase of the main Cabernet Sauvignon canes

When analying the results one may notice that in case of the low grapevine trained style the cane length was bigger compared to semi high and high trained styles, where differences were small, namely 150.4 cm in low trained style and 155 cm respectively in semi high trained style (figure 1). The maturation level of wood is different depending on climate conditions during the cultivation year, as well as on training techniques. In case of the low trained style the length of unmatured wood was bigger (44.8 cm) compared to semi high (22.5 cm) and high (20.1 cm) trained styles due to the climate conditions characterised by abundance of precipitations and lower thermal regime during the year 2014.

The determination of the berry size was performed in line with the OIV regulations, by taking measurements of 50 central-based berries at full maturation. The indicated results are for year 2014 only. By overlapping the measurement results with the hydric supply conditions related to the growth period of berries we obtained data regarding the cumulated effect of the hydric supply and the training technique on the grape diameter.

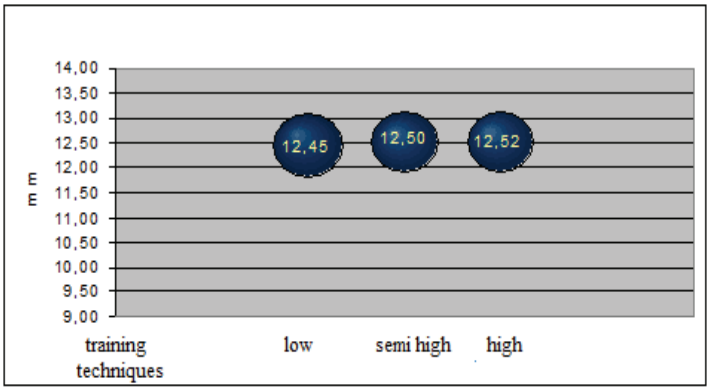

Figure 2. The effect of grapevine training techniques and climate conditions on berry growth

Results indicate that the differences between the berry diameters in the 3 grapevine training techniques are small, i.e. 0.5 mm, bigger berries being found in case of high trained styles, i.e. 12.52 mm compared to 12. 51 mm in semi high and 12.45 mm in low trained styles, as shown in figure 2.

The determinations made in order to point out the influence of the hydric supply conditions on the intensity of photosynthesis were made with a MiniPam equipment which

allowed the determination of physiological indexes at leaf level by non-destructive methods (without removing the leaves from the plant), as shown in figure 3. By keeping leaves intact it was possible to take all measurements at the level of the same leaf located on a fertile cane nearby the flowers or clusters. The measurements meant to point out the photosynthesis process were taken in their annual dynamics. For this purpose, during the 2nd decade of each month with sunny, blue-skied days, measurements were taken in two days at noon time, the results shown in pictures attached representing the average figure of the measurements taken during the 2 days.

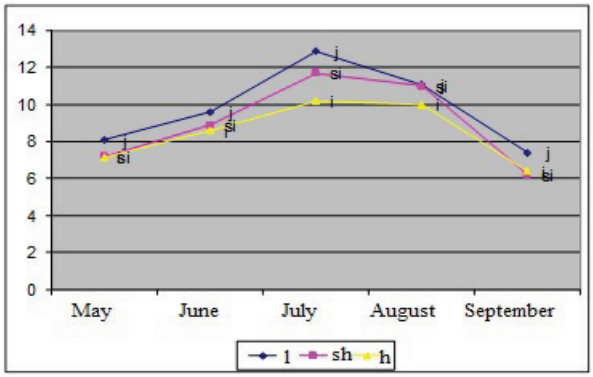

Figure 3. The annual dynamics of photosynthesis

In all training techniques the photosynthesis process indicate lower values before blooming (May, June), then values go up during the high growing phenophase (late June and early July), then slightly go down at ripening (in August) and significantly drop at maturation (in September), as shown in figure 3.

The measurements taken allowed pointing out the fact that in case of the low trained style, the intensity of the photosynthesis process was higher compared to semi high and high trained styles.

For a more profound analysis of the effects of the humidity conditions and grapevine training techniques on the plants under study, besides the photosynthesis measurements, the sapflow velocity was also measured by using the SAPFLOW equipment, which operated based on the heat-pulse method. Measurements were taken on 2 adjoined vine trunks with 2 sensors each.

Under optimal environment conditions, the intensity of transpiration and hence the sapflow velocity as well, went down from blooming to cropping time. The different hydric conditions determined the sap flow to take place at different velocity depending on the volume of precipitations. One may notice the high sapflow velocity during June and September as result of the heavy rainfalls, as well as the higher sapflow velocity in case of a high trained style being determined by the bigger intensity of transpiration (figure 4.)

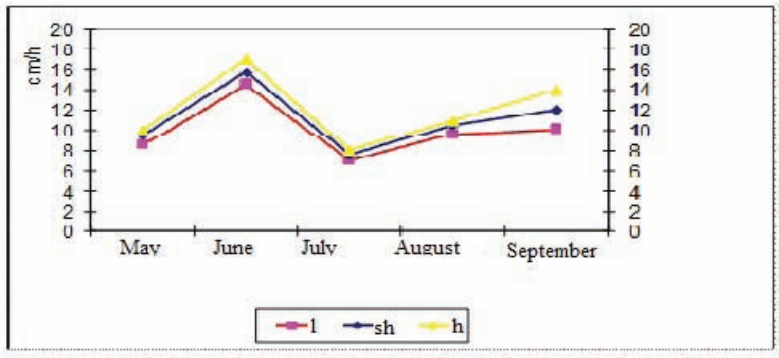

Figure 4. The dynamics of the sap flow

The quantity and quality analysis of the production obtained indicate that both the training techniques and the level of unfavourable hydric supply associated with the temperature conditions have greatly influenced the yield (table 2), the yield level being 40% lower than normal years.

As result of the heavy rainfalls in the second part of the vegetation period, after the early ripening time, the yield quality was lower, below the potential of the Cabernet Sauvignon variety.

Table 2

The yield indexes values of the crop

Training style \ Yield index	Sugars (g/l)	Acidity (g/l $_2SO_4$)	Maturation index	Anthocyanin (mg)	Crop yield kg/trunk
Low trained style	184.7	4.7	36.12	1155	850
Semi high trained style	190.5	4.6	38.99	1185	975
High trained style	195	4.5	41.35	1204	1.05

Due to the high volume of precipitation, as well as during the period before cropping the quantity of anthocyanins in 2014 Cabernet Sauvignon was lower than the usual; a bigger content was to be found in the high trained grapes (i.e. 1,204 mg/l) compared to semi-high and high trained grapes, i.e. 1,185 and 1,155 mg/l respectively. In case of low trained style, both the content of sugars and anthocyanins and the volume of crop yield per trunk were lower compared to semi high and high trained styles.

CONCLUSIONS

The different training techniques associated with the climate conditions (especially the hydric supply regime) specific to the cultivation year had a strong influence on the growth and ripening of the Cabernet Sauvignon variety.

In all training styles the photosynthesis process had lower values before blooming time (May and June); then values went up during the high growth phenophase (in late June and early July); they slightly dropped until ripening time and at maturation (in September).

The measurements taken allowed pointing out the fact that in case of the low trained style, the intensity of the photosynthesis process was higher compared to semi high and high trained styles.

The different hydric conditions determined the sap flow to take place at different velocity depending on the volume of precipitations. One may notice the high sapflow velocity during June and September 2014 as result of the heavy rainfalls.

The content of sugars and anthocyanins, as well as the volume of crop yield per trunk were lower compared to semi high and high trained styles.

The unfavourable climate conditions strongly influenced both the quality and the quantity of the crop yield.

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***http://www.accuweather.com/ro/ro/simnicu-de-sus

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THE CULTURE OF PEACH ON THE PSALMOBASES IN THE CLIMATIC CONDITIONS OF THE SOUTHERN OLTENIA

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Keywords: *Peach, psalmobases, climate conditions*

ABSTRACT

This paper aims on the analyzing the peach crop on the psalmobases under the climatic changes occurred in the South region of Oltenia. Known as the most important environmental factor for the proper development of the plant's growth phenophase fruit, the temperature has the greatest negative impact on them. The peach is a very sensitive species to sudden changes in temperature in winter and especially those of its end, which can cause severe physiological disorders, leading ultimately to the death of trees.The climate's changes in recent years, which debuted in 2015 with minimum temperature over ˚-23 C, resulted in the loss of culture in the bud 99% and frostbite entire tree, questioning the suitability of the area for planting species Southern Oltenia peach.

INTRODUCTION

The interest in phenology is one of the oldest, since in the past the possibilities for survival of man and, in particular, of agriculture, were directly related to the understanding of the relationship between the environment and development of flora and fauna (Kramer 1994).

In the present context of climate change, due to the possibilities of monitoring based on plant species sensitivity to record and respond to environmental conditions, phenology undergoes a revival phase (Mănescu et al. 1975, Menzel 2002, Sparks & Menzel 2002, Chmielewski et al. 2001, Mihăescu & Stanciu 1966).

Changes in temperature caused by the greenhouse effect are shown by the diurnal changes and the annual and inter-annual changes which can lead to the plant's phenological different structure (Walther et al. 2002, Cosmulescu & Baciu 2002, Cosmulescu et al. 2007, Cosmulescu et al. 2008)

In terms of factors influencing the phenology of plants, even if they are quite many such diseases, pests, competition, factors of soil, genetic characteristics, age, the most important are considered, however, the weather during the current growing season and the earlier, during sleep and photoperiod (Mihăescu & Stanciu 1966); the role of photoperiod, there are currently still unclear, it depends on the species and variability of phenological place and can not explain the lack of correlation with temperature (Chuine et al. 2003).

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In particular, spring phenophases are temperature-sensitive (Sparks et al. 2000), which implies that an analysis of their long-term can provide information on temperature changes in winter and spring (Menzel 2002).

In this sense, analysing at long-term records of flowering to *Prunus avium* (Szőcs 2011) found a very strong correlation with spring temperatures (R2 = 0.69), which means that the variability observed (40 days) can be attributed to thereof. On the other hand, based on a long series of observations (since 1808) on budding chestnut (*Aesculus hippocastanum*) in Geneva, (Defila & Clot 2001) found that this phenophase is particularly influenced by winter temperatures, the determining factor is linked local climate in the city. Also, if spring phenological phases, almost all correlate with temperatures in the previous months, and some North Atlantic oscillation index (NAO), related to climatic conditions in winter (Szőcs 2011).

Regarding the autumn's phenophases (Szőcs 2011) shows that they tend to be much more difficult to define, being under the influence of weather events such as frost isolated strong winds, information on the relationship between meteorological factors and coloring / fall leaves being still vague (Mihăescu & Stanciu 1966). If, for example, for the weather phenophase spring there are many models, for the phenological fall phases there has not been developed yet one (Downing & Patwardhan 2003, Chuine et al. 2003)

Peach, as we know was formed as a species in regions with warm and relatively dry climate with plenty heatstroke. Therefore, it makes greater demands from heat than other tree species grown in our country; it is slightly exceeded in this regard almond and apricot trees only (Sarvas 1972).

The temperature's influence as a limiting factor of peach's crop, manifests itself differently, whether it's high or low temperatures, or alternation of the two (Cociu et al.1981 , Popescu et al. 1968).

The peach gives satisfactory results in areas where the medium annual temperature is between 10ºC and 11.5ºC it. Fruit bud resistance at low temperatures is conditional genetic characteristics of the genus. However, the damage caused by frosts in winter the temperatures are recorded at different varieties varied as the genetic traits plus numerous other factors as preparedness trees for the winter, during low temperatures, temperature decreases how early winter and temperature fluctuations during winter and date when the temperatures are lower than the rest of the winter. Buds' flowering peach resting lasts up to ....- -22ºC 23ºC, and sometimes even up to -30ºC, according to the genus. Furthermore, their strength is more vigorous branches at their base and tip (Cociu et al.1981)

After exiting the forced rest, flowering buds can be damaged at temperatures of -17ºC ...- 8 ° C (Keatley et al. 2003).

The amount of heat in our country differs greatly from one place to another, showing large variations depending on the geographic latitude, altitude, relief, exhibition, cloudiness, soil color, direction and intensity of winds, coverage vegetation, season and so on . The air and soil's warming varies from day to day, from year to year, and even earlier in the day (Baciu 2005).

By classifying counties in Romania by size and direction of potential effects of climate change on Downing and Patwardhan (Estrella 2000), Szöcs Emse (Peiling et al. 2006) to classify after their vulnerability and scored Dolj, Olt, Mehedinti, Buzau, Teleorman, Giurgiu, Tulcea, Calarasi, Ialomita, Braila, Vrancea, in very vulnerable areas.

In the South of Romania, the light as the vegetation's factor has an influence over the production process trees (Hoza et al. 1998). Since it depends on the leaf morphology and photosynthetic efficiency, vegetative growth, induction of differentiation, binding and fruit growing (Fideghelli & Rigo 1995).

With 40° C maximum temperature (heat stress)°-32 C and minimum rainfall of 520 mm (Croitoru et al. 1999) south Oltenia region is unfavorable for the peach crop after climatic resource estimation methodology″ of their land and orchards' pretability.

MATERIALS AND METHODS

The study was undertaken to CCDCPN in Dabuleni-Romania and the climatic parameters studied were related to the values of active growing period peach and targeted thermal balance due and the amount of the rainfall. There have also conducted studies on promoting the area for peach culture, multi-criteria analysis of climate and soil studies.

Peach varieties under study are: Springold, Springcrest, Collins, Cardinal, Jerseyland, Redhaven and Southland, and interpretation of phenological observations were possible using climate data provided by the Meteorological Station Research Station.

RESULTS AND DISCUSSIONS

Life cycle of trees is carried out in characteristic stages for both ontogenetic development and the development of different organs. The organ's formation stages, organogenesis or morphogenesis is conducted in a sequence of steps required. They start with the formation and development of shoots, sprouts, flowers and ends with the formation and development of the seeds and fruit. (Burzo et al. 1999)

The quietness or the secondary repose is the first rest or repose, the vegetative itself, which is characterized by the inability of buds to grow in favorable environmental conditions and indicated leaf fall occurs in late September - early October. After Hauage and Cummins (1991), installs rest gradually once vegetative bud formation and intensify with the falling of leaves' process. Jacoboni and Pinnola (1994) stated that the entry dormant peaches take place in late July and early August.(Burzo et al. 1999)

Research by authors stated that during the dormant vegetative in buds there are physiological and biochemical significant changes. The water content of buds decreases, while increasing soluble dry substance, which gives them an increased resistance to frost. Balan and Ivascu (1993) stressed that buds can withstand up -15° C at the beginning of the rest and to - 22 C ... - 25° the end of December, if the tempering temperature drops gradually ensuring buds (Burzo et al. 1999).

After Monet and Bastard (1968) , in the first rest period (August 14. and October 13th) buds are tolerant to high temperature, while in the 2nd period (13 October- December 18.) buds are sensitive to high temperatures. Up to dormant is done after a week and up to one month of the fall leaves (Burzo et al. 1999).

In Oltenia the medium temperatures in the months of August to December (during the Sleep peach) were positive (classification after INM) with a deviation of the average air temperature in the normal range compared to climatological averages of previous years.

To better understand the total loss of the peach buds 2015 there were analyzed temperatures in the months of December 2015 which are responsible for preparing the whole plant fruit (tempering) for the following minimum temperatures.

From 1-3 tables, it can be noticed the fact that the maximum temperatures were too elevated above the normal of the month of October 2014 low rainfall in November and end-December temperatures quite minimal. All this had a negative impact on flowering buds; they are sensitive to temperatures around 30 C in October°, high temperatures in November and the first 2 decades of December. High temperatures did not allow the bud by decreased progressively hardening temperatures and minimum temperatures in the 3rd decade of December and the beginning of January (Table 4) affected the peach's buds.

Table 1

Climatic Data October 2014

No	Decade	Temperature°C			U %	Rainfall(mm)
		Medium	Minimum	Maximum		
1	I	14.1	4.7	25.9	84.09	6.60
2	II	15.2	3.5	27.8	85.48	0.80
3	III	6.9	-0.8	26.7	91.85	35.40
4	AVERAGE	12.07	-0.8	27.8	87.14	42.80

Source(S.M.SCCCPN DABULENI)

Table 2

Climatic Data November 2014

No	Decade	Temperature°C			U %	Rainfall(mm)
		Medium	Minimum	Maximum		
1	I	6.06	-1.2	11.8	98.34	1.0
2	II	8.28	5.5	13.7	97.85	34.2
3	III	1.95	-3.5	13.3	85.11	4.8
4	AVERAGE	5.43	-3.5	13.7	93.10	40.0

Source(S.M.SCCCPN DABULENI)

Table 3

Climatic Data December 2014

No	Decade	Temperature°C			U %	Rainfall (mm)
		Medium	Minimum	Maximum		
1	I	1.15	-2.0	3.5	99.8	89.8
2	II	1.18	-4.3	14.9	96.12	9.2
3	III	1.12	-20.4	17.6	83.16	15.8
4	AVERAGE	1.15	-20.4	17.6	93.03	114.8

Source(S.M.SCCCPN DABULENI)

Table 4

Climatic Data January 2015

No	Decade	Temperature°C			U %	Rainfall (mm)
		Medium	Minimum	Maximum		
1	I	-3.33	-23.1	11.4	86.32	20.6
2	II	1.9	-6.3	19.2	89.61	1.6
3	III	3.35	0.4	15.3	94.71	23.6
4	AVERAGE	0.64	-23.1	19.2	90.21	45.8

Source(S.M.SCCCPN DABULENI)

As the peach fruit tree is a species with small cold (200-1000 after Faust-1989), it is less deep vegetative rest, so temperatures of February 2015 in the third decade, leaving the rest period indicated Winter fruit bud peach species was conducive to the development of this phenomenon in terms of temperature, the maximum temperature was 14.5˚C, the minimum temperature was 8.6 ° C decade, exceeding the threshold of biological species (Burzo et al. 1999).

Temperatures of March proved favorable to these phenological phases, with maximum temperature of 16.5 C and minimum of -1.2 C, but they were less relevant given that flowering buds were affected to a minimum in January. The entry into vegetation is marked by swelling buds them, due to the ongoing processes of micro- and macrosporogenesis.

To see the impact of climate change in the region, especially the impact of temperature on fruit bud (flowering) we realized longitudinal cuts at different times with two week break between observations. On 02/28/2015, I made the first observation (photos 1-7) notably the enlargement of anthers and carpel, so finding out the rest of the obligatory winter and forced entry into the (optional), but some of buds take to be observed were necrosis.

Observations determined three weeks after, on 21.3.2015 (photos 8-14) confirms temperature -23℃ consequences, most buds, especially those of the middle part of the branches being necrosis. After another two-week period on 03.04.2015 for the report of loss of flowering buds flowers were counted results in viable buds on the branches of peach plantation, leading to the conclusion that peach plantations suffered losses of 99% of flowering buds, leaving peach plantation in the area in 2015 with no hope of production. (Photo 15-16)

The phenophase flowering and binding fruit is dependent on the one hand, the needs of the cold of the variety (ie low temperature for the formation of gametes and removing state "dormans") and, on the other hand, the needs of heat beginning of vegetation (biological threshold over temperature), Menzel 2000.

In 2015 on this phenophase there could not be some comments, only comments that have been obtained were phenophase vegetation was taking place between 23-31.03.2015 achieve amount temperature of 133° C for early varieties and 215 ° C for the latest variety of plantation. Peach fruit tree plantation in the resort exprimental field besides Dabuleni suffered total loss of flowering buds and frostbite whole plant (tree), due to disease and the action before entering the rest (photo 17-18).

CONCLUSIONS

A question for the frosted fruit bud was due to several factors including: the readiness of trees for the winter, bud development stage, the moisture from the soil and atmosphere, especially during low temperature and its oscillations, but cultivated variety and rootstock.99% of the frostbite fruit peach buds damaged the harvest of 2015, representing the 4th year in 10 years, previous similar situation was in 2012 when temperatures above absolute minimum - totally destroyed 23° C production peaches. Minimum temperatures in recent years have questioned the psalmobases peach crop in the Southern Oltenia climate changes occurred in the area.

When preparing varieties of trees for sand area is necessary to take into account of their resistance against late frosts, and improvement, to be used as genitors varieties with the best behavior in this regard.

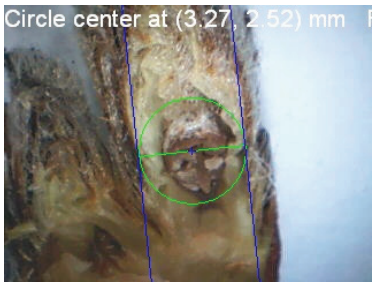

Photo.1 The Collins Variety

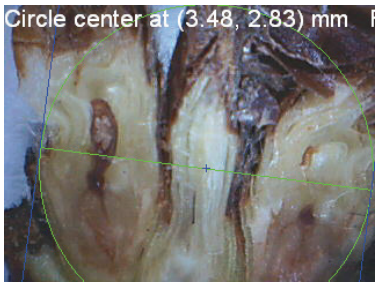

Photo.2 The Cardinal Variety

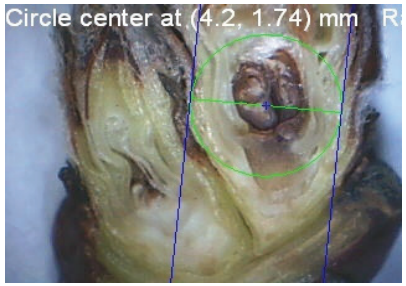

Photo.3 The Southland Variety

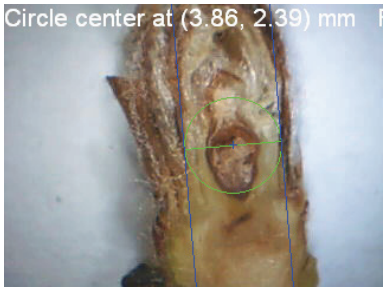

Photo.4. The Springold Variety

Photo.5 The Springcrest Variety

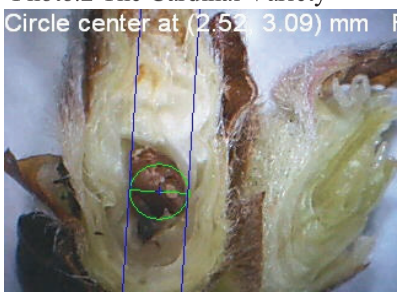

Photo.6 The Jerseyland Variety

Photo.7 The Redhaven Variety

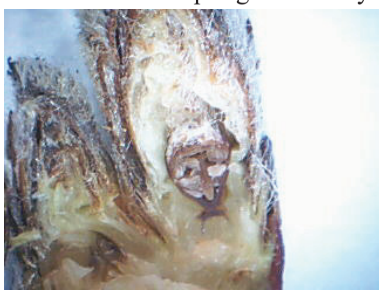

Photo.8 The Collins Variety

Photo.9 The Springcrest Variety

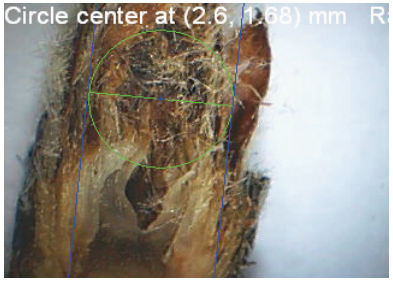

Photo.10 The Springold Variety

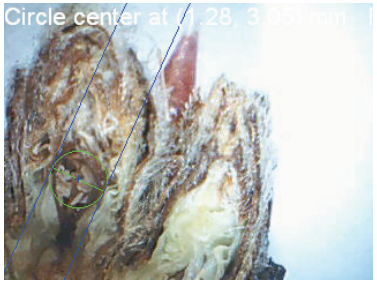

Photo.11 The Cardinal Variety

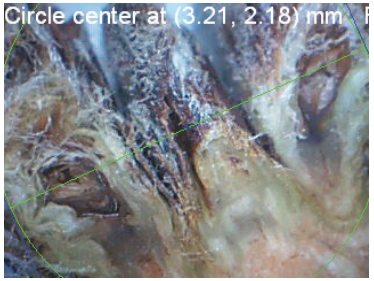

Photo.12 The Redhaven Variety

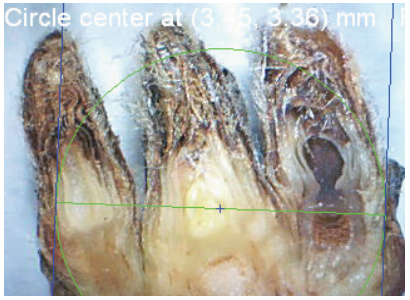

Photo.13 The Jerseyland Variety

Photo.14 The Southland Variety


Photo.15 Photo. 16

The peach plantation at CCDCPN Dabuleni – 03.04. 2015


Photo. 17 Photo. 18

The frost's effect on trees at CCDCPN Dăbuleni

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***Metodologia estimării resurselor pedoclimatice ale terenurilor și pretabilitea lor pentru culturile pomicole .

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Seria: ✓*Biologie*
✓*Horticultură*
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✓*Ingineria mediului*

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RESEARCH ON MONITORING GRAPE JUICE FERMENTATION QUALITY PARAMETERS IN ORDER TO OBTAIN TYPICAL AUTHENTIC WINES

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Keywords: *juice, fermentation, typical, authentic, wines*

ABSTRACT

Researches were developed among 2013 - 2014 in a private vineyard located in Pâncota-Arad County which is part of the Miniş-Măderat vineyards. For the purpose of research on physico-chemical parameters to obtain the typical and authentic wines, experiences were carried out on four white wine grapes; for monitoring the process of juice fermentation the cellar laboratory was used, OenoFoss FTIR device respectively. Following laboratory analysis, it was observed that in all white wines studied during two years, recorded values of alcohol concentration was higher than 11% (the minimum accepted in the specifications to obtain Miniş AOC wines) excepting Mustoasă de Măderat variety which was recorded as a table wine, both in 2013 and 2014. Results obtained for all juice quality parameters confirm that Miniş-Măderat vineyards is very highly recommended for obtaining high quality both red and white wines.

INTRODUCTION

Viticulture has developed as practical occupation along with the human society, a step forward for all the people who practiced this occupation. Over time, the importance of viticulture has grown both in terms of food and socio-economic importance (Dobrei, 2005). Regardless of where the wine is produced always contains constantly and variable quantities of certain substances which characterizes it. Some of these substances originate in grapes, another part is formed during alcoholic fermentation of the juice; a third part is formed during maturation of young wine, and finally another category of substances during aging (Balla, 2011). The fermentability of grape juice is related to cultivar, maturity at harvest, fertility of soil, environment and grapes treatment in the winery (Buescher et al., 2001). Acidity plays an important role in sensorial analysis for wines and even if pH and acidity taste are not totally correlated, pH can give information on this organoleptic property (Akin et al., 2008).

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MATERIALS AND METHODS

For carrying out the research on physical and chemical properties of wine grape cultivars in the experimental years 2013-2014, collection of raw material (grapes) was held in Pâncota vineyard located in Arad County, in the Miniş-Măderat vineyards. The plots of each cultivar included in the study were relatively close to each other, benefiting from the same environmental conditions. In order to conduct research on physico-chemical parameters to obtain the typical, authentic wines, experiences were performed on four white wines cultivars. Regarding the juice and wine, chemical parameters studied were: glucose/fructose, ethanol, pH, density, total acidity, volatile acidity and malic acid (Clarke and Bakker, 2004). Then, a few drops were collected from the filtered grape juice/wine with a pipette and were placed in the FTIR module of the OenoFoss device. FTIR OenoFoss uses infra-red spectroscopy to measure the samples at two wavelengths, ~ 43 mm and ~ 18 mm, which eliminates calculation errors which are related to the measurements. The values of physico-chemical parameters (glucose/fructose, ethanol, pH, total acidity, volatile acidity and malic acid) are read automatically by the device and stored in a special program installed on laptop connected to the OenoFoss module.

RESULTS AND DISCUSSIONS

Juice fermentation depends of temperature, degree of juice clarity, the sugar content and volume of the juice or the degree of sulphitation. In Vignadoro wine cellar, fermentation of grape juice was done in vertical cylindrical tanks, made of stainless steel provided with jacketed cooling and temperature sensors for monitoring during fermentation. Ambient temperature during fermentation of the juice is very important because contributes to slowing the propagation of yeast, to delay the grape juice fermentation and causes a uniform fermentation process, offering good opportunities for obtaining high quality wines. From Table 1 it can be observed that the fermentation in studied white wine cultivars was monitored for a period of 7 to 11 days, until its ending. For all four cultivars, sugars (glucose/fructose) decreased during the fermentation process, so that the wines obtained in this case are dry, with a quantity of sugars less than 4 g $l.^{-1}$

During the 10 days of Pinot Gris monitoring, sugars declined from 215.8 g l^{-1} as was recorded at harvest, at 1.7 g l^{-1} at the final completion of the alcoholic fermentation. Pinot Gris grape juice alcoholic concentration increased during fermentation from 0.24% to 13.31%. All other studied white cultivars had values of sugars and alcoholic concentration relatively similar to Pinot Gris.

In 2014 (Table 2), Pinot Gris has accumulated the largest amount of sugars (213.30 g l^{-1}) in early fermentation, followed at an insignificant difference by Feteasc㠠Regală (209.80 g l^{-1}). Mustoasă de Măderat recorded the lowest value of sugars, ie 187.00 g l^{-1}. During fermentation the sugars were converted to percentage of alcohol, and thus alcohol level grew from values below 1.00% (except Feteasc㠠regală 3.07%) to percent higher than 11.00% (exception Mustoasă de Măderat -10.26%). As regards pH parameter, it has reached a value close to the optimum at harvest time (3.20), ie 3.15 (Feteasc㠠Regală), which even had oscillations during grape juice fermentation, pH value of 3.13 of wine in final stage making process is low; usually wine pH must be between 3.30 and 3.50 according to the literature (Ribéreau-Gayon et al. 2006).

Comparative analysis of the physico-chemical characteristics of the juice during fermentation in both experimental years has been carried out in terms of two parameters, namely, the concentration of reducing sugars (glucose/fructose) and alcohol concentration. Year 2013 was a warm year with higher temperatures, and concentration of reducing sugars in all four varieties studied, was higher in the harvest day than in 2014. The alcoholic concentration from the last day of fermentation in 2013 revealed that wines produced in this year are stronger (with a higher alcoholic strength); this parameter was higher than in 2014.

As regards the quality of wines produced in 2013 (Table 3), after analyzing each cultivar was noted that wines obtained showed a variable alcohol content: 12.16% vol. alcohol in Fetească Regală, 11.98% vol. alcohol in Muscat Ottonel, 13.12% vol. alcohol in Pinot Gris

Table 1

Qualitative parameters of juice in fermentation, at white cultivars studied in 2013

Day	Glucose/ Fructose (gl^{-1})	Total acidity (gl^{-1})	pH	Alcohol (%vol)	Malic acid (gl^{-1})	Volatile acidity (gl^{-1})
Fetească Regală cultivar						
10.09.2013	200.3	5.20	3.34	0.41	1.5	0.17
11.09.2013	160.6	6.07	3.21	2.10	1.4	0.20
12.09.2013	121.5	6.23	3.20	4.53	0.9	0.16
13.09.2013	92.9	6.01	3.18	6.45	1.0	0.09
14.09.2013	64.4	5.87	3.21	8.26	0.9	0.13
16.09.2013	28.7	5.76	3.25	10.47	0.9	0.06
17.09.2013	15.1	5.64	3.25	11.15	0.8	0.06
18.09.2013	3.2	5.66	3.24	11.73	0.9	0.02
19.09.2013	2.7	5.55	3.26	12.05	1.0	0.03
20.09.2013	1.5	5.30	3.36	12.18	1.1	0.05
Muscat Ottonel cultivar						
18.09.2013	199.8	6.07	3.19	0.55	1.1	0.22
19.09.2013	165.5	6.73	3.06	2.06	1.1	0.18
20.09.2013	143.1	6.91	3.05	3.46	0.8	0.22
21.09.2013	122.0	7.33	3.00	4.80	1.0	0.22
22.09.2013	102.4	7.21	3.01	6.07	0.7	0.23
24.09.2013	55.2	7.31	2.99	8.92	0.5	0.20
25.09.2013	41.4	7.36	3.00	9.64	0.5	0.21
27.09.2013	16.8	7.53	2.97	10.91	0.6	0.18
28.09.2013	10.2	7.49	2.97	11.49	0.6	0.19
30.09.2013	9.0	7.37	2.99	11.64	0.9	0.13
01.10.2013	3.3	7.52	2.96	11.71	0.8	0.15
Pinot Gris cultivar						
26.08.2013	215.8	5.67	3.29	0.24	1.7	0.25
27.08.2013	207.6	5.74	3.35	0.26	1.7	0.28
30.08.2013	124.0	6.91	3.12	5.29	0.9	0.31
31.08.2013	97.2	6.75	3.15	7.08	0.8	0.27
01.09.2013	68.1	6.67	3.13	8.96	0.4	0.27
02.09.2013	45.7	6.78	3.14	10.15	0.6	0.21
03.09.2013	26.7	6.57	3.14	11.64	0.3	0.19
04.09.2013	11.6	6.32	3.17	12.52	0.4	0.16
05.09.2013	3.3	6.38	3.16	12.78	0.5	0.16
06.09.2013	1.7	6.61	3.08	13.31	1.0	0.13
Mustoasă de Măderat cultivar						
09.10.2013	177.7	8.20	3.03	1.72	1.6	0.24
10.10.2013	114.4	8.26	2.96	4.30	1.2	0.24
11.10.2013	68.2	8.41	2.99	6.59	1.5	0.21
12.10.2013	37.6	7.85	2.99	8.51	0.7	0.18
13.10.2013	10.4	7.89	2.99	10.13	0.8	0.17
14.10.2013	4.3	6.98	2.98	10.21	0.9	0.17
15.10.2013	1.5	6.78	2.97	10.42	0.8	0.18

and 10.75% vol. alcohol in Mustoasă de Măderat. Except Mustoasă de Măderat (due to the alcohol concentration of less than 11%), the other three cultivars have been classified as AOC Minis wines because it fulfills all the conditions from the specification of Miniş-Măderat vineyards.

Table 2

Qualitative parameters of juice in fermentation, at white cultivars studied in 2014

Day	Glucose/ Fructose (gl^{-1})	Total acidity (gl^{-1})	pH	Alcohol (%vol)	Malic acid (gl^{-1})	Volatile acidity (gl^{-1})
Fetească Regală cultivar						
21.09.2014	209.80	7.53	3.15	3.07	2.60	0.25
22.09.2014	64.20	7.50	3.04	7.09	2.00	0.21
23.09.2014	32.10	7.48	3.15	9.23	2.20	0.11
24.09.2014	17.70	7.53	3.09	10.71	2.10	0.11
25.09.2014	4.90	7.38	3.08	11.67	2.10	0.08
26.09.2014	2.60	7.33	3.11	11.80	2.20	0.09
27.09.2014	3.50	7.20	3.13	11.87	2.20	0.08
Muscat Ottonel cultivar						
21.09.2014	206.20	5.66	3.48	0.30	2.10	0.27
22.09.2014	166.00	5.83	3.37	0.92	1.90	0.31
23.09.2014	118.80	6.79	3.05	3.93	1.40	0.24
24.09.2014	64.40	6.83	3.06	7.28	1.10	0.15
25.09.2014	26.20	6.67	3.15	9.87	1.20	0.14
26.09.2014	2.70	6.58	3.09	10.94	1.10	0.11
27.09.2014	2.40	6.48	3.09	11.05	1.10	0.12
Pinot Gris cultivar						
11.09.2014	213.30	5.88	3.39	0.37	1.90	0.38
13.09.2014	203.50	5.40	3.70	0.49	2.30	0.46
14.09.2014	165.10	6.31	3.16	3.06	1.80	0.30
15.09.2014	106.20	6.63	3.12	6.84	1.40	0.26
16.09.2014	74.30	6.98	3.17	9.44	1.80	0.23
17.09.2014	46.50	6.90	3.15	11.26	1.80	0.19
18.09.2014	22.10	6.45	3.16	12.39	1.20	0.15
19.09.2014	11.20	6.43	3.16	13.23	1.50	0.13
20.09.2014	8.80	6.50	3.22	13.60	1.90	0.06
21.09.2014	2.00	6.34	3.18	13.74	1.30	0.09
Mustoasă de Măderat cultivar						
26.09.2014	187.00	9.31	3.10	0.34	3.70	0.36
27.09.2014	149.80	9.60	2.98	0.53	3.60	0.37
28.09.2014	107.50	10.21	2.63	3.10	3.10	0.32
29.09.2014	55.40	10.24	2.62	6.36	2.60	0.28
30.09.2014	30.30	10.12	2.66	8.79	2.50	0.22
01.10.2014	5.30	9.98	2.63	10.17	2.60	0.19
02.10.2014	4.20	9.70	2.66	10.22	2.60	0.15
03.10.2014	3.30	9.48	2.77	10.22	2.40	0.21
04.10.2014	1.90	9.48	2.74	10.26	2.60	0.20

Total acidity is an important parameter for wine quality; the absence (below 4.5 g l^{-1} tartaric acid) or excess makes wines to be not resistant to storage, to present the harshly taste and organoleptic disharmony of the wine. In 2013, total acidity of the analyzed wine

samples (Table 3) oscillates between 4.93 g l^{-1} and 7.00 g l^{-1} for tartaric acid. The total acidity of wine obtained from Mustoasă de Măderat is the highest among four tested wines,

Table 3

The physical-chemical properties of wines from 2013 harvest

Day	Glucose/ Fructose (gl^{-1})	Alcohol (%vol)	pH	Total acidity (gl^{-1})	Volatile acidity (gl^{-1})	Malic acid (gl^{-1})	Free SO_2 level
Fetească Regală cultivar							
30.10.2013	1.3	12.16	3.27	4.97	0.14	1.1	27
05.11.2013	0.6	12.11	3.28	4.93	0.13	1.1	25
26.11.2013	0.7	12.23	3.25	5.00	0.15	1.2	22
16.12.2013	0.5	11.98	3.28	4.92	0.15	1.1	21
09.01.2014	0.3	12.16	3.28	4.93	0.16	1.2	28
Muscat Ottonel cultivar							
30.10.2013	0.1	11.88	2.97	6.72	0.17	1.2	25
05.11.2013	0.0	11.87	2.98	6.68	0.17	1.3	22
26.11.2013	0.2	11.98	2.94	6.82	0.17	1.3	20
16.12.2013	0.1	11.87	2.99	6.68	0.18	1.2	20
09.01.2014	0.1	11.98	2.98	6.67	0.19	1.2	24
Pinot Gris cultivar							
30.10.2013	0.2	13.25	3.2	5.63	0.14	1.1	28
05.11.2013	0.3	13.20	3.2	5.60	0.14	1.1	26
26.11.2013	0.4	13.27	3.18	5.67	0.12	1.2	26
16.12.2013	0.1	13.02	3.22	5.48	0.15	1.1	24
09.01.2014	0.0	13.31	3.21	5.62	0.16	1.1	28
03.02.2014	0.9	13.12	3.20	6.10	0.20	1.1	19
Mutoasă de Măderat cultivar							
30.10.2013	0.1	10.47	3.03	6.93	0.19	1.4	26
05.11.2013	0.0	10.52	3.01	6.89	0.17	1.4	25
26.11.2013	0.0	10.71	3.03	6.82	0.05	1.5	25
16.12.2013	0.2	10.42	3.00	6.72	0.18	1.4	22
06.01.2014	0.3	10.49	3.05	6.97	0.26	1.5	22
03.02.2014	0.8	10.75	3.00	7.00	0.22	1.4	26

this cultivar having also the highest juice acidity; this can be explained by weather and soil conditions from the vineyard which is not always ideal at each harvest. The volatile acidity is considered as a benchmark for the "health" and evolution of wine, foreseeable difficulties in wine storage; in normal technological conditions, volatile acidity in wine is found in the maximum limit of 1.2 g l^{-1} acetic acid. White wines analytical values obtained in 2014 (Table 4) showed that may belong to AOC wines, excepting Mustoasă de Măderat wine which has an alcohol concentration of 10.11%, and can be marketed as a table wine.

As regards reducing sugar, Muscat Ottonel (2.40 g l^{-1}) had the highest content, followed by Pinot Gris with 2.20 g l^{-1} and Mustoasă de Măderat with 0.80 g l^{-1}; the smallest amount of reducing sugars was registered in Fetească Regală (0.75 g l^{-1}) wine.

The largest amount of free SO_2 was registered in Pinot Gris wine (30.0 mgl^{-1}) and Muscat Ottonel (29.0 mgl^{-1}); the smallest amount was obtained from Mustoasă de Măderat (27.0 mg / l) wine.

Table 4

The physical-chemical properties of wines from 2013 harvest

Day	Glucose/ Fructose (gl^{-1})	Alcohol (%vol)	pH	Total acidity (gl^{-1})	Volatile acidity (gl^{-1})	Malic acid (gl^{-1})	Free SO_2 level
Fetească Regală cultivar							
20.11.2014	0.30	11.65	3.24	6.54	0.17	2.4	20.8
17.12.2014	0.00	11.61	3.29	6.47	0.11	2.4	30.8
06.01.2015	0.20	11.61	3.27	6.43	0.14	2.4	29.6
20.01.2015	0.75	11.50	3.25	6.50	0.24	2.3	28.0
Muscat Ottonel cultivar							
21.11.2014	0.50	11.09	3.27	5.93	0.12	1.6	28.0
17.12.2014	0.40	11.08	3.26	5.84	0.15	1.6	30.0
06.01.2015	1.00	10.83	3.23	5.82	0.19	1.6	30.0
20.01.2015	2.40	11.09	3.20	5.80	0.24	1.5	29.0
Pinot Gris cultivar							
20.11.2014	0.20	12.16	3.43	6.01	0.21	2.3	28.8
17.12.2014	0.10	12.27	3.46	5.92	0.19	2.4	28.0
06.01.2015	0.10	12.24	3.46	5.81	0.18	2.4	26.0
20.01.2015	2.20	12.95	3.45	5.10	0.33	2.3	30.0
Mustoasă de Măderat cultivar							
20.11.2014	0.10	9.95	2.95	8.96	0.21	3.1	27.2
17.12.2014	0.10	10.04	3.02	8.91	0.17	3.1	27.2
06.01.2015	0.10	9.88	2.96	9.01	0.20	3.1	30.0
20.01.2015	0.80	10.11	2.99	8.50	0.22	3.0	27.0

CONCLUSIONS

In 2013, evaluation of white wines by alcoholic strength has shown that not all cultivars have the ability to generate superior wines (variety Mustoasă de Măderat). The need to assess these cultivars has been linked to the possible use of grapes from these cultivars as blending partners (with an increased acidity in Pinot Gris). In all studied cultivars it was obtained a dry wine, with sugar concentration below 4 g l^{-1} in all cultivars. To obtain a high quality wine, both organoleptic and compositional, a major role has both physico-chemical characterization and also determining the typical and authentic characteristics of wines after sensorial analyzes. White wines analytical values obtained in 2014 showed that all of them can fall in AOC except Mustoasă de Măderat which had an alcohol concentration of 10.11%, and can be marketed as a table wine. Results confirm that Miniş-Măderat vineyards area is a traditional one in the cultivation of vines and in obtaining high quality wines both white and red, due to several factors: climate-soil-technology, which together make up terroir area.

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RESEARCH ON BEHAVIOUR OF WINE GRAPES CULTIVARS IN TWO DIFFERENT MICROCLIMATES AREAS FROM MINIŞ - MĂDERAT VITICULTURAL AREA

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Keywords: *wine grapes, microclimate, terraces*

ABSTRACT

Researches have focused on monitoring the influence of natural conditions in 2013 and 2014 on certain cultivars for high quality red and white wines (Pinot Gris, Sauvignon Blanc and Merlot), from hills, valley and terraces vineyards, in the viticultural area Miniş - Măderat to demonstrate the suitability of these cultivars for the studied area, but also to recommend them to be extended to other vineyards in the west of the country. Vine vigor and frost resistance were determined, in two areas with different microclimate. Comparative data and correlations between different parameters that come to enhance the obtained results were statistical analyzed. From the research carried out it resulted that cultivars susceptibility to frost was different, both depending on the crop, and also according to the area where the vineyard is located; shoots full-length on trunk confirms the high vigor of cultivars in the hill-valley vineyards compared to the terraces.

INTRODUCTION

Viticulture is an intensive agriculture sector characterized by a high efficiency of land exploitation. This is because vines can be grown even on less fertile lands unsuitable for other crops establishment (slopes, weathered land and sands). The production value obtained from one hectare, cultivated with vineyards equals to 10-15 ha of cereals (Ţârdea et al., 2003; Dobrei A. et al, 2008).

Vineyards are economically efficient because can exploit the land unfavorable for other crops. In Romania, 85% of vineyards are placed on slope lands and covers approximately 20,000 hectares of sandy soils in Dobrogea, south of Oltenia and west of the country (Pop Nastasia, 2010). Arad County wine region is distinguished by an abundance of cultivars and local biotypes, some really valuable, but little known (Ciucur CA, 2013). The existence of most wine settlements from Arad is attested since the early Middle Ages, which demonstrates both their seniority and importance (Mihalca A., Lazea E., 1990).

Following studies carried out by Ciobanu F. (2012) was established that the special green pruning applied not significantly influenced the length and diameter of the canes, the amount of wood removed with trimming and shoots growth. Vines, due to its

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cultivation in the different areas is one of the plants most affected by low temperatures below the cold-resistance.

The damage caused by the winter frosts may decrease the quantity and quality of production, with a significant economic impact both for wine growers and oenologists as well as for traders and other branches of industry (Fennell, 2004; cited by Călugăr, 2011).

Tolerance of vines at low temperatures is conditional upon climate during the growing season, plant age, health and the harvest level (Hajdu and Gabor, 1997). Frost resistance of the genus Vitis species is largely determined by genetics (Reisch and Pratt, 1996).

MATERIALS AND METHODS

Research and observations were carried out following the application of conventional system specific technology under compliance with all technological links regarding work on the plant and the soil.

Grapevines were planted in 2012, both white cultivars, Pinot Gris and Sauvignon Blanc as well as red cultiva - Merlot. Reseaches were located in low to medium size plots in both the hill-valley area (Pinot Gris, 1.75 ha, 2.25 ha Sauvignon Blanc, Merlot 4.53 ha) and on the terraces (Pinot Gris, 1.81 ha, 1.47 ha Sauvignon Blanc, Merlot 1.70 ha); in both areas the average density was 4630 vines ha^{-1}. Randomized block experimental design was delineated in four repetitions. Demarcations were made in large production plots. More specifically, the experiences settlement for each experimental year was identical.

Biometric measurements were performed with roulette, the length of the canes in the autumn (after the end of the growing season, after leaves falls) and the frozen portion (tops) in the spring. To determine the portion of viable caines for each variety, was calculated the difference between the two measurements: from the total caines measured in autumn was deducting the frozen portion in the winter due to low temperatures (top brown).

The plots of grape vines cultivars were divided in equal parts; four rows (repetitions) considered representative have been elected for measurements. From each row (repetition) were chosen five vine trunks (in total 20 trunks/cultivar). For accurate measurements, vines chosen as representative should not be at the beginning or end of the row as they are always more vigorous.

RESULTS AND DISCUSSIONS

In recent years the global climate changes inevitably affected Romania and implicitly the vineyards that have suffered in recent year's major damages, losses of one year old wood, and even the entire number of vines.

To limit the effect of minimum temperatures in winter on vine, it helps to know a number of issues concerning: land choose for vineyards establishing, choice of grape wine cultivars, management system, knowledge the frost resistance of various organs of vines and applying an appropriate technology.

It is known that the vigor of vines is given by the length of canes. In the experiment were monitored both length canes, as well as frosted tips of shoots affected by low temperatures. Growth vigor of the vine differ according to a number of factors such as: hereditary characteristics of the cultivar and rootstock, vine vigor, buds from which shoots derived, length and position of two-year old cane, the development of the root, surface and the intensity of leaves assimilation rate, crop load, etc.

In the hill-valley area, in 2013, there were lower sizes of canes, which were shorter, their length being lower than those obtained in 2014 (the same situation at all three studied cultivars). The number of canes/trunk was less with one, compared to 2014. The

average length of a cane frozen section/trunk in the hill-valley area was less in experimental year 2013 with about 1- 3 cm in studied cultivars. In conclusion, the winter of 2014 was frostier, and affected more intensely the vines.

In the hill-valley area, it was found that the average number of canes/trunk was with 2-5 canes higher than in the terraces area for all cultivars in both experimental years.

The value of the total length of canes/trunk registered in two experimental years, confirms the high vigor cultivars in 2014 compared to 2013, in the hill-valley area compared to the terraces.

Year 2014 was rainy, which has resulted in an increased more intense of canes vigor/trunk (Figure 1).

Sauvignon Blanc cultivar, for both experimental years (2013 and 2014), achieved a medium to large vigor, with an average length of canes /trunk of 1.36 m and 1.98 m in the hilly-valley area, a vigor much higher than the other two cultivars in both areas of grapevine growing; Sauvignon Blanc cultivar is characterized in the literature as having a low vigor, thus proving the well adapted of the cultivar to the pedo-climatic conditions from Pâncota vineyards.

A high and constant vigor was also observed in Merlot cultivar, both in the hill-valley and the terraces area, a vigor corresponding to the varietal characteristics. Therefore, it can be concluding that, in the hill -valley area, the average and total length of canes was the highest in 2013.

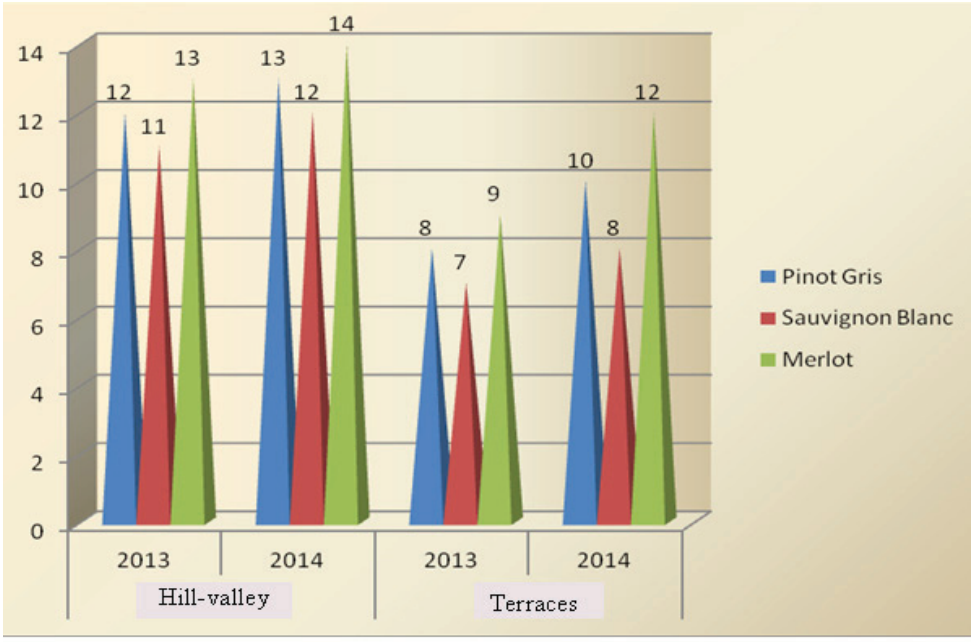

Figure1. Data on the average number of canes/trunk in the hill-valley and terraces areas during 2013-2014 in the Pâncota vineyard

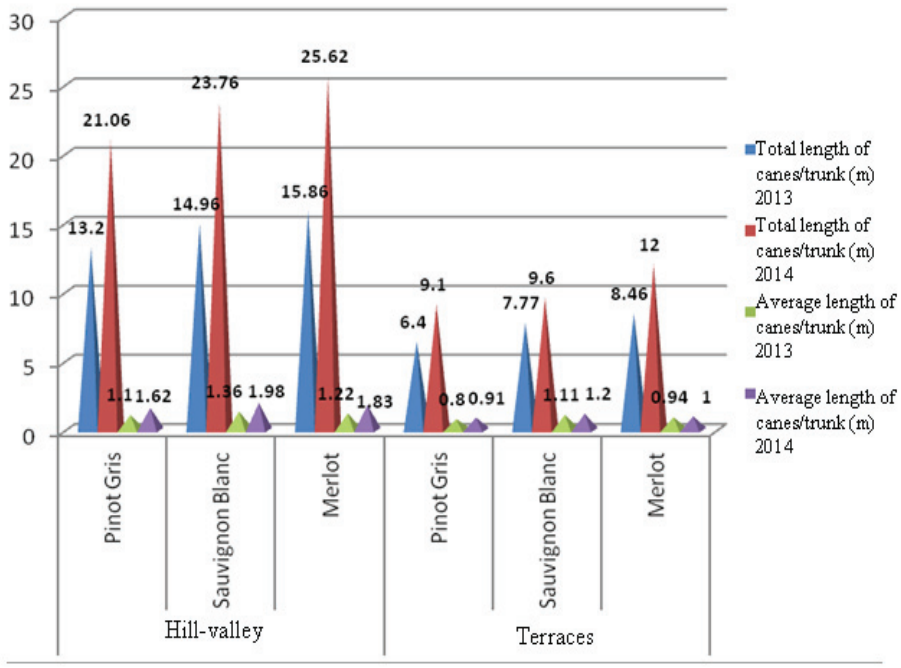

Figure 2. Comparative measurements of the canes/trunk in hill-valley areas and terraces in studied cultivars during 2013-2014, in the Pancota vineyard

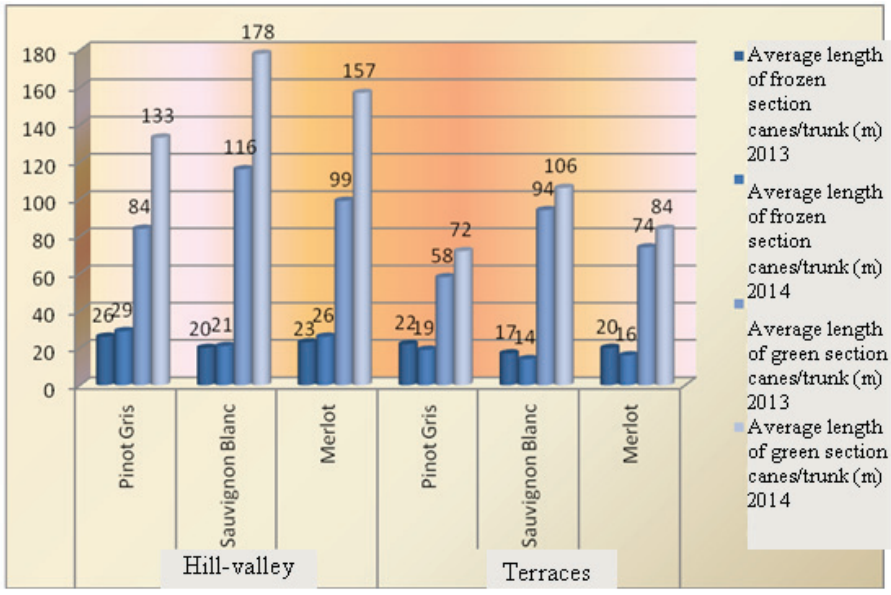

Figure 3. Comparison of cultivars frost resistant in the hill-valley and terraces area during 2013-2014, in the Pancota vineyard

Regarding resistance to frost, the vine is known as a plant that is not resistant to very low temperatures, vine being a sensitive plant during winter. From investigations it was found that the cultivars sensitivity was different depending on the harvest season, as well as the area where the vineyard is situated.

Cultivars studied were the worst affected by frost during the winter in experimental year 2014 in the hill-valley area (Figure 3). This is because the terraces are placed face towards southwest to have the longest exposure of the grapes to the light and heat of the sun, which protected them from the frost during the cold winters.

Length of cane trimming was determined annually for each variety placed on different places (hill-valley or terraces), and only after wintering trunk condition is established.

CONCLUSIONS

In 2013, there were lower size canes, their length being shorter than those obtained in 2014 (the same situation at all three cultivars). Year 2014 was rainy and the canes/trunk increased more intense.

The total length of the canes/trunk registered in both experimental years, confirms the great vigor of cultivars in the hill-valley area compared to the terraces.

The average length of the frozen section of a cane/trunk, in the hill-valley area, was lower in 2013 with about 1-3 cm in studied cultivars. In conclusion the winter of 2014 was frosty and has affected vines more intensely.

The average length of a cane viable portion per trunk was higher with about 10-14 cm in 2014 on the terraces area in all cultivars. Regarding the cultivars winter hardiness, it can be said that the white wine cultivar Sauvignon Blanc was the most resistant in both the experimental year 2013 as well as in 2014, as it recorded the lowest frostbitten section of a cane/trunk. From investigations it was found that the cultivars sensitivity was different, both depending on the harvest season, as well as according to the area where the vineyard is situated.

As a result of studies in both years, it was concluded that the cultivars with the highest sensitivity was proved to be Pinot Gris. Given the results, it is recommended to expand crop cultivars studied, not only in the western part of the country but also in other areas suitable for grapevine growing, and not only on small areas, but also on large areas. These varieties are characterized by resistance to natural critical conditions.

Although in the Banat region in recent decades almost was generalized the unprotected cultivation, it is considered that for avoiding the risk of irreversible damage by frost would be more appropriate to cultivate vines in semi-protected system. It can be concluded that are more exposed to frost the vineyards from the hill-valley areas compared to those located on the sunny terraces.

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SOME ASPECTS CONCERNING THE PRODUCTION OF *HIBISCUS ROSA-SINENSIS* L. ROOTED CUTTINGS

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Keywords*: type of cuttings, rooting substrate, rhyzogene stimulants, cuttings anatomy*

ABSTRACT

Our research aimed at establishing the optimal parameters for producing Hibiscus rosa-sinensis L. plant, starting from two types of cuttings (shoot cuttings and stem section cuttings). The cuttings were grouped into three variants: some cuttings were treated with Humusil, other part of the cuttings were treated with Radistim and the other part of the cuttings have not been treated with rooting hormones.

Also, before the planting of cuttings we realized microscopic preparations to determine the structural-anatomic particularities of cuttings internodes.

As rooting substrate we used sand and peat + perlite (1:1).

Our research showed that for both types of substrate and the both types of cuttings, the using of rooting hormone Radistim led to significant increases of rooting coefficient and quality of rooted cuttings.

Internode cross section through the top of the shoots show a secondary structure emerging, cambium came in the first meristem secondary activity.

Internode shoots median of hibiscus has a secondary structure unlike most developed upper internodes.

INTRODUCTION

Hibiscus rosa sinensis is one of the most popular flowering plants grown in pots. It requires both the beauty and elegance of flowers and leaves sprout (Toma, 2011). Multiplication is performed most often by cuttings and grafting (Bayly, 1989).

The results of cuttings rooting are influenced heavily by rooted hormones and rooting substrate (Wang et al., 1989).

Other authors believe that rooting cuttings is different and depending on the variety and climatic conditions ensured (Kuligowska et al., 2013).

Besides rooting substrate and type of rooted hormones, our experiences were considered a possible influence of the type of cuttings. We also make microscopic anatomical structure of the two types of cuttings planted for rooting.

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MATERIALS AND METHODS

Macroscopic observations. We used two types of cuttings: shoot cuttings and stem section cuttings. Some part of cuttings were treated with Humusil, other part of the cuttings were treated with rooting hormones Radistim and the other part of the cuttings have not been treated with rooting hormones. As rooting substrate we used sand and peat + perlite (1:1). After 7 weeks after planting of cuttings on rooting substrate we determined rooting coefficient, roots volume, the number of newly formed leaves and height growth of seedlings.

Microscopic observations. For determination the structural-anatomic particularities of the cuttings internodes we realized microscopic preparations. The sections of cuttings were kept for 24 hours in a saturated solution of Chloral hydrate for clarification, washed 2-3 times with distilled water, acidified water with 1% acetic acid and again distilled water (Georgescu and al., 2001; Zanovschi and al., 1985).

After that, the sections were placed on a slide in a drop of distilled water and 70^0 alcohol and examined and photographed at MC-7 optical microscope with a digital Panasonic camera type DCM -L27.

RESULTS AND DISCUSSIONS

Macroscopic observations. From Table 1 we see that the highest values of the coefficient of rooting meet from the variants which cuttings were treated with Radistim.

Table 1.

The results of macroscopic observations to rooted cuttings

Exp. var.	Type of cuttings	Rooting substra-tes	Rooted hormones	Root. coef. (%)	Roots volume (cmc)	No. of newly formed leaves	Height growth of seedlings (cm)
V1	cuttings shoot	sand	-	52.34	1.4	1.2	2.6
V2	cuttings shoot	sand	Radistim	74.65	2.1	2.6	2.8
V3	cuttings shoot	sand	Humusil	56.64	1.3	1.4	2.6
V4	cuttings shoot	peat + perlite	-	58.26	1.4	1.3	2.8
V5	cuttings shoot	peat + perlite	Radistim	76.64	2.3	2.6	3.2
V6	cuttings shoot	peat + perlite	Humusil	58.64	1.5	1.4	2.8
V7	stem section cuttings	sand	-	58.42	1.8	1.4	1.8
V8	stem section cuttings	sand	Radistim	83.68	2.6	2.2	2.4
V9	stem section cuttings	sand	Humusil	59.42	1.6	1.3	2.4
V10	stem section cuttings	peat + perlite	-	61.64	1.6	1.3	2.6
V11	stem section cuttings	peat + perlite	Radistim	86.24	3.2	2.4	2.8
V12	stem section cuttings	peat + perlite	Humusil	58.64	1.8	1.2	2.6

When referring to the type of cutting, we observe higher values of the coefficient to variants performed by stem section cuttings. These results are confirmed by a microscopic studies performed at the cuttings internodes.

In the rooting substrate, we find that, in general, the substrate composed of peat and perlite (1:1) leads to slightly higher values of the coefficient of rooting.

Concerning the roots volume we find a similar distribution to that of the coefficient values rooting (Figure 1).

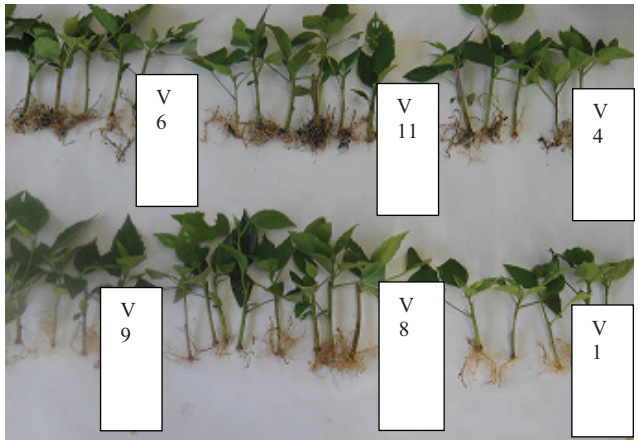
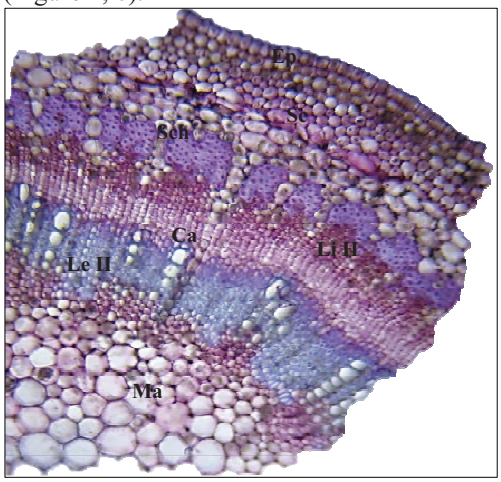


Figure 1. The rooted cuttings of *Hibiscus rosa sinensis* L. (similar variants)

The number of newly formed leaves is, generally, greater to variants which shoot cuttings than the variants which stem section cuttings. The highest values were obtained in the variants which cuttings were treated with Radistim.

Increase in height of the cuttings is also superior to variants which shoot cuttings. The differences between the two types of cuttings is most obvious in this case.

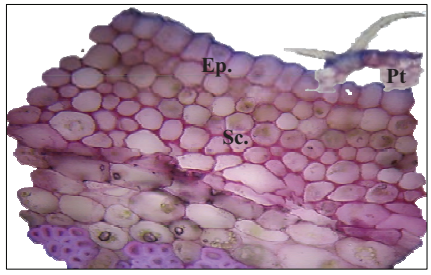
Microscopic observations. Internode cross section through the top of the shoots show a secondary structure emerging, bills came in the first meristem secondary activity (Figure 2, 6).



Ep – epidermis;
Sc – cortex;
Sch – sclerenchyma;
Ca – cambium;
Le – secondary xylem;
Li – secondary phloem;
Ma – pith.

Figure 2. Internode cross section through the shoot tip cuttings – overview.

Intact epidermal layer (Figure 2) provides external protection of the structure by means of a row of isodiametric cells covered by a very thin cuticle. At this level, there are stomata and, from place to place, two-armed trichomes (Figure 3).

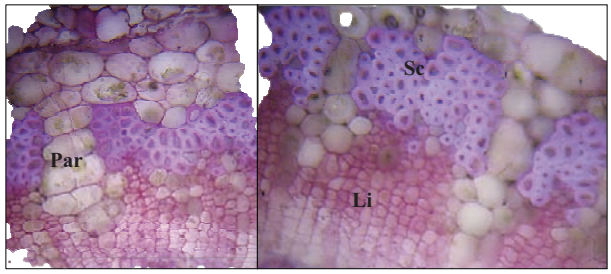


Ep – epidermis;
Pt – protective trichomes;
Sc – cortex.

Figure 3. The outside section - the epidermis, cortex.

The cortex (Figure 2) is divided into three sub-areas: the first, situated below the epidermis, consists of small cells rich in chloroplasts, the second is an angular collenchyma and the third is a parenchyma, comprising cells with starch and cavities mucilage.

The central cylinder is limited outside of a sclerenchyma tissue that plays the pericycle role, interrupted by parenchyma cells (Figure 4).

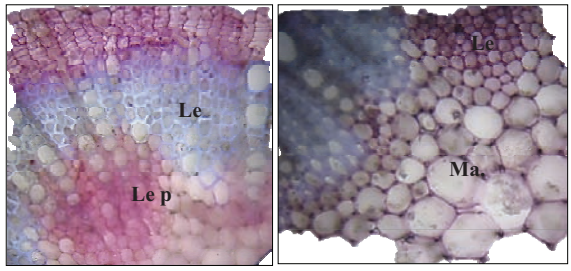


Par – parenchyma;
Sch – sclerenchyma;
Li – secondary phloem.

Figure 4. Central cylinder (detail)

The cambium is in the form of a continuous ring and is active, producing on the abaxial side secondary phloem tissue and on the abaxial side secondary xylem tissue.

The secondary xylem is formed by radial rows of vessels arranged together with fibers (Figure 5). Underlying the secondary xylem are primary xylem vessels. In the centre of the cross-section is the pith, as a parenchymal tissue.



Le – secondary xylem
Le p – primary xylem;
Ma – pith

Figure 5. Detail of secondary and primary xylem and parenchymal tissue.

Internode stem cross-section of *Hibiscus* shows a secondary structure most developed, unlike upper internodes (Figure 6).

The product of secondary tissue by cambium is higher than those in shoot tips and the principal components of the secondary structures of phloem and xylem are formed.

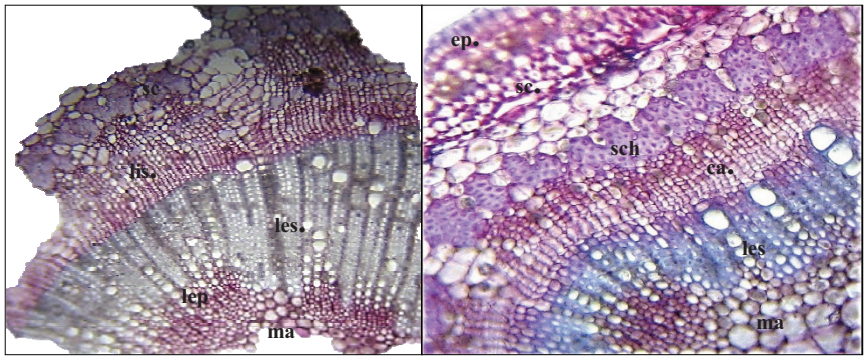


Figure 6. Secondary xylem and parenchymal tissue of stem cross-section (details and overview).

sc – cortex; lis – secondary phloem; les – secondary xylem; lep – primary xylem; ma – pith; ep – epidermis; sch – sclerenchyma; ca – cambium.

At the base of the secondary xylem vessels of the primary xylem tissue are observed; outwardly, primary cortex cells appear affected by the activity of the second secondary meristem – the phellogen. Pericycle area is represented by a sclerenchyma above the phloem tissues.

To outside of section we can be seen in the activity of the second meristematic tissue – the phellogen (Figure 7), formed in the deeper layers of the cortex.

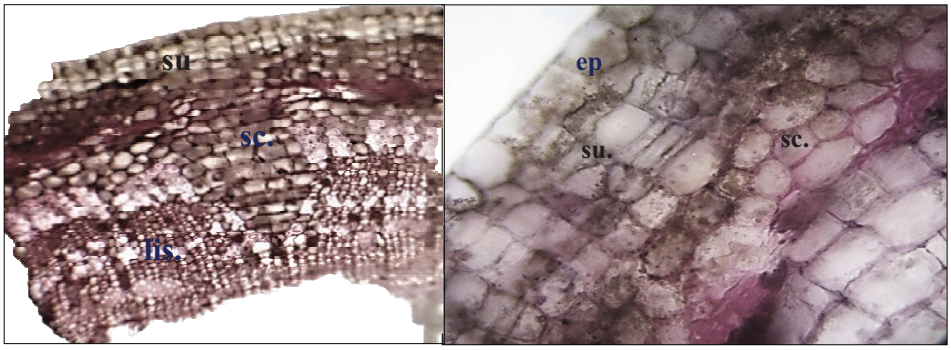


Figure 7. Detail of cork cells, epidermis and cortex in stem cross-section.

su – cork; sc – cortex; lis – secondary phloem; ep –epidermis

Phellogen produces, on the outside, packages of cells with suberized walls forming the cork. Epidermal layer will be gradually replaced by the cork which will become the protective tissue. On the inner side phellogen generate secondary cortex. The new tissue pressure on primary cortex, so, sometimes, causes the collapse of mucilage cavity.

Phloem is made up of areas with vessels and phloem parenchyma cells, arranged in radial rows (Figure 8). Inside the secondary phloem appear strands with sclerenchyma cells. Secondary xylem consists of vessels, parenchyma and fibres. The pith, as in the case of the shoot tips internodes, is present in the form of a parenchyma tissue; in the cells can be observed calcium oxalate crystals in the form of druses.

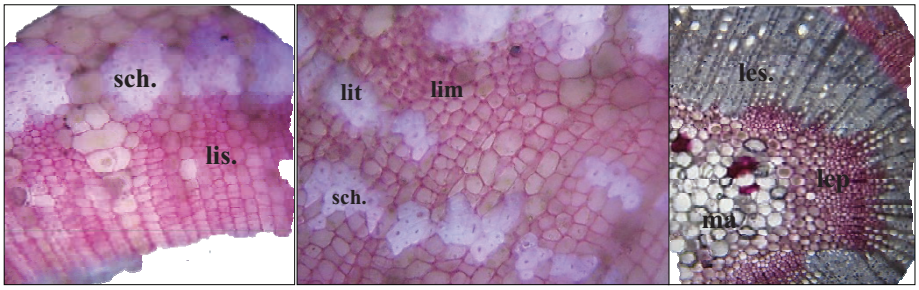


Figure 8. Detail of phloem and central cylinder to stem section cuttings.

sch – sclerenchyma; lis – secondary phloem; lit – phloem with sclerenchyma cells; lim – phloem with vessels and parenchyma cells; ; les – secondary xylem; lep – primary xylem; ma – pith.

These anatomical differences between shoot and stem cross-section explain the better results obtained from rooting of stem section cuttings.

CONCLUSIONS

Stem section cuttings had a better rooting than the shoots cuttings.

Radistim rooting hormone determine a higher values of the coefficient of rooting and volume roots compared to the product Humusil.

The cuttings planted on peat and perlite (1:1) substrate have been a superior rooting than the cuttings planted on sandy substrate.

Internode cross section of the shoot tips shows a secondary structure, with cambium the first secondary meristem in activity.

Internode shoots median of hibiscus has a developed secondary structure, unlike the shoot tips.

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RESEARCH ON THE INFLUENCE OF THE DEGREE DEHYDRATION OF CUTTINGS AND TYPE OF SUBSTRATE UPON THE ROOTING OF CUTTINGS ON *CRASSULA OVATA* MILL.

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Keywords: *cuttings dehydration, rooting substrate, cuttings anatomy*

ABSTRACT

Our research aimed to study the influence of the degree dehydration of cuttings and type of substrate upon the rooting cuttings on Crassula ovata Mill. We used cuttings planted in 4 versions: planted in the day of harvest, a day after harvest, two days after harvesting and three days after harvest. As rooting substrates were used: peat; sand; perlite; peat + perlite (1:1). All type of cuttings were treated with rooting hormones Incit 1.

To establish the differences between the variants in quality rooting these determinations were performed: roots volume (cm3); cuttings height (cm); the number of leaves; the number of branches; rooting coefficient (%).

Also, microscopic preparations were made for highlighting the structural characteristics of internodes of cuttings.

The research results showed that quality of cuttings rooting is greater to variants which cuttings were planted after two days of dehydration. The microscopic point of view in this day dehydratation caused the lack of visibility of the epidermal cells and amilifer parenchyma and vascular bundles aren't affected by the drying process.

The best rooting substrate was peat + perlite (1:1).

INTRODUCTION

Crassula plant is particularly interesting from the standpoint ornamental (Toma, 2011). Although multiply and easy care, *Crassula* is very studied by many researchers. Some of this research studies the classical plant breeding methods (Lyons and al., 1987) or modern micropropagation method (Ahmed and al, 2014). Other research focused on the anatomical structure of plant organs (Cahhon and al., 2012) or genus *Crassula* genetic variability and adaptability of plants to different environmental conditions (Jones, 2011).

The research in this paper aimed influence the degree of dehydration of the cuttings and rooting cuttings on the type of substrate. Also, we performed a microscopic study to see what happens with the internodes anatomical cuttings as they dehydrate.

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MATERIALS AND METHODS

Macroscopic observations. We used shoot tip cuttings 3-4 and 5-6 leaf nodes. The first part of the cuttings were planted in rooting substrate immediately after harvest. The second part of the cuttings were left dehydrated one day and then were planted in rooting substrate. The third part of the cuttings were planted in the rooting substrate after being left two days in a dehydrated. The last part of the cuttings were planted in the rooting substrate after being left for 3 days in dehydrated. Before planting the cuttings in rooting substrate were treated with rooting hormone Incit 1. After 8 weeks after planting rooting substrate, the following data were recorded: ratio of rooting of the cuttings, the volume of the roots, cuttings height, number of leaves and number of branches.

Microscopic observations. For each of the series of cuttings were made microscopic observations to see which internodes cuttings structure in relation to the degree of dehydration.

The sections of cuttings were kept for 24 hours in a saturated solution of Chloral hydrate for clarification, washed 2-3 times with distilled water, acidified water with 1% acetic acid and again distilled water (Georgescu et al., 2001, Zanovschi V. et al., 1985).

After that, the sections were placed on a slide in a drop of distilled water and 70^0 alcohol and examined and photographed at MC-7 optical microscope with a digital Panasonic camera type DCM -L27.

RESULTS AND DISCUSSIONS

Macroscopic observations. Observations made after removal of cuttings rooting substrate are shown in Table 1.

Table 1.

The results of macroscopic observations to rooted cuttings

Exp. var.	Days of cuttings dehydra-tion	Rooting substrates	Root. coef. (%)	Roots volume (cmc)	Height of roots cuttings (cm)	No. of leaves	No. of. branches
V1	0	perlite	87.50	0.67	4.65	6.12	0.00
V2	1	sand	55.25	1.06	4.68	6.50	0.00
V3	2	peat	92.50	1.31	4.18	6.50	0.12
V4	3	peat+perlite	98.45	1.56	5.06	6.62	0.12
V5	0	perlite	87.50	1.27	4.06	6.25	0.00
V6	1	sand	89.35	1.31	4.37	6.75	0.12
V7	2	peat	91.40	1.45	4.25	7.00	0.12
V8	3	peat+perlite	93.50	1.56	5.31	7.25	0.25
V9	0	perlite	85.50	1.31	4.87	7.12	0.12
V10	1	sand	85.50	1.31	4.62	6.75	0.00
V11	2	peat	93.50	1.75	5.62	7.62	0.12
V12	3	peat+perlite	95.45	2.18	5.93	7.00	0.37
V13	0	perlite	68.50	1.12	4.31	7.87	0.00
V14	1	sand	82.50	1.12	4.12	6.75	0.00
V15	2	peat	89.35	1.25	3.87	6.00	0.12
V16	3	peat+perlite	98.45	1.37	4.34	7.00	0.25

The table shows that the highest values of the coefficient of rooting can be found in the variants has been used as a substrate for rooting peat + perlite. The differences between the variants in relation to the degree of dehydration of the cuttings are small.

Analyzing the roots volume we find that the highest values are found in variants that cuttings were dehydrated 2 days before planting in rooting substrate (Figure 1). For each of the four variants of dehydration of the cuttings, the best effect on the volume of roots had substrate composed of peat and perlite. Similar results can be found for the other indicators followed, namely: the number of leaves, height of cuttings and number of branches.

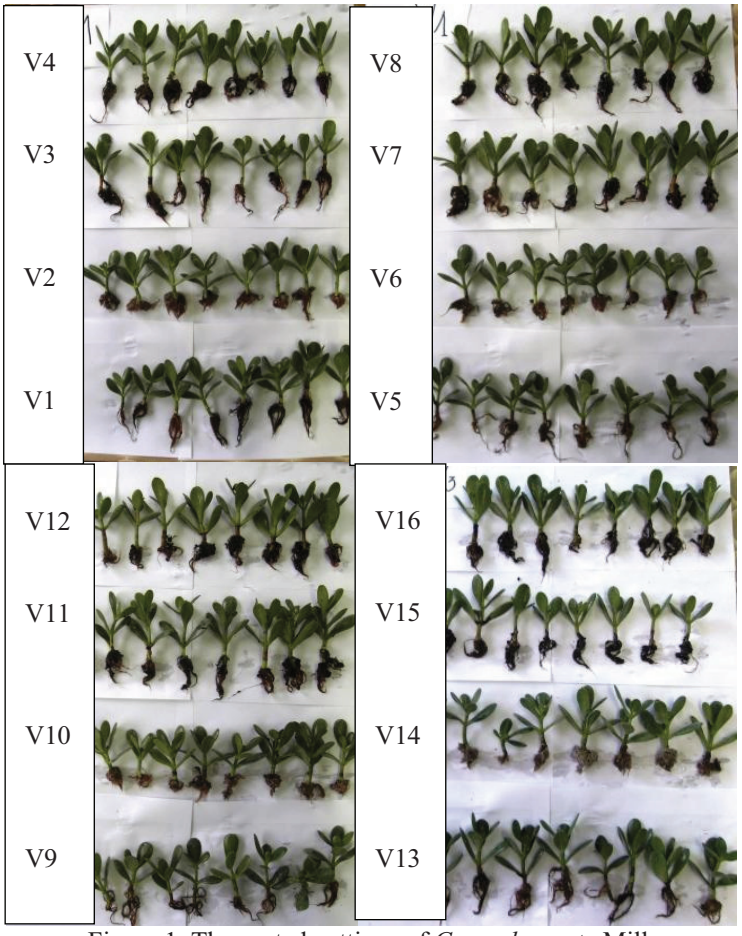


Figure 1. The rooted cuttings of *Crassula ovata* Mill.

Microscopic observations. These observations were made for each of the four variants of dehydration of the cuttings. In Figures 2 and 3 we see the anatomical structure of internodes cuttings planted the same day they were harvested (0 days dehydration).

Epidermis: one flattened cells layer, with thicket tangential walls and a cuticular layer on the outside. Hypoderm: the first cortex layer beneath the epidermis is a tabular collenchyma. The cortex with aquifers cells; inside there are a big vacuole and chloroplasts arranged at the edge of the cells; inner layers of this parenchyma are formed of cells rich in starch. The central cylinder is composed of vascular bundles arranged on a single verticile, demarcate the pith area, also rich in starch.

In Figures 4 and 5 we see the anatomical structure of internodes cuttings planted after 1 days of dehydration.

After a day from detaching the cutting from mother plant all the tissues are obvious. There are some changes in the external layers zone – the epidermal, hypodermal and the cells of the first cortex layers of the cortex cells are shrinking in volume.

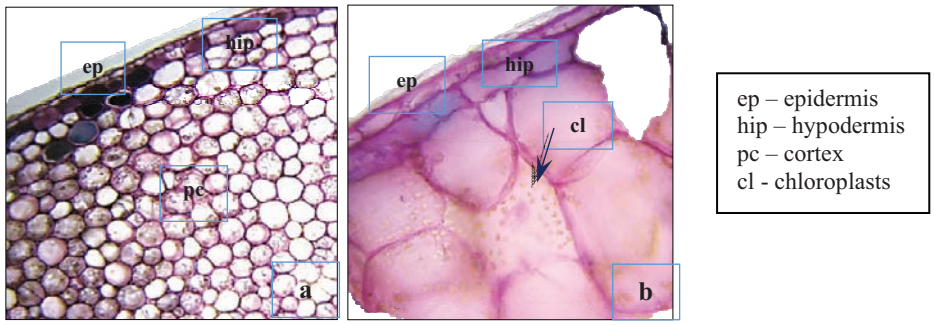


Figure 2. Internodes of *Crassula* 0 day dehydration
a) – cross-section (overview); b) - epidermis, hypodermis, external cortex layers (detail).

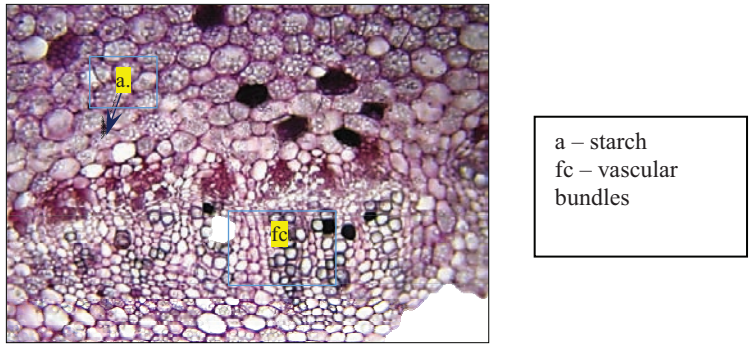


Figure 3. Internodes of *Crassula* 0 day dehydration:
amilifer parnchyma, central cylinder (detail)

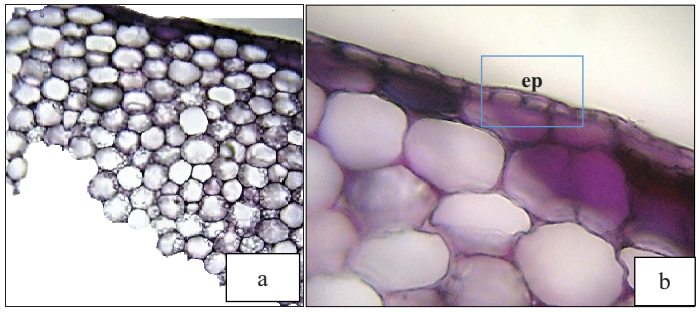
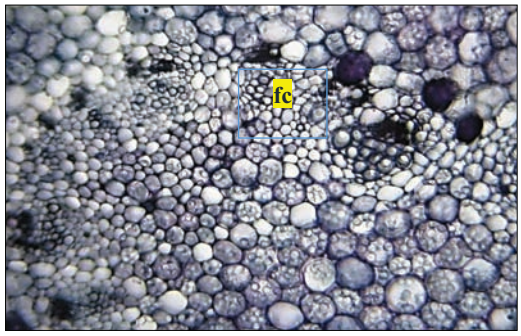


Figure 4. Internodes of *Crassula* after one day of dehydration
a) cross-section (overview); b) epidermis (detail).

Chloroplasts are in small number in the first two layers of the cortex. There are no major modifications in the central cylinder zone.

The anatomical structure of internodes cuttings planted after 2 days of dehydration is included in Figures 6 and 7.

Two days after the cuttings were prelevated from the plant mother, the changes are obvious to the external layers of the cross-section. Dehydratation caused the lack of



fc – vascular bundles

Figure 5. Internodes of *Crassula* after one day of dehydration: central cylinder (detail)

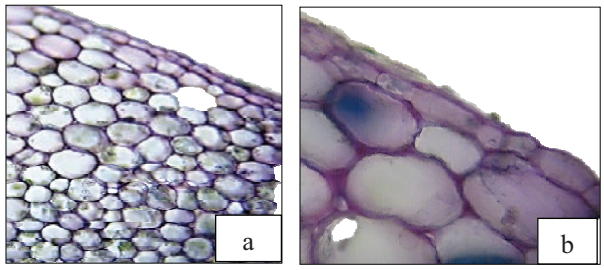


Figure 6. Internodes of *Crassula* after two day of dehydration
a) cross-section (overview); b) epidermis (detail).

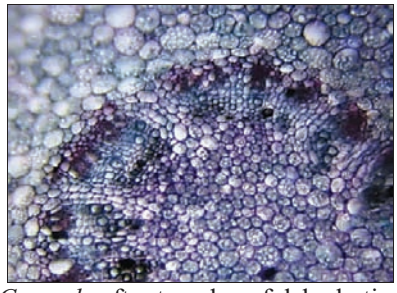


Figure 7. Internodes of *Crassula* after two day of dehydration: vascular bundles zone

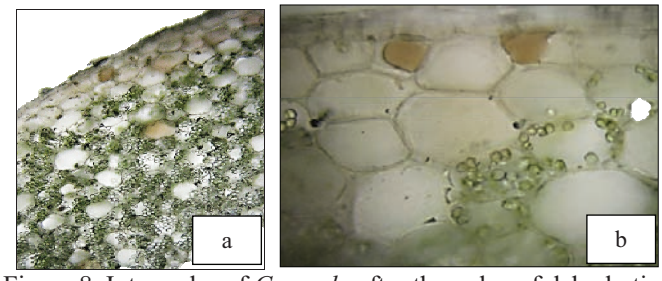


Figure 8. Internodes of *Crassula* after three day of dehydration
a) cross-section (overview); b) external layers (detail).

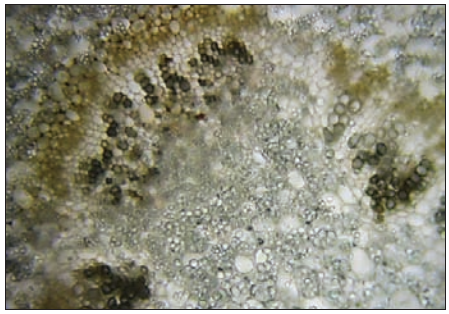


Figure 9. Internodes of *Crassula* after three day of dehydration: Central cylinder (detail)

visibility of the epidermal cells. Amilifer parenchyma and vascular bundles aren't affected by the drying process.

In Figures 8 and 9 we see the anatomical structure of internodes cuttings planted after three days of dehydration. Changes due to dehydratation in the third day are similar to previous day: the epidermal layer are not visibile on the entire outline of the section, chloroplasts are dysfunctional in some of the external layer cells of the cortex. In the central cylinder zone aren't obvious changes.

CONCLUSIONS

The best rooting substrate was peat + perlite (1:1).

The quality of cuttings rooting is greater to variants which cuttings were planted after two days of dehydration.

After a day from detaching the cutting from mother plant we observed some changes in the external layers zone – the epidermal, hypodermal and the cells of the first cortex layers of the cortex cells are shrinking in volume.

These changes are more obvious since the third day of harvesting cuttings.

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STUDIES ON AGROBIOLOGIC AND TECHNICAL CHARACTERISTICS OF CERTAIN CLONES OF WHITE FETEASCĂ ACQUIRED IN ŞTEFĂNEŞTI - ARGEŞ VINEYARD

Giugea N.[1], Popa Camelia[2], Mărăcineanu L.[1]

Keywords*: grapevine, clonal selections, Fetească albă*

ABSTRACT

In order to get a genetic determination and assignation of valuable productivity-quality compositions and characteristics, the white Feteasca varieties were subjected to clonal selection. The present paper presents two assimilated clonal selections from 2008 and 2014 considered valuable for their own agrobiologic characteristics. The two clonal elites were compared to the rest of population but also to each other. If the elite Fetească albă 2 Şt. was homologated due to the characteristics carried by the grapes and large berries which exceed by far the reference variety, the elite Fetească albă 97Şt. was appreciated for the quality of its must and wines.

All data registered following the observations and determination of agrobiologic and technical characteristics performed bears the print of the climatic conditions of the wine years 2010-2013.

INTRODUCTION

The clonal selection represents a higher level of the selection papers as it contributes to the qualitative and productive wellbeing of the existing wine varieties. It consists in the individual selection and reproduction of the most valuable vegetative breeds derived from hubs which have maintained special characteristics for several years. By the works of vine clonal selection conducted at INCDBH Ştefăneşti, two selections of Fetească alba variety were acquired, contributing to the enhancement of the vine variety for higher quality white wines.

The clonal elites were registered in the Official Catalogue between 2008 (Fetească albă 97 Şt) and 2014 (Fetească albă 4 Şt).

Following the determinations and observations performed during 4 years, each selection proved to be better than the population it came from. In Romania, 7 clonal selections of Fetească albă have been assimilated in different vineyards: Argeş, Odobeşti, Iaşi, Blaj and Cotnari.

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MATERIAL AND METHODS

In the clonal selection papers started in Ştefăneşti in 1996, it was used a pattern of 3 important stages (Bandinelli R., et all, 1989; Bădiţescu M., 1959, Calistru Gh. et all. 1980; Popa C., 2003): positive mass selection and choosing the clonal elites from the mother vinery, followed by a fast breeding; the comparative study of the elites considering the productivity potential, quality of the grapes and wine, the phytosanitary testing, breeding of the high performance clones and their registration in ISTIS.

The identification, selection and designation of the valuable elites was performed in vineries older than 20 years, with a proper phytosanitary state.

In order to compare the performances of the chosen elites, the population of Fetească albă variety was used asa butte. During the third selection year, the hubs which have not preserved the quality and productivity characteristics were cut out.

Parallel to the study of the elites in the mother vinery it was also performed the proliferation of the best by grafting the hubs in view of founding comparative and testing vineyards.

The sock used for grafting was Kobber 5BB. They were planted at 2.5m /interval and 0.9 m/raw (4000but/ha).

The logs were led in Guyot on semi-stem and support on fruit-frame with 5 wires. The soil is brown coluvile, loamy, with phosphorus and potassium, weak carbonated, with slightly pH acid (6.2-6.4).

RESULTS AND DISCUSSIONS

All data registered following the observations and determination of agrobiologic and technical characteristics performed bears the print of the climatic conditions of the wine years 2010-2013.

The climatic conditions of the studied wine years are characterized especially by the high water regime, during the most important times of grapes growth and ripening, as well as by huge temperature differences between summer and winter.

The two clonal elites have been compared to the rest of population but also to each other. If the elite Fetească albă 2 Şt. was assimilated due to the characteristics carried by the grapes and large berries which exceed by far the reference variety, the elite Fetească albă 97 Şt. was appreciated for the quality of its must and wines.

By these analyses and determinations the intention is to present both the agrobiologic importance of the white Fetească variety, and the relevant role of the clonal selection. There can be acquired clones which display certain qualities: grapes with large berries, high productivity, resistance to biotic and abiotic factors and the quality of the must. Therefore, the clonal selection helps the genetic washout of a variety.

The clonal elite Fetească albă 97 Şt. was assimilated for its qualitative characteristics, especially for the high sugar content in the must and wine.

The agrobiologic and technological characteristics of the elites Fetească albă 97 Şt and Fetească albă 2 Şt. compared to the Fetească albă butte, are presented in figures 1,2,3 and 4 below.

The durability of vine buds of the clonal elites proves that they are frost-hardy, over 80%, dead eyes, which is pretty close to the population variety. An increased fertility presents the elite 97 Şt., (78% fertile shoots), as a productive clone, adapted to the climatic conditions in Ştefăneşti vinery (figure 1).

By determining the fertility coefficient (absolute and relative) we can appreciate that the two clonal elites are definitely superior to the butte variety having a high fertility level expressed by values between 1.74-1.41 (CFA) and 1.37-0.89 (CFR). See figure 2.

In order to check up the productivity of the two assimilated selections, it was also determined the productivity index, calculated as the product between the absolute fertility

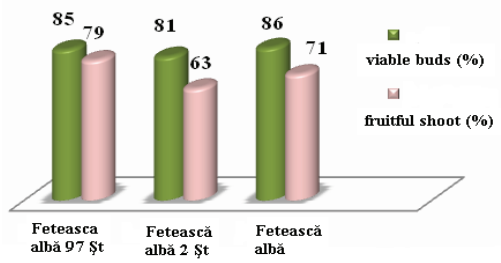


Figure 1. Bud viability and fertility

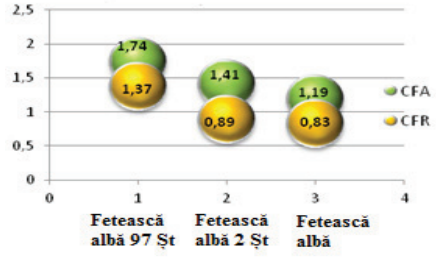


Figure 2. Fertility expressed by fertility coefficient

coefficient (IPA) or the relative fertility coefficient (IPR) and the average mass of a grape-cluster.

The productivity indexes (IPA and IPR) had average multiannual values (IPA= 200,191; IPR= 151, 126) superior to the population (144 absolute and 102 relative). One of the reasons why these clones have been selected was also their high production capacity. (figure 3).

Technological elements have also assisted in getting the high productivity (Figure 4): the weight of the grape and berries. If the clonal elite Fetească albă 2 Șt. distinguished by the weight of the grape and berried, 20-30g heavier than the selection 97 Șt. and the butte, the sugar content in the must (205 g/L) places this clone below the second selection (189 g/L), but above the quality of the must produced from berried of Fetească albă variety (171 g/L).

We can therefore say that the selection Fetească albă 2 Șt. was chosen for the size of its grapes and berries, definitely superior to the population, while the selection Fetească albă 97 Șt. has distinguished by the quality of the must and wine.

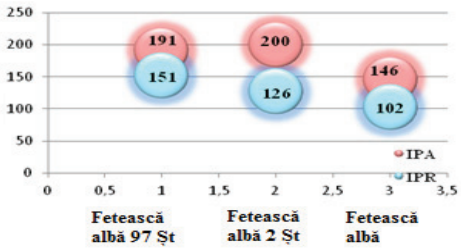


Figure 3. Clones productivity elements

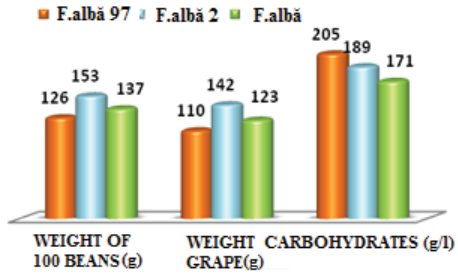
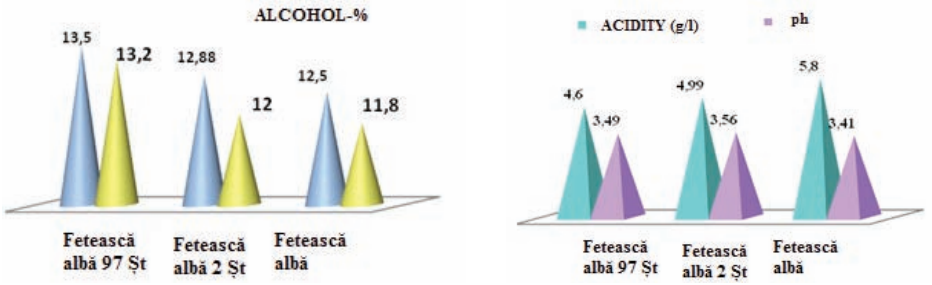


Figure 4 Clones quality elements

The microvinification of the grapes coming from the two white wine selections proves once again the superior quality of the wine resulted from the cone Fetească albă 97 Șt. (figures 5a and 5b) by means of the following: high concentration of alcohol, balanced acidity and specific pH.



a b

Figure 5. Quality elements of the wine got from clonal selections

Organoleptically speaking, the two clonal selections represent well-balanced wines, a little more acid than the butte. The sugar concentration in the must was high, and consequently, so was the alcohol content (13.5-12.88%vol.).

CONCLUSIONS

The clonal selections Fetească albă 2 Şt. and Fetească albă 97 Şt. acquired from Fetească albă variety proved to be superior to the reference variety in terms of quality and quantity.

By including the clonal selections in the Romanian Official Catalogue of the Varieties of Plant Species it was created the possibility of breeding them and taking advantage of the seedling provenance material.

The clone Fetească albă 2 Şt. was assimilated because of the characteristics of the grapes and large berries, significantly larger than any reference variety.

The clone Fetească albă 97 Şt. was appreciated due to the quality of its must and consequently of the wine. It is recommended to extend the production of the two clonal selections acquired in Ştefăneşti.

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COMPARATIVE STUDY REGARDING THE CHEMICAL COMPOSITION OF SPARCKLING WINES OBTAINED BY DIFFERENT METHODS

Giurgiulescu L.[1], Daraban Mariana[1], Stoica Felicia[2], Banică M.[3]

Keywords: *sparkling wines, second fermentation, foamabality, pearling.*

ABSTRACT

The goal of this study focused on the chemical composition of sparkling wines. Five different sparkling wines was study, 2 obtained by Champenoise method, 1 by Charmat method and 2 by injection wine with CO_2. It was determined foamability, pearling, total acidity, volatile acidity, total and free SO_2. Considering all the results sparkling wine obtained the best foam and pearling characteristics, followed by sparkling wine obtained by transfer method.

INTRODUCTION

Sparkling wines are obtained after a second fermentation of raw materials wines. The second fermentation can be doing by traditional method used in Champagne – France, by transfer method – Charmat used in Italy and by injection of SO_2 in wines, direct method with low quality results. High quality sparkling wines like Cava in Spain, Cremant in France Berlucchi in Italy or Henkell in Germany, are obtained by second fermentation in closed bottle following the traditional or champenoise method. The wines stay in contact with yeasts between 6-9 months. The great difference between sparkling wines consist in raw materials, wines and grapes, second fermentation method, ageing period (Pozo-Bayon, et. al. 2010; Riu-Aumatell, et. al., 2006; Torrens, et. al., 2010).

During the sparkling wine second fermentation there are a lot of processes which improve or decrease the qualities of products. Most of compounds results by yeast autolysis which enrich the sparkling wines in volatile compunds (Gouilloux Benatier, 2006; Francioli et. al., 2003; Pozo-Bayon et. al. 2010).

Raw material used in production of sparkling wines need to respect following conditions: alcohol degree 10-11.5 % vol., total acidity 5-7 g/L, volatile acidity maximum 0,5 g/L H_2SO_4, dry extract 17-22 g/L, total nitrogen 200-300 mg/L, reduced sugars

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maximum 2 g/L, Fe maximum 4 mg/L, SO_2 total 100 mg/L, SO_2 free 15 mg/L (Gheorghita et. al., 2002).

During the sparkling wine ageing a lot of enzymatic process determine some chemical reaction can determine the increase or degradation of some volatile compounds. (Del Bario-Gallan, 2012; Torrens et. al., 2010; Perez-Magarino, 2015).

This study focused on chemical composition and physical characteristics of sparkling wines obtained by different methods.

MATERIAL AND METHODS

In experiments was used 5 types of sparkling wines coded as bellow:

A- Margaritar Jidvei
B- Zarea Dyamond Collection
C- Garrone Asti
D- Angelli Cuve Imperial
E- Dorato

For all of sparkling wines it was determinate pearling time, foamability, total acidity, volatile acidity, free SO_2, ash and total SO_2. Three bootless of each varietal sparkling wine was used in experiment. One extraction for each bottle was carried out.

i) Foamability and pearling time was determinate by simply pouring and observing champagne in special glasses. The pearling was determinate by timing from first bubbles appear in the glasses and las bubbles evaporate from the glasses. The foamability was determinate by timing between foam generation and foam disappearance.

ii) Total acidity - (H2SO4 gr.L^{-1}) OIV-MA-AS313-01

The total acidity of the wine is the sum of its titratable acidities when it is titrated to pH 7 against a standard alkaline solution. Carbon dioxide is not included in the total acidity and was eliminated before analyses by sparkling wine filtration method. For determination it used potentiometric titration method.

iii) Volatile acidity (CH_3COOH gr.L^{-1}) OIV-MA-AS313-02

The method consists in training the volatile acid by titration with NaOH of the wine acidified with sulfuric acid in the presence of metal orange indicator up to pH=2,7

iv)Total (SO_2 mg.L^{-1}) OIV-MA-AS323-04B

Sulfur dioxide is determined by direct titration with iodine. The combined sulfur dioxide is subsequently determined by iodometric titration after alkaline hydrolysis. When added to the free sulfur dioxide, it gives the total sulfur dioxide. Total sulfur dioxide is defined as the total of all the various forms of sulfur dioxide present in the wine, either in the free state or combined with their constituents.

v) Free SO_2 (mg.L^{-1}) OIV-MA-AS323-04B

Free sulfur dioxide is defined as the sulfur dioxide present in the must or wine in the following forms: H_2SO_3, HSO_3, whose equilibrium as a function of pH and temperature.

vi) Ash OIV-MA-AS2-05

Add 10 mL 0.05 M sulfuric acid solution to the ash from 20 mL of wine contained in the platinum dish. Place the dish on the boiling water-bath for about 15 min, breaking up and agitating the residue with a glass rod to speed up the dissolution. Add two drops of methyl orange solution and titrate the excess sulfuric acid against 0.1 M sodium hydroxide until the color of the indicator changes to yellow.

RESULTS AND DISCUSSIONS

From figure 1-2 results that traditional method lead to sparkling wines with high foamability and pearling time. Transfer method permit to obtain sparkling wines with foamability and pearling time near the traditional method. Introduce CO_2 by injection in wines determine a low quality products. The foamability are very low, bubbles are bigger than others sparkling wines and pearling time are very short.

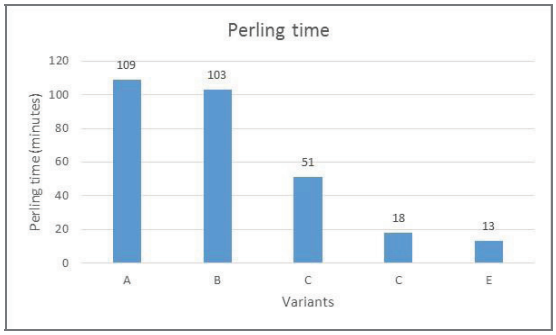

Figure 1 . Perling time for sparkling wines

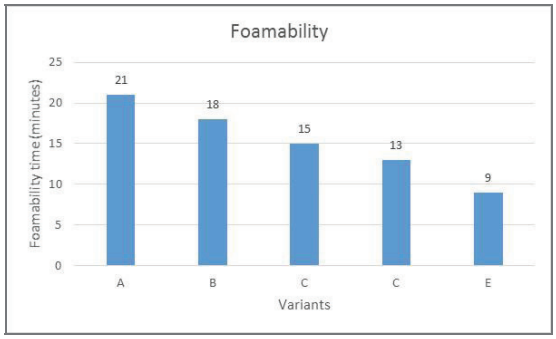

Figure 2 . Foamability time for sparkling wines

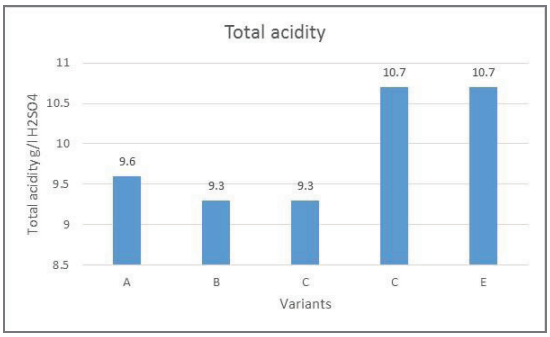

Figure 3 . Total acidity of sparkling wines

Total acidity record high values at variants obtained by wines impregnation with CO_2. These method, in special when it used 2 steps of impregnation (Gheorghita et.al.,

2002), increase sparkling wines acidity. New methods used porous ceramic candles for better impregnation with CO_2 (Sugar, 2014). All of this methods lead to high content of acidity in sparkling wines. A special remark can be make for sparkling wine obtained by Champenoise method at Jidvei. The raw material wine have a high content in acidity which determine an increase of total acidity compare with the others 2 samples.

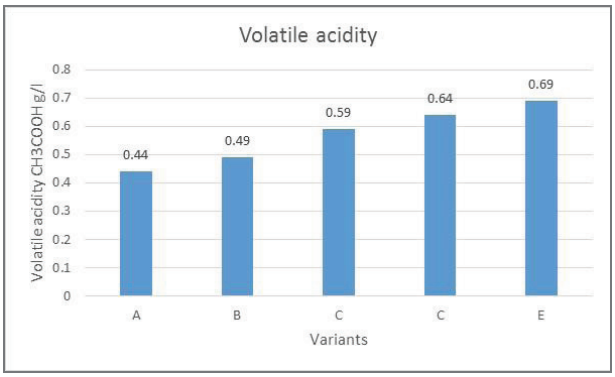

Figure 4. Total acidity of sparkling wines

Volatile acidity show an increase from the first to the end variants. In generally, volatile acidity record near values, the technological process determine only the types of volatile compounds. For sparkling wines obtained by traditional and transfer method most of aromatic compounds results in second fermentation. For sparkling wines obtained by impregnation with CO_2 volatile compounds come only from wines raw material.

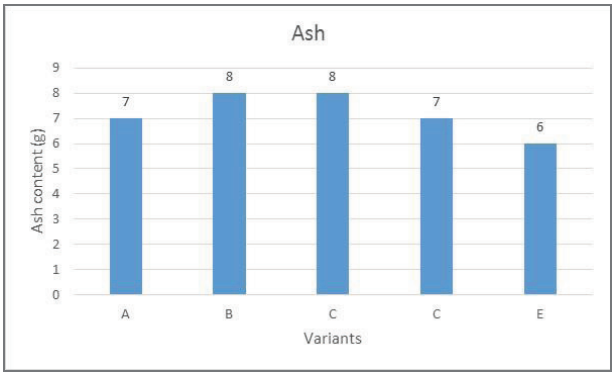

Figure 5. Ash content of sparkling wines

Ash content represent totally of cations and anions after incineration method. The ash content is influenced by the wine raw material used in sparkling wine technology. In wine making technology a lot of inorganic substances are eliminated by technological practices: tartaric stabilization; wine clarify, etc. (Cotea D.V., 1985). The method used in second fermentation has less influence. Sparkling wines produce by impregnation with CO_2 record ash content near then sparkling wines obtained by traditional method and transfer method.

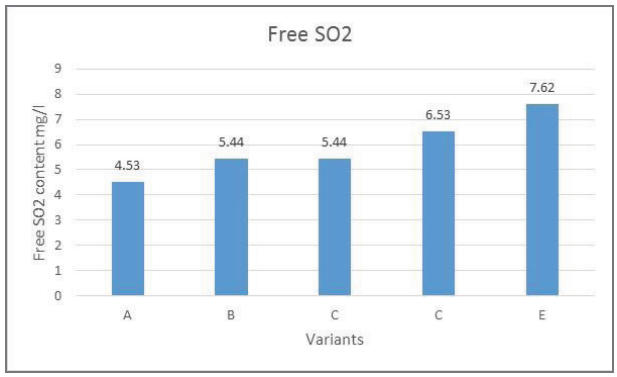

Figure 6. Free SO_2 content in sparkling wines

Free SO_2 content record lower values than standard for wines raw material. (Gheorghita et. al., 2002). The values increase from sparkling wines obtaining by Champenoise method, to wines obtaining by Cremant method and higher values record to wines impregnated with CO_2. The wines CO_2 injected, requires double amount of free SO_2 content than sparkling wines produced by traditional method. A high level of free SO_2 in wines exposed at second fermentation block the yeast activity.

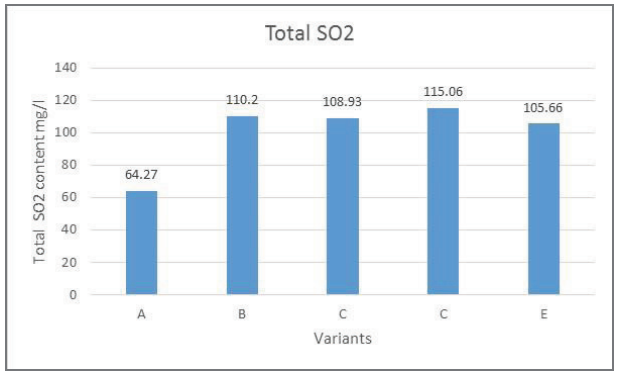

Figure 7. Total SO_2 content in sparkling wines

The last determination present total content of SO_2 in sparkling wines analyzed. This parameter depend by wine raw material used in technological process. All the variants, except first record concentration in total SO_2 high than standards for wines raw material. Only the sparkling wine obtained by traditional method, in Transylvania record a normal content in SO_2. For sparkling wines obtained by CO_2 injection, the SO_2 content is in normal limits. These types of wines need to conserve long time. For second and third variants, the content in total SO_2 record high values than normal, for a sparkling wine.

CONCLUSIONS

In resume, methods used in sparkling wine technology influence quality of final product.

It can be remarked some differences in chemical composition for all types of sparkling wines obtaining by Champenoise method, Cremant methode and wine injection with CO_2 method.

The sparkling wines result by traditional method have a good pearling and foamability, low content in total and volatile acidity, low content in free SO_2 and total SO_2. A special remark can be make for the second variant, where total SO_2 was higher than first variant.

The sparkling wines obtained by transfer method record a good pearling and foamability, a low content in total acidity, medium content in volatile acidity, and high level in total SO_2.

The sparkling wines obtained by CO_2 injection in wine present a low quality, foamability and pearling for short period, big bubbles with low persist period, high content in total and volatile acidity, high content in free and total SO_2.

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CLASSIFICATION OF VINEGAR BLENDED WITH DIFFERENT WOOD ESSENCES BY SPECTROSCOPY METHOD

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Keywords*: vinegar, identification, spectroscopy, wood essences*

ABSTRACT

The identification of vinegar produced from raw materials (white wine, apple juice) in blends with different shavings wood essences (cherry, walnut, beech, acacia) has been realized by UV-vis spectrophotometry. The spectra characterize each type of vinegar by measure at different wavelengths 200-620 nm. Physical-chemical determination was made for each variant. The difference between natural vinegar and vinegar blended with wood shavings were observed only by spectroscopy method. The study can be used to identification of falsified vinegar by immersion inside of shavings wood.

INTRODUCTION

Vinegar is very used in Europe as condiment, food preservative and taste equilibrate (De la Haba, 2014; Chen, 2012). Vinegar contains in chemical composition organic acids, polyphenols, antioxidants, phenolic compounds with positive role in human health (Nakamura et al., 2010). Utilization of vinegar in daily food, base by antioxidant activity have had an important role in prevention of lot coronary disease, cancer, hypertension, cardiovascular disease, diabetes, etc. (Budak, 2014; Nakamura et al., 2010).

Quality of vinegar depends essentially by the raw materials used in fermentation process. On the other hand, the acetification system determine the amount of positive compounds extracted in vinegar (Guan et al., 2014; Chen et al. 2012).

The largest amount of vinegar consumed in Europe is produced from wine. The vinegar can be produced from some fruits: apple, molasses, rice and cider. Most of consumers prefer different type of products obtained by mixing several types of vinegar. This blending doesn't involve a healthy risk but determine potential fraud. (Saiz-Abajo et al. 2004) In this condition, to prevent the fraud there are necessary methods to control the quality and origin of vinegar. The analytical methods are able to determine these frauds and

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illegal practice. The most known analytical methods involved mass spectrophotometry, gas chromatography, infrared spectroscopy and electronic nose system to determine the compounds from vinegar chemical composition (Saiz-Abajo, 2004; De la Haba, 2014; Guan et al., 2014). These methods consume a lot of reagents, require specialized persons and expensive apparatus. In this condition spectroscopy methods are an alternative to the modern analytical technics. Spectroscopy methods offer great results in the discrimination of vinegars (Torecilla et al. 2015).

The three components, wood, color and flavor go hand in hand, as long as the vinegar is kept in wooden cask, it will gain little from the essence of the barrel is made of wood, flavor, and then the specific color hardwood. Tannins, quercetin, hemicellulose and lignin is transferred from wood to vinegar, changing its dry extract, acidity and giving it a darker color. Color varies from subject to alteration wine, but also according to woods in the barrel, with the specific characters of color amber to mahogany intense, combining notes of wine and spirits wood accents. The use of barrels made from different types of wood produces differences in the aromatic composition of vinegar (Callejon et al., 2010).

This study proposes to demonstrate the difference between spectrum of normal vinegar and spectrums of vinegar artificial ageing as discrimination method for diverse types of vinegar.

MATERIAL AND METHODS

The vinegar samples analyzed in this study were produced from white wine vinegar and apple vinegar. In these samples was immersed 4 types of wood shavings: beech, cherry, walnut and acacia. All samples were kept in a dark room 6 months. Vinegar completely covered sachets with wood shavings. Each sample was keep in bottle of 250 ml fill with vinegar. In each bottle was immersed 1 bag with 20 g of wood shavings. After 6 months, all the samples were open and analyzed: total acidity, volatile acidity, iron content, extract, dry residue, pH and spectrums.

i) Total acidity OIV- OENO 52/2000

The total acidity refers to a vinegar whose acidity can be titled in the presence of phenolphthalein in an alcoholic solution, used as indicator. Reagents: Solution of sodium hydroxide 0.5 M. Indicator – phenolphthalein alcoholic solution at 1 g per 100 ml. Standard equipment for laboratory.

ii) Fixed acidity OIV- OENO 53/2000

The fixed acidity of a vinegar refers to all the fixed (non-volatile) acids titled in the presence of phenolphthalein in an alcoholic solution, used as indicator. Elimination of volatile substances from the vinegar by evaporation. Neutralization of the (non-volatile) acids of the residue in an aqueous solution using an alkali solution.

iii) Volatile acidity OIV-OENO 54/2000

By convention, the volatile acidity of vinegar refers to the difference between the total acidity and the fixed acidity. Calculation of difference between total acidity and fixed acidity, expressed in grams of acetic acid per L.

iv) Iron content OIV-OENO 66/2000

As for the other metals, the presence of iron in vinegars mainly has its origin in contaminations from contact materials during their manufacture, and of course the iron of the wine itself from which the vinegar has been made. Direct measurement of iron content in the vinegar by flame atomic absorption spectrometry, samples being tested with standard acetic solutions. Shake the sample to homogenize and filter if necessary. In case of an > 8 mg/l iron content, sample should be diluted with an acetic acid solution at 5% (v/v).

v) Determination of total dry extract content

The total dry extract refers to all the substances which, under the conditions described here, do not volatilize and are not affected by alteration. Evaporation of sample and drying in oven, then weighing. Add 10 ml of the sample to a previously calibrated capsule, evaporate in a water bath at 100°C for 30 min., dry in an oven for 2 hours 30 min., cool in a dryer and weigh.

To obtain conclusive results, always use capsules with the same characteristics and comply strictly with the described drying times.

vi) Spectrophotometry analyses

Select the pair of cuvettes for the spectrophotometric reading, ensuring that the upper measurement limit within the linear range of the spectrophotometer is not exceeded. By way of indication, for vinegar it is recommended to use cuvettes with 10 mm of optical thickness,

The absorption spectra of the samples were acquired with UV-vis Spectrophotometer Cadex SB038, with a scanning speed 3600 nm/min. The samples were diluted three times in quarts cuvette 10 mm length path. After obtaining and preparing the samples, measure its transmittance from 200 to 620 nm every 5 nm, using distilled water as a reference in a cuvette with the same optical thickness, in order to establish the base line.

RESULTS AND DISCUSSIONS

In figure 1 total acidity of the vinegar record a very low value compared with total acidity of apple vinegar. In rest at all the samples where it was immersed wood shavings, the acidity was higher than in control. Regarding the total acidity for each wood species immersed in vinegar, the results was influenced by the type of vinegar. Vinegar with cherry shavings record a high total acidity than apple vinegar with cherry shavings. Vinegar with walnut shavings has total acidity near the apple vinegar with walnut shavings.

The fixed acidity follows the same line as total acidity. The low value was record at vinegar control sample and the high value at apple vinegar with beech wood shavings. Compared the samples with the same vinegar, at first group fixed acidity decrease from cherry, high value, to acacia, low value; second group fixed acidity increase from cherry to beech, high fixed acidity, and decrease to acacia, low fixed acidity.

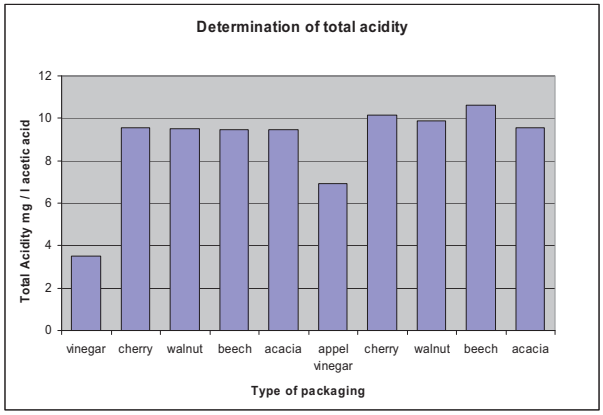

Figure 1. Fixed acidity at vinegar samples

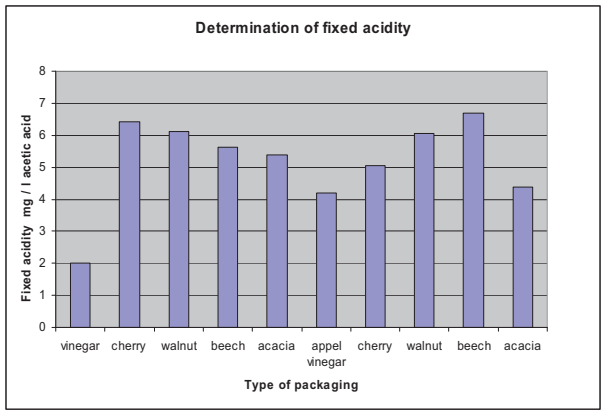

Figure 2. Fixed acidity at vinegar samples

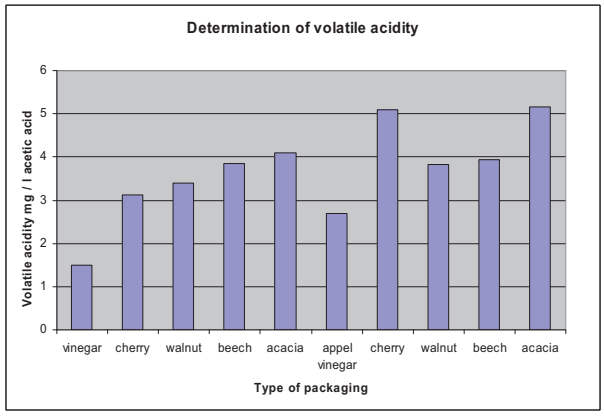

Figure 3. Fixed acidity at vinegar samples

The volatile acidity is high in apple vinegar than wine vinegar. Apple vinegar with cherry and acacia wood shavings record high values of volatile acidity due the large quantities of acetic acid. Compare volatile acidity with total acidity, the samples with low total acidity content record a high volatile acidity content and vice versa. In generally, immersion of wood shavings in vinegar determine an increase of volatile acidity, explain by extraction of volatile compounds from wood pieces.

Qualitative determination of iron content showed the absence of this compound in all samples analyzed.

Dry residue record similar values at all the samples analyzed. Immersion of wood parts in vinegar determine transformation of color, volatile substances, acidity, organic substances content, but not greatly influence the concentration of dry residue. The dry extract content of samples was near the content of control samples.

Following the results obtained in figure 5, pH samples divide in 2 intervals. For vinegar samples pH present values between 3-3.5 and for apple vinegar samples pH present values between 4- 4.5. For the vinegar group cherry wood shavings determine an increase of pH value with 0.5 points and for apple vinegar group, beech determine a decrease of pH value with 0.5 points.

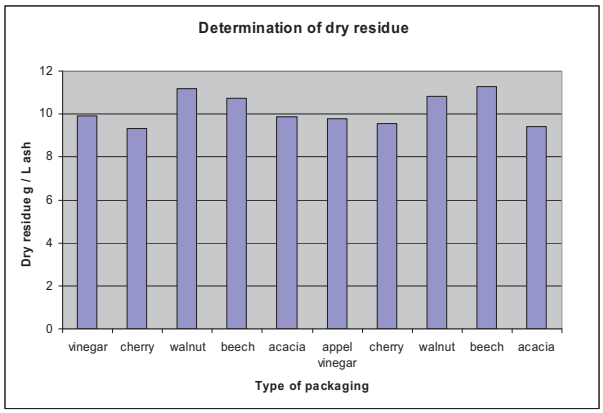

Figure 4. Determination of dry residue

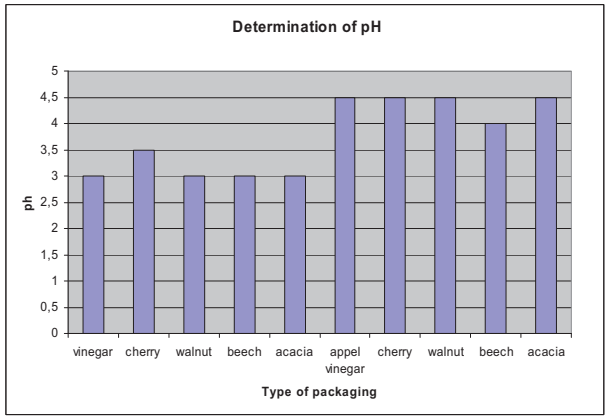

Figure 5. Determination of pH

Vinegar UV-vis absorption spectroscopic measurements

Each vinegar sample has a different chemical composition and determine a different spectra register. Each spectrum provides specific and reliable information about the different types of vinegar and their mixture.

The domain of wavelength range used in analyzed are the same for a lot of chemical compounds as: aromatic substances, color substances, polyphenols, etc.

The concentration and level of these compounds in vinegar are different, depends the type of wood use in immersion and type of vinegar. The absorption spectra are similar with tops of the hill, the form in most of cases are the same, but the peaks level are different.

Relevant spectroscopic information is concentrated between 250-400 nm. There are no absorption bands between 400-500 nm.

In cases where the wood essences determine an extraction of red color compounds, the spectrophotometer record value from 500 to 650 nm. A special remark can be make regarding 240 nm as an intense band saturated. (Teorrecilla et al. 2016).

From figure 6-10 it can be seen that, the absorption bands vary depending by the

type of vinegar. For control samples the spectra decrease from maximum absorbance at 250 nm to minimum absorbance at 350 nm. For sample with cherry shavings immersion, the absorbance has a maximum value at 250 nm decrease at 300 nm and increase again at 380 nm.

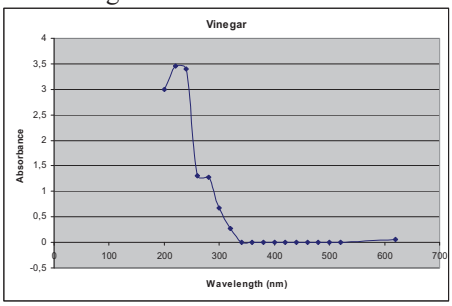

Figure 6. UV-vis absorption spectra of vinegar

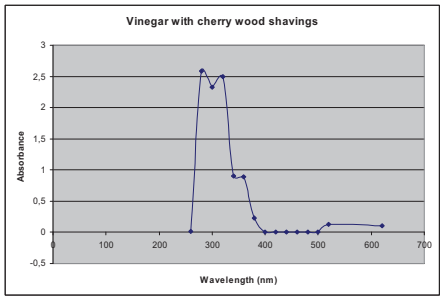

Figure 7. UV-vis absorption spectra of vinegar with cherry wood shavings

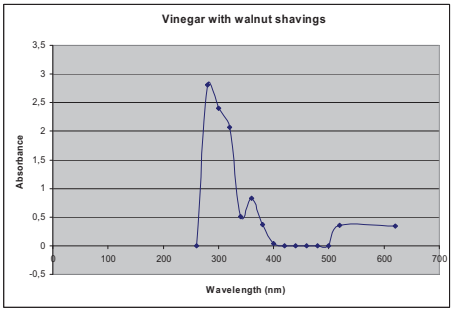

Figure 8. UV-vis absorption spectra of vinegar with walnut shavings

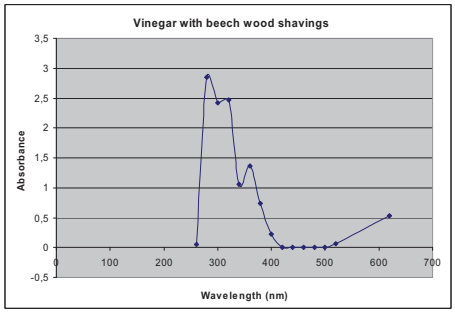

Figure 9. UV-vis absorption spectra of vinegar with beech shavings

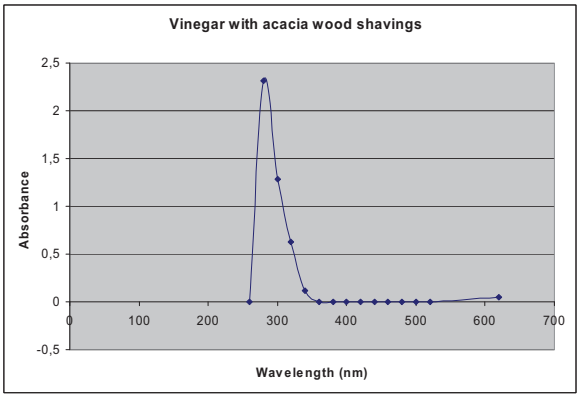

Figure 10. UV-vis absorption spectra of vinegar with acacia wood shavings

Samples with walnut shavings record a maximum absorption at 280 nm, decrease to 350 nm increase at 380 nm and finally decrease at 400 nm. On interval 400-500 nm there are no absorption band and it was record a new signal between 500-600 nm interval.

From figure 11-16 it can be seen that, the absorption bands vary depending by the type of apple vinegar.

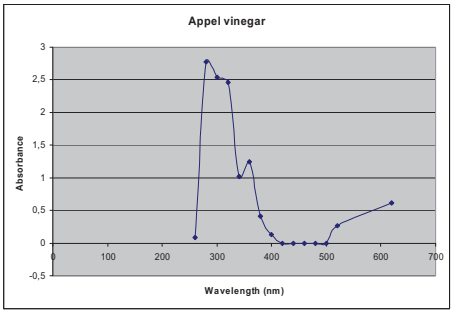

Figure 11. UV-vis absorption spectra of apple vinegar

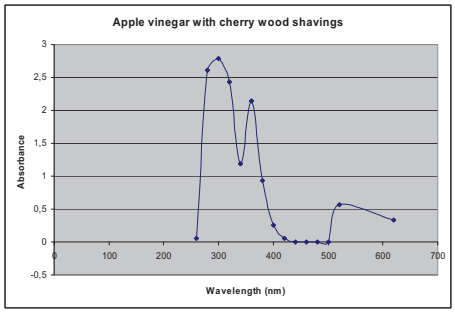

Figure 12. UV-vis absorption spectra of apple vinegar with cherry wood shavings

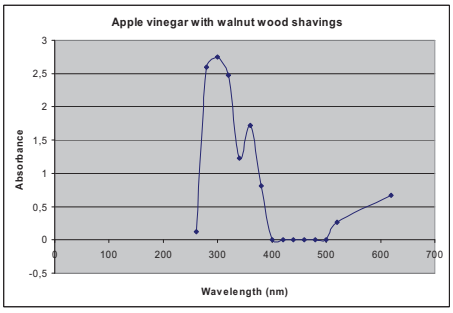

Figure 13. UV-vis absorption spectra of apple vinegar with walnut wood shavings

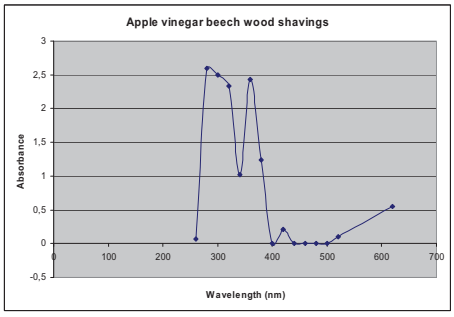

Figure 14. UV-vis absorption spectra of apple vinegar with beech wood shavings

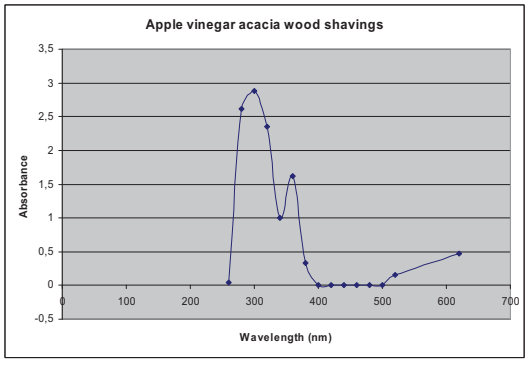

Figure 15. UV-vis absorption spectra of apple vinegar with acacia wood shavings

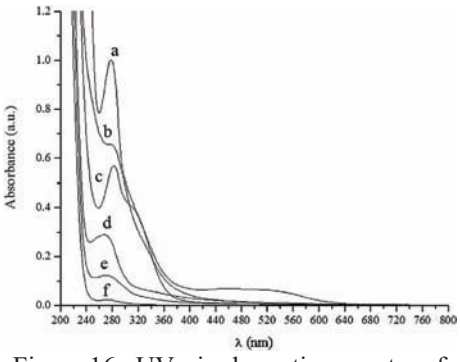

Figure 16. UV-vis absorption spectra of different vinegars (Torecilla et. al., 2016) a) red wine; b) apple ; c) cider; d) rice; e) white wine; f) molasse

Spectra for white wine vinegar and apple vinegar are in conform with Torecilla et. al. study (Torecilla et. al., 2016.). All spectra obtained can be used for identifying in quick analysis of fraud vinegars. A vinegar ageing by immersion of wood shavings inside the liquid, will be record a spectra equivalent with spectra present in this study. The apple vinegar extract more color compounds from wood pieces. That can explain the absorbance recorded at 280, 420, 520 and 620 nm.

CONCLUSIONS

Total acidity of wine vinegar record a low value compared with the rest of vinegars. The contact between wood parts determine an increase of total acidity for all the samples, except the control. Apple vinegar record a double acidity compare with white wine vinegar.

Fixed acidity follow the same line like total acidity. Walnut, cherry and beech wood parts immersed in vinegar determine an increase of fixed acidity. All the samples where was immersed wood shavings present a high content in fixed acidity then control.

Volatile acidity increase in all the samples with wood essences. The immersion method involved extraction process of volatiles compounds from wood pieces in vinegar liquid. The high increase was record at samples with cherry and acacia woods immersed in vinegar.

Relevant spectroscopic information is concentrated between 250-400 nm. There are no absorption bands between 400-500 nm. In cases where the wood essences determine an extraction of red color compounds, the spectrophotometer record value from 500 to 650 nm. Apple vinegar determine at all the samples analyzed a signal from 500 to 650 nm. This can be explained by a higher power extraction of colored compounds compared with the white wine vinegar. All spectra obtained can be used for identifying in quick analysis of fraud vinegars. A vinegar ageing by immersion of wood shavings inside the liquid, will be record a spectra equivalent with spectra present in this study.

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Seria: ✓*Biologie*
✓*Horticultură*
✓*Tehnologia prelucrării produselor agricole*
✓*Ingineria mediului*

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THE BEHAVIOUR OF SOME PECH HYBRIDS BELONGING TO THE GERMOPLASM WORLD COLLECTION IN PEDOCLIMATIC CONDITIONS OF TIMIȘOARA AREA, CONCERNING FRUITS QUALITY

Iordănescu Olimpia Alina [1], Costea Viorica Adriana[1], Olaru Daniela Nicoleta[1], Becherescu Alexandra[1]

Keywords: *peaches, hybrids, small and large diameter, weight, sugar content*

ABSTRACT

In the present work were studied 9 hybrids of peach and nectarine pertaining to the Peach and Nectarine World Collection introduced and multiplied in Romania by Acad. Dr. Vasile Cociu: HB 61/5, DDD67, P-1, P-5, IFF926, IFF853, HB 4/81, P-52 and HB18/9. The hybrids originating from all continents have been planted in Timișoara in 2007 with the purpose to being tested in culture and naturalizing in Romania of some new foreign cultivars. Were followed aspects linked to fructification of plants as fruits size index, weight of fruits and pulp dry substance and sugar content. For each variety 20 fruits were analyzed. Fruits were measured with calipers and weighed with high accuracy balance. The fruit size index was calculated as average of large diameter, small diameter and height of the fruits of each variety.

Among hybrids studied, five presents small fruits, four of these presents small to middle fruits and regarding sugar content, four hybrids have low content in sugar (HB 61/5, DDD67, P-1, P-5), two hybrids have moderate content in sugar (IFF926 și IFF853) and tree hybrids have high and very high content in sugar ((HB 4/81, P-52 și HB18/9).

INTRODUCTION

Peach represent one the most appreciated fruit tree specie of the temperate climate, many researches considered that peaches, concerning savor, occupy third place, after oranges and grapes. The peach tree technology is very complex, especially cuttings and control pests, many researches approached different problems linked by biology, ecology, physiology and technology (Hoza & Asănică 2004; Dumitru Liana Melania, 2008; Cantin C.M., 2010).

Researches carried out in USA, Canada, France, Italy, even in our country had led to obtained a large number of varieties with remarkable agro-productive characteristics (Li Z., 1984; Wang Y.L., 1985; Ivaşcu Antonia et all., 2001; Badenes M.I.,1998).

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In Banat region, respectively in Timişoara, the climatic and soil conditions are good for peaches growth and fructification, reason for that, some studies are directs toward very important specie (Iordănescu Olimpia Alina, 2008).

MATERIAL AND METHODS

The experience was conducted in the orchard of Fruit Growing Department of USAMVBT.

The biological material was constituted of 9 peach hybrids pertaining to the Peach and Nectarine World Collection founded to Timişoara in the year 2007.

The hybrids originating from all continents were multiplied at SCDP Băneasa from where they were purchased afterwards being planted in the climatic and soil conditions of Timişoara.

The planting distances were 4x2 m and the crowns were conducted in free palmette system. It was used wax cherry rootstock. Maintenance works are the current applied in the orchard.

All these are less known hybrids were considered for this study respectively: *HB 61/5, DDD67, P-1, P-5, IFF926, IFF853, HB 4/81, P-52 and HB18/9.* Like control was choice experiment average.

It were followed aspects linked to fructification of plants as fruits dimensions, large diameter, small diameter and fruit height, index size of fruits, average fruits weight, pulp dry substance and sugar content. For each element 20 fruits were analyzed. Fruits were measured with calipers and weight with high accuracy balance Kern Pes. Dry substance was determined with the refractometer Hanna Instruments.

All the data were statistically processed using variance analysis.

The biological material: *HB 61/5, DDD67, P-1, P-5, IFF926, IFF853, HB 4/81, P-52 and HB18/9 (figure 1,2,3,4,5,6,7,8,9).*

Figure1. **Variant 1** - HB – 61-5

Figure2. **Variant 2** - DDD – 67

Figure3. **Variant 3** - P-1

Figure4. **Variant 4** - P-5.

Figure5. **Variant 5 –IFF-926**

Figure6. **Variant 6 -IFF-853**

Figure7. **Variant 7** - HB – 4/81

Figure8. **Variant 8** – P-52

Figure9. **Variant 9 -H.B.** – 18-9

RESULTS AND DISCUSSIONS

Results obtained concerning large diameter, small diameter and height of fruits to studied hybrids are presented in table no. 1-3.

The large diameter of fruits to hybrids studied was registered between 40.67 mm to HB 18-9, who was very significant negative face to control and 40.0 mm to tree hybrids: DDD-67, IFF 853, respectively P-52 who were significant positive face to control. Value superior to the control were obtained also on the fruits of the P-1 (46.0 mm) hybrid, but close in value, respectively 45.29 mm. Value inferior to the control were obtained to HB 21-13 and P-5, neither one being statistically insured.

Table 1

The large diameter of fruits to peach hybrids

No.	Hybrid	Large diameter (mm)	Relative value (%)	Different face to control	Signification
1	HB 21-13	43.00	94.94	-2.29	-
2	DDD-67	48.00	105.98	2.71	X
3	P-1	46.00	101.57	0.71	-
4	P-5	44.33	97.89	-0.96	-
5	IFF 926	43.67	96.42	-1.62	-
6	IFF 853	48.00	105.98	2.71	X
7	HB 4/81	46.00	101.57	0.71	-
8	P-52	48.00	105.98	2.71	X
9	HB 18-9	40.67	89.79	-4.62	000
10	Experiment average	45.29	100.00	0.00	Control
	DL5% = 2.37 mm		DL1% = 3.21 mm	DL0.1% = 4.27 mm	

Table 2

The small diameter of fruits to peach hybrids

No.	Hybrid	Small diameter (mm)	Relative value (%)	Different face to control	Signification
1	HB 21-13	41.67	95.76	-1.85	-
2	DDD-67	46.00	105.71	2.49	X
3	P-1	45.00	103.42	1.49	-
4	P-5	43.00	98.82	-0.51	-
5	IFF 926	41.33	94.99	-2.18	0
6	IFF 853	43.67	100.35	0.15	-
7	HB 4/81	44.33	101.88	0.82	-
8	P-52	47.33	108.78	3.82	XXX
9	HB 18-9	39.33	90.39	-4.18	000
10	Experiment average	43.51	100.00	0.00	Control
	DL5% = 1.88 mm		DL1% = 2.55 mm	DL0.1% = 3.39 mm	

The small diameter of fruits to hybrids studied was registered between 39.33 mm to HB 18-9, who was very significant negative face to control 3.41 mm) and 47.33 mm to P-52, who was very significant positive face to control. Values superior to the control were obtained also on the fruits of the DDD-67 hybrid (significant positive) and to P-1, HB 4/81

and IFF 853 hybrids, but neither one being statistically insured. Values inferior to the control were obtained to HB 21-13 and P-5 hybrids, but neither one being statistically insured.

Table 3

The height of fruits to peach hybrids

No.	Hybrid	The height of fruits (mm)	Relative value (%)	Different face to control	Signification
1	HB 21-13	44.33	101.19	0.52	-
2	DDD-67	48.33	110.32	4.52	XX
3	P-1	46.00	105.00	2.19	-
4	P-5	46.67	106.52	2.86	X
5	IFF 926	42.67	97.39	-1.14	-
6	IFF 853	49.33	112.61	5.52	XXX
7	HB 4/81	46.00	105.00	2.19	-
8	P-52	46.00	105.00	2.19	-
9	HB 18-9	25.00	57.06	-18.81	000
10	Experiment average	43.81	100.00	0.00	Control
	DL5% = 2.79 mm		DL1% = 3.78 mm	DL0,1% = 5.03 mm	

The height of fruits to peach varieties was registered between 25.00 mm to HB 18-9, who was very significant negative face to control (43.81 mm) and 49.33 mm to IFF 853, who was very significant positive face to control. Values superior to the control were obtained also on the fruits of the DDD-67 hybrid (distinct significant positive) and to P-5 (significant positive) face to control.

Table 4

The index size of fruits to peach hybrids studied

No	Hybrid	Large diameter medium value (mm)	Small diameter medium value (mm)	Height of fruits medium value (mm)	I.S. (mm)
1	HB 21-13	43.00	41.67	44.33	43.0
2	DDD-67	48.00	46.00	48.33	47.43
3	P-1	46.00	45.00	46.00	45.66
4	P-5	44.33	43.00	46.67	44.66
5	IFF 926	43.67	41.33	42.67	42.55
6	IFF 853	48.00	43.67	49.33	47.0
7	HB 4/81	46.00	44.33	46.00	45.44
8	P-52	48.00	47.33	46.00	47.11
9	HB 18-9	40.67	39.33	25.00	35.0

The index size values to peach hybrids studied was registered between 35.0 mm to HB 18-9 (small fruit flattened) and 35.0 mm to HB 18-9 (middle elongated spherical fruit).

Results concerning average weight of fruits to hybrids studied in 2013 year are presented in table no. 5.

Table 5

The average weight of fruits to hybrids studied

No.	Hybrid	The weight of fruits (g)	Relative value (%)	Different face to control	Signification
1	HB 21-13	41.38	93.26	-2.99	-
2	DDD-67	60.62	136.63	16.25	XXX
3	P-1	32.25	72.68	-12.12	000
4	P-5	39.58	89.21	-4.79	-
5	IFF 926	48.63	109.61	4.26	-
6	IFF 853	48.21	108.67	3.85	-
7	HB 4/81	49.67	111.96	5.31	-
8	P-52	48.66	109.67	4.29	-
9	HB 18-9	30.35	68.40	-14.02	00
10	Experiment average	44.37	100.00	0.00	Control
	DL5% = 8.01 g		DL1% = 10.82 g	DL0.1% = 14.41 g	

The average weight of fruits to peach hybrids studied was registered between 32.25 g to P-1 and 60.62 g to DDD-67, with a experiments average by 44.37 g. And therefore, trough their values obtained, the hybrid DDD-67 is very significant positive face to control and the P-1 hybrid is very significant negative face experiment control.

Values superior to the control were obtained also on the fruits of the HB 4/81, P-52, IFF 926 și IFF 853 hybrids, but close in value, neither one being statistically insured. Values inferior to the control were obtained to HB 18-9 (distinct significant negative) and to P-5 and HB 21-13,neither one being statistically insured.

Results obtained concerning chemical composition of fruits to peach hybrids studied are presented in table no. 6 and 7.

Table 6

Dry substance contents in fruits of studied hybrids

No.	Hybrid	Dry substance of fruits (%)	Relative value (%)	Different face to control	Signification
1	HB 21-13	10.80	84.91	-1.92	0
2	DDD-67	11.20	88.05	-1.52	-
3	P-1	9.40	73.90	-3.32	000
4	P-5	9.70	76.26	-3.02	000
5	IFF 926	12.23	96.17	-0.49	-
6	IFF 853	12.23	96.17	-0.49	-
7	HB 4/81	14.70	115.57	1.98	X
8	P-52	13.87	109.01	1.15	-
9	HB 18-9	20.37	160.12	7.65	XXX
10	Experiment average	12.72	100.00	0.00	Control
	DL5% = 1.67%		DL1% = 2.25 %	DL0.1% = 3.00 %	

The highest value of the fruits dry substance was registered on HB 18-9 hybrid, the difference to the experiment control being very significant positive, followed by HB 4/81 hybrid, who was significant positive face to experiment control. Value superior to the control were obtained also on the fruits of the P-52 (13.87) hybrid, but close in value, respectively 12.72.

The lowest value of the fruits dry substance was registered on P-5 and P-1 hybrids, difference to the experiment control being very significant negative. A small quantity in dry substance was obtained in fruits of HB 21-13, different face to control being significant negative. Values inferior to the control were obtained to: DDD-67, IFF 926 and IFF 853 hybrids.

Table 7

Sugar content in fruits of studied hybrids

No.	Hybrid	Sugar content (g/l)	Relative value (%)	Different face to control	Signification
1	HB 21-13	8.97	81.10	-2.09	0
2	DDD-67	9.23	83.51	-1.82	-
3	P-1	7.93	71.75	-3.12	00
4	P-5	7.80	70.55	-3.26	00
5	IFF 926	10.50	94.97	-0.56	-
6	IFF 853	10.50	94.97	-0.56	-
7	HB 4/81	13.20	119.38	2.14	X
8	P-52	12.27	110.94	1.21	-
9	HB 18-9	19.13	173.05	8.08	XXX
10	Experiment average	11.06	100.00	0.00	Control
	DL5% = 1.95 g/l		DL1% = 2.63 g/l	DL0.1% = 3.50 g/l	

The highest value of the fruits sugar content was registered on HB 18-9 hybrid, the difference to the experiment control being very significant positive, followed by HB 4/81 hybrid, who was significant positive face to experiment control.

The lowest value of the fruits dry substance was registered on P-5 and P-1 hybrids, difference to the experiment control being very significant negative. A small quantity in dry substance was obtained in fruits of HB 21-13, different face to control being significant negative.

CONCLUSIONS

HB 21-13 – peach hybrid, small fruits, almost spherical, red skin, with fine pubescence, small content in sugar;

DDD 67 – nectarine hybrid, middle fruits, almost spherical, red skin, with characteristic luster, small content in sugar;

P-1 - peach hybrid, small fruits, almost spherical, yellow-orange skin on sunny part, with red fine pinstriped, characteristic pubescence, small content in sugar;

P-5 - peach hybrid, small fruits, oblong shape, yellow-orange skin on sunny part, with red fine pinstriped, characteristic pubescence, small content in sugar;

IFF 926 - peach hybrid, small to medium fruits, oblong shape, yellow gold skin, with red on sunny part, with fine pubescence, middle content in sugar;

IFF 853 - peach hybrid, small to medium fruits, spherical, yellow gold skin, with red-orange on sunny part, very pubescence, middle content in sugar;

HB 4/81 - peach hybrid, small fruits, oblong shape, orange skin, with red on sunny part, fine pubescence, higher content in sugar;

P 52 - peach hybrid, small to medium fruits, spherical flattened, orange skin, with red on sunny part, fine pubescence, higher content in sugar;

HB 18/9 - nectarine hybrid, small fruits, oblong shape, yellow skin, with red on sunny part, characteristic luster, very high content in sugar.

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✔*Ingineria mediului*

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STUDIES IN THE AESTHETICS OF THE WINE LABEL SYMBOLISM

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Keywords*: techniques, symbol, aesthtics, perenity, composition*

ABSTRACT

Wine is a product which bears the mark and the producer's reputation. Identification, or the question of authenticity, confers quality wine a perenial title. Therefore, the axiom quality = authenticity must become the prerogative of the professional producer through the whole route to the consumer, with the dissociation of the latter towards mimicry and imitating a product without quality. The label of the wine is the clothing that stylishly dresses it and provides it with added value. The signs and symbols of local significance, in combination with the revolution in labeling techniques globalises the peculiarities of the producer and exponentially identifies him in the worldwide market. The technical achievements minutely detail the symbolism and the aesthetics of beauty to the point of a perfected art. The symbolism and significance of the colors in accepting of the term "royal".

INTRODUCTION

The wine accompanies the evolution of mankind. The first containers were made of the animal skins with bone corks. In ancient times clay containers called amphorae were used to transport wine, and carried a plaque specifying dates and names. Other ancient amphorae had markings engraved on wooden plaques, or painted, indicating the origin and validity.

Any innovation in the development of civilization was accompanied by the practice of wine marketing. From the desire to carry larger quantities of wine, appeared barrels. The containers were marked with coal heated iron brands unique to the producer and to the merchant. Today conservative coopers (barrel makers) still mark the barrels with hot iron brands, in some instances the hot iron is replaced with laser engraving.

The production of glass, in the beginning of our era has heralded the coming of glass containers, and then the flagon needed to transport wine over long distances. The perfection of the technique has increased the capacity of the glass containers that we know today, but with different shapes, for example the large bottles wrapped with wiker. The industrial development has imposed the need to apply a label on the wine bottle. The beginning of labeling is known as personalization on paper or canvas, printed in the engraving technique, with handwritten additions. The invention of lithography by the Aloys Senefelder in 1796, enables more complex printing with graphics full of details and colors.

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MATERIAL AND METHODS

The present work has been realised through the documentary research method and critical analysis, by corroborating the means of plastic or artistic imagistic expression with the compositional ratio and colour. The documentation took into account the information concerning the discoveries and innovations of the printing methods as the main form of expression. Images have been analyzed by comparison with numerous sources of information.

RESULTS AND DISCUSSIONS

The technical achievements and the methods of engraving and printing, related to the aesthetical rendering of the wine label.

The wine labels with a history in graphic imagery, have proved ever since 1604, an evolution from simple, classic to modernity, retaining a clear definition of the visual expression clear and an emphasis on conservatorism; examples of such are those of the domain "La Solitude" (loneliness) Chateauneuf du Pape (Figure 1), homeland France. Initially, these labels were printed on wood with the help of the engraving technique (xylography) and revealed the name of the wine "Vin de la Solitude" surrounded by frames with decorative floral ornaments. This simplicity in the graphical expression of the labels lasted until 1780.

Figure 1. Labels "La Solitude" domain, year 1780
(Source: www.objets-de-legende.fr/le-chateauneuf-du-pape.html)

With the advent of the lithography technique in 1796, the Chateauneuf du Pape labels have evolved, going through different changes at first glance. After a thorough study it can be seen that the association of the domain's papal sign Chateauneuf du Pape with numerous other producers determined the creation of many elegant compositions which combine the basics of the papal sign itself with other graphic signs. The domain's logo is symbolic and represents "the keys of St. Peter and the papal tiara on three levels, with the significance that the wine comes from within Chateauneuf du Pape " (Figure 2).

The creation of Chateauneuf du Pape producers federation generate a real competition in illustrating the lables and their diversity. One can not ignore the fact that as early as the 14th century, the Pope's court moved to Avignon, France, and Châteauneuf du Pape – which means "new castle of the Pope" - became the new Pope's seal. Five centuries later, the symbol of the seal became an internationally recognized brand of Châteauneuf-du-Pape. Personality through diversity is the theme of the new labels (Figures 3, 4, and 5).

Figure 2. Label „Châteauneuf du Pape" Field, logo original font
(Source : www.woodberrywine.com)

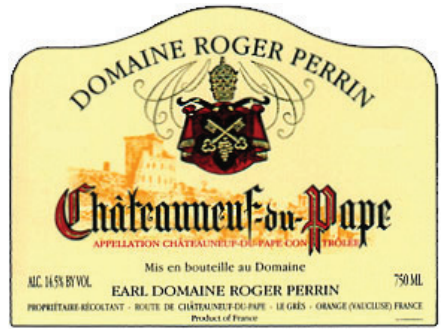

Figure 3. Label Roger Perrin domain, label frotted form, together with two overlapping images
(Source : http://charlesnealselections.com)

Figure 4. Label Châteauneuf du Pape Pegau Cuvée Laurence 2004
(Source : www.handpickedselections.com)

Figure 5. Label Chateauneuf du Pape or the Solitude domain
(Source : www.wine-searcher.com)

The domain labels of Roger Perrin domain (Figure 3) and "Solitude" domain Pierre Lançon (Figure 5), give us a lesson about the evolving graphic image.

They are adorned with the logos of the twin domains, the lion and the unicorn of the Pegau area - Paul Feraud & Sons (Figure 4), the bees and honeycomb of Pierre Lançon (Figure 5), the papal keys and tiaras and not least the undefiled image of the old castle (Figure 6, 7, 8 and 9).

Baroque ornaments are combined with elements of the new regions. Besides the papal tiara we can observe the daggers, royal crowns, the papal miter described with a specific artistic style Art-Nouveau or Art –Deco (Figure 6).

The classical label in the foreground, with images governed by families' shield, overlaps another image in the background, with the blurred image of the castle, the papal tiara, royal lions or the ornamental pendentives (Figure 3, 7, 8, 9, and 10).

The Vieux Donjon domain with the producer Michel Lucien reach almost photographic detail of the castle using the most modern techniques of printing (Figure 7).

Figure 6. Label Gabriel * Meffre domain with the laurel (Laurus), bring forth gothic miniature compositions with many ornaments (Source: www.produitsregionaux.fr)

Figure 7. The Vieux Donjon domain (Source: http://noagendaentertainment.com)

Figure 8. The label Roger Sabon domain (Source: www.wine-searcher.com)

Figure 9. The label Ronciere domain (Source: www.vintnersfinewines.co.uk)

Figure 10. Label Raymond Usseglio &Fils domain (Source: www.wine-searcher.com)

The labels begin to show modern printing techniques with Photoshop application. Domain seal letters and colors are applied with relief printing (Figure 7, 8, 9 and 10).

The label Raymond Usseglio &Fils domain (Figure 10) use background drawings reminiscent of old stamps and ornaments accompanying text referring to the Baroque

period. Old English font are often decorated with ornaments, it is different especially for letters C and P of name "Chateauneuf du Pape ".

Figure 11. Label "Domaine de la Solitude" (Source: www.cavusvinifera.com)

Figure 12. Label "Domaine de la Solitude" (www.snooth.com/wine/domaine-de-la-solitude)

This is where a bi-dimensionality effect is completed with the effect of spaciousness. Moreover, the label "Domaine de la Solitude" offers an aerial view of the architectural ensemble and the seventeenth century vineyard. The blurred tinted fond and the text used with romantic font and character, reminds us of "Grand vin de Graves" that consecrated on a worldwide level the wine "Solitude" (Figure 11 and 12).

The colors chosen in the „Royal" technique. The first color is taken to a maximum of purity (exalted), the second one is diminished and the third is barely suggested. In a restricted palette, red, black and gold are associated with the name and the symbol of the papal tiara. The color quantities diminished as an area and paradoxically they become the compositional interest. The general data are sorted around one of the three colors listed. Chateauneuf du Pape labels commonly practiced a colorful triangle to illustrate the symbolism used from old times to today.

Figure 13. "Roland B. Chevenin & Fils" Old English font graphic wave effect. (Source: www.delcampe.net)

Figure14. Label "Du Haut des Terres Blaches" richly ornamented Baroque style. (Source: www.cellartracker.com)

Figure 15. Label “Du Haut des Terres Blaches”
A delicate watercolor background.
(Source: www.pinterest.com)

16. Label “Regis CHASTAN Orange”
Logo familly with hounds and royal crown.
(Source: www.delcampe.net)

Figure 17. Label “La Belle du Roy” 1964
(Source: www.delcampe.net)

Figure 18. Label “Henry BOUACHON ”
(Source: www.delcampe.net)

Figure 19. Label “La Belle du Roy” 1964
(Source: www.delcampe.net)

Figure 20. Label “Patriarche Pere & Fils”
(Source: Source: www.delcampe.net)

Labels (Figure 17, 18, 19 and 20) Superb thumbnails with poetic dedications such as “I drank this Crystal and my heart sing” (Figure 17). Hunting deer with a character of the eighteenth century. (Figure 18). Harvesting stage and crushed grapes with a miniature stained glass (Figure 19). “Patriarch(e)” character identifies the wine cellar in a realistic drawing (Figure 20). Asymmetric placement of compositional structure labeled with the left drawing gives us a single page of history and legend name "Chateauneuf du Pape " (Figure 17, 18, and 20).

Figure 21. Label “La fiole du Pape”
Figure 22. ” Bottle du Pape”
(Source: www.fountanabeverage.com)

Figure 23. Label Pape Clement V
L'A bbaye Des Papes
(Source: www.vivino.com)

The packaging of this wine is as unique as the contents. The bottle shape represents the wind that passes through Chateauneuf which the locals call the Mistral. The ochre red coating of the bottle represents the dust that can fly around with this wind (Figure 21 and 22). (Sourse: www.fountanabeverage.com)

These labels are examples of optical mixture, optically active, with the participation of as few colors and intense as a result, results exponential basis, variety and uniqueness through diversity the titles " Chateauneuf du Pape ".

Figure 24. Label Berthet – Rayne domain
(Source: www.elitewines.net)

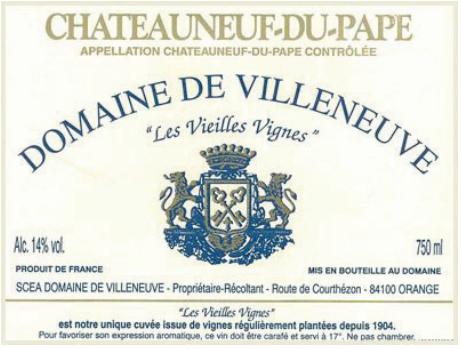

Figure 25. Label Villeneuve domain
(Source: www.wine-searcher.com)

Sometimes the palette of colors is restricted around red and black, gold and another color, for example the label of the Berthet – Rayne domain (Figure 24).
Villeneuve domain label with blue and silver, near monochromy, leading the symbolism to refinement: red expresses a dual moving or potential mobility, blue means confidence and increased concentric movement (Figure 25).

The "Old English" graphic font, from the multitude of computer editing fonts, which defins the name " Chateauneuf du Pape ", by the letters format and the graphic lines, with few exceptions, is used as a seal, becoming a logo used by almost all regions of the federation of Chateauneuf du Pape producers. They have used for the logo of the *Chateauneuf du Pape* Edwardian font (Figure 6.), or the font Adobe Caslon

CHATEAUNEUF DU PAPE (Figure 25), letter fonts with characters from the immediate culture of symbolism, imagery belonging to the beginnings of the period and historical placement.

Figure 26. Label Bichat Alex domain
(Source: www.delcampe.net)

Figure 27. Label Vieux Lazaret domain
(Source: www.francs-vins.ca)

Red used for the label of Bichat Alex domain (Figure 26) or Vieux Lazaret domain (Figure 27), therefore this indicates the need to enhance domain names rather than anything else. This optical effect put in second place vineyard and logo " Chateauneuf du Pape "

Figure 28. Label of Depagneux Antoine domain.
(Source: www.priceminister.com)

Figure 29. Label „Reserve des Cameriers”
(Sourse: http://wiki-wine.net/affiche_vin.php?id=3919)

Semicircular arch supported by two columns. Distinguish the title “Chateaneuf du Pape” on a background hight light and ornamental reliefs. The symmetrical reliefs of the label are ornaments for reasons leafy vegetable and vine rope . On the central axis, the family coat of arms shows a five-pointed star and a red heraldic lion, on an azure blue background. The decorations and ornaments remind us of the interiors of the Vatican and of the nostaligia of Catholic churches. There is a Harmonious balance between Gothic and Renaissance architecture (Figure 28).

Label „Reserve des Cameriers” belonging to the trading House Arnaud Berger. A delicate print in offset printing technique. The scene with the Pope concerning the family from the balcony of the papal Castle crushing grapes. Drawing and pastel-color label recall about a rare vintage white wine (Figure 28).

Figure 29. Labels Clos de L'Oratoire des Papes
(Source: www.wine-searcher.com)

Figure 30. Labels Clos de L'Oratoire des Papes
(Source: www.avis-vin.lefigaro.fr)

Figure 31. Bandoleer Clos de L'Oratoire des Papes
(Source: www.javade.com)

The one of Clos de L'Oratoire des Papes (closed oratory) domain, although they are now modernly printed, they present highly descriptive images with drawings with a strong aspect of handcraft. The effigy portrait of "Benedictus XIII PONT MAX" dominates the cutouts full of the architectural glass windows and broken arches, columns and Renaissance capitels. The main letters' font of the logo "Chateauneuf du Pape" are richly decorated in the style of old church books uppercases. Label, regardless of quantity, the color red is the soloist (Figure 29).

The label , being less dominated by color version with green and purple together effigy portrait of "Benedictus XIII PONT MAX" can be seen a composition with geometric definition. Shapes with concentric circles. Ovals that are completely or partially shaded. Triangles Renaissance with one or more curved sides. Various models with overall triangular shape characteristic of the architecture of the new Castle. Gold and black design complete the sober elegance of the label (Figure 30).

Figure 31. Label "Sénéchaux" domain
(Source: www.awinestory.com)

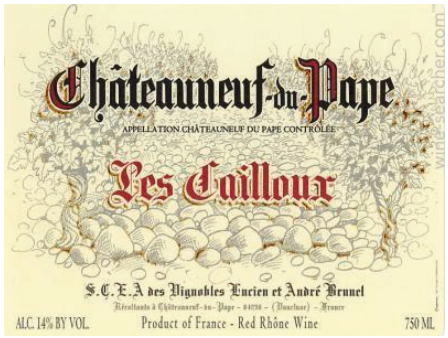

Figure 32. Label "Les Cailloux" domain
(Source: www.crus.fr)

Image with eight persons of which seven Popes, period from 1305 to 1378, when they left Rome and moved the entire religious court to Avignon (Figure 31).

Label domain “Les Cailloux” made for “day 3” It means three days before the new year (Figure 32). Source: www.crus.fr

CONCLUSIONS

The illustrations made, are going through phases, through the technique of lithography or the aqvaforte etching technique, photos, or through modern printing offset techniques, or laser have become exemples of performance, that can keep their originality, untouched by the natural timeline.

Thus, the wine companies would need to invest in identification elements in order to avoid counterfeits and forgeries. The label can be seen as similar to the money bill, and the investment in the development of distinct safety labels or personalized with elements on the specifics of either the variety of wine production area, region or country, will bring safety and confidence in the truthfulness of the product itself.

The security features such as the watermarks, embossing, holographic images (stamps), graphics elements fretted with transparencies in the color, the printed paper is replaced by plastic or polycarbonate, the security metallic thread, the reaction of colors to UV light (ultraviolet), the microtext, will be able to differentiate between one originally labeled product and another one that was forgered. History and perennity!

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***www.javade.com/gourmandises/produits/vins/chateauneuf-du-pape-clos-de-loratoire-du-pape-blanc-1985-de-leonce-amouroux/

***www.noagendaentertainment.com,

***www.objets-de-legende.fr/le-chateauneuf-du-pape.html (Figure 1)

***www.pinterest.com

***www.produitsregionaux.fr

***www.snooth.com/wine/domaine-de-la-solitude-chateauneuf-du-pape-blanc-2010/

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A GRAPHICAL DESIGN STUDY OF THE WINE LABEL AS UNIQUE THROUGH DIVERSITY

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Keywords*: label, culture, composition*

ABSTRACT

The image of the label in countries with great tradition, the upgrading with some measure is beneficial, being a permanent reminder of the sources of basic imagery. Labels showing traditional varieties and vineyards, with a long history, have become brands for the regions or the countries of origin. These labels bring more value and exist by identifying some events, symbols, remind of or present the transformation of famous buildings, houses, castles, settlements with architecture specific to the area, the style of the historical period, reveal personalities of the history of culture, politics and arts. These labels can convey culture, poetry, art, politics, geography and human discoveries, being the mirrors of humanity in the past, present and future.

INTRODUCTION

The wine label is an area of paper glued on a bottle of wine on which all the information about the wine, its content and origin are printed. It has multiple functions, from identifying the product by name, its brand, symbolism, informing the consumer about its contents, date of manufacture, instructions for use, to promoting the product through the attractiveness of the label's graphics. A technically and graphically well realised label represents an element of authentication and prevents counterfeiting and forgery.

Some bottles bear a single label which contains all the general and required information. Others have attached more "friendly" to the consumer counter-label, which gives more optional information about the grapes, the time it took to mature, possible wine associations with other foods, preservation time and temperature and serving recommendations.

The consumer make a compared choice. The label can be illustrated with drawings or pictures from the wine domain, buildings, or reproductions of works of art, engravings, or other measures of printing identification. Visual information can be accompanied by the tactile one, regarding the embossing, or colour quality, which can precede taste and smell, completing a whole range of sensorial impulses in a natural order.

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MATERIAL AND METHODS

The present work has been realised through the documentary research method and critical analysis, by corroborating the means of plastic or artistic imagistic expression with the compositional ratio and colour. The documentation took into account the information concerning the discoveries and innovations of the printing methods as the main form of expression. Images have been analyzed by comparison with numerous sources of information.

RESULTS AND DISCUSSIONS

An example, which starts from the brand and highlighting the manufacturer's name, the vineyard, the region of origin, the harvest year or the classic sign symbol to the total innovation in imagery, is the famous wine Chateau Mouton Rothschild, France being its adoptive country. Since the beginning of labeling from 1853, 1910, 1916 to 1922, with few exceptions, the labels belonged to those who bottled the wine besides owners. They were simple monochrome tickets personalized with inscriptions bearing the name of the region, the type of wine or the year.

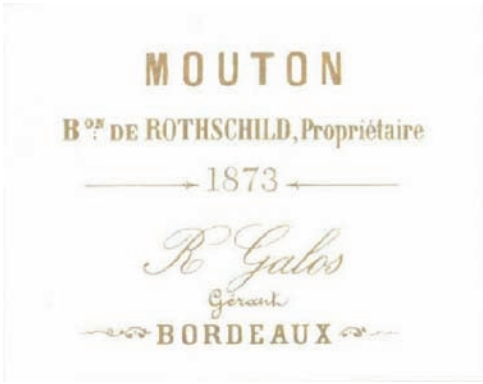


Figure 1. Label Mouton Rothschild 1873
(Source: www.cepdivin.org)

Figure 2. Label Mouton Rothschild 1901
(Source: www.cepdivin.org)

Examples of the years 1873, 1901, 1921 labels reminiscent of Baron Nathaniel de Rothschild vineyard start from single-color tickets. They do not carry a complex graphical drawing, only its debut inscription "MOUTON" (Aries), the year and a symmetrical vegetable ornament left / right of "BORDEAUX" region of origin, being litographed. Words chosen with gravity and simplicity: the field, Court, titles, wine variety - to a wine that promises to make career and advertises the owners Rothschild. Paper lithography as support was either parchment paper or cloth that is why years past did not delete the information or the quality of printing ink. The square shape of the labels leads us on its center, optic, for the year of harvest. The effect of the two arrows pointing toward the tip the same communication: vintage of labelling (Figure 1 and Figure 2).

We present two Château Mouton Rothschild labels, made and decorated in Bordeaux realised and decorated by merchants who were doing business services and bottling (late nineteenth century), in trading relations with the Rothschild heirs without identifying the "designation of origin" or the harvest year.

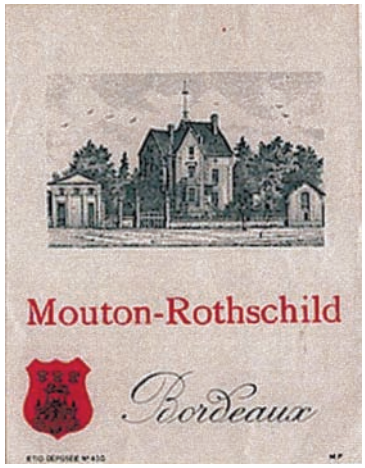


Figure 3. Label Mouton Rothschild, 1873
(Source: www.cepdivin.org)

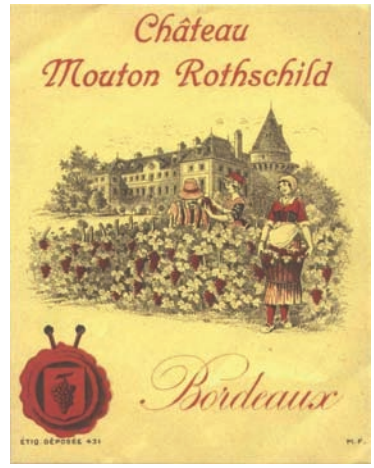
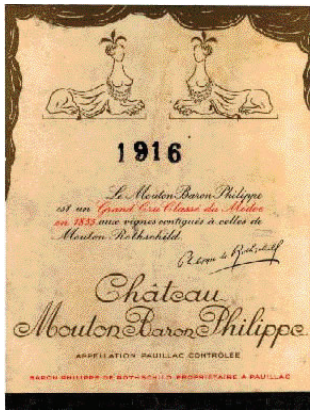


Figure 4. Label Mouton Rothschild, 1901
(Source: www.cepdivin.org)

They are made in rectangular format, stacked vertically, made through lithographic printing with a two-color graphics. Using photography in the lithography techniques (since 1790) increases the degree of authenticity of the Mouton Rothschild castle, along the graphic intervention of the heraldic shield emblem of the house. Another label (top right) also made with the technique of lithography, combines the photographic image of the castle in the background with a rustic theme drawing and a seal without the family brand. (Figure 3 & 4)



Chateau Mouton Rothschild wine labels go through all the phases of evolution. More than a half-century the image and symbol of the castle Mouton Rothschild arouses the imagination of famous graphic artists, painters and writers of the nintheenth and twentieth century. The graphic expression evolves so much that in the year 2000 (Figure 11), the paper label disappears and gives way to text and to the reproducing of the ram image from Augsburg, glued directly on the glass with gold or black silk-screening system. The dynamics and evolution of these labels is eloquent and is the exception that confirms the rule of the conservative wine labels.

Figure 5. Label Château Mouton Rothschild - year 1916, same graphic imagine - year 1965
(Source: http://www.90thidpg.us/Equipment/Downloads/AlcoholLabels/WW1/index.htm)

In the year 1922 the Baron Philippe de Rothschild re-launched “Mouton and the five arrows” with an innovative idea that placed his wine among the best in the world. From a graphical point of view, his ideas were revolutionary and diverse whilst maintaining the elegant line of conservatism and combining it with modern elements. For sixty-five years he has constantly managed and innovated on the process, proposing an experiment that was taken from his predecessors, also imposing a culture of the label’s graphic imagine.

Figure 6. Label Château Mouton Rothschild year 1924
(http://www.cepdivin.org/articles/phmargot01.html)

Starting with the years 1918, 1920, 1921, 1924, the graphic designer Jean Carlu draw the picture of the ram, the arrows and the castle in a decorative, modern, almost abstract manner. The composition of the symbolic elements overlaps on a colorful adornment of the background with various nuances, perfected through the printing technique. The label has the atypical square shape. Modernity is the element that marks the first bottling made at the castle.

At the end of World War II in 1945 (Figure 7), Baron Philippe initiated a label for Château Mouton Rothschild that was illustrated with complex ideas colorful graphics.

Figure 7. Label Château Mouton Rothschild-1945
(source: wine-searcher.com)

Figure 8. Label Mouton Rothschild-1953
(source: wine-searcher.com)

There were four exceptions in which maintain a sober coloring; one of them was in 1953 (Figure 8) during the centenary of the domain with the portrait of Baron Nathaniel Rothschild and the other in 1977 (Figure 9) in honor of the visit of the Queen of Great Britain. A third exception, in 1993 (Figure 10), gave birth to a scandal in America, the label designed by Balthus-Count Balthazar Klossovski included the drawing of a sleeping nude young woman - "too young and too bare" the labeled bottles were withdrawn and replaced with ones without the drawing. The fourth was the cloisonne in gold foil on the bottle of the image „The D* Augsbourg Ram" " in 2000 (Figure 11) after the silver sculpture by Jacob Schenauer.

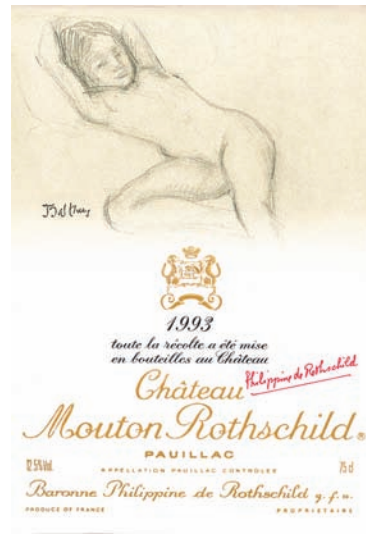


Figure 9. Label Mouton Rothschild-1977 Figure 10. Label Label Mouton Rothschild-1993

Figure 11. Label and bottle Chateau Mouton Rothschild "of the three zero" year 2000
(Labels 9, 10 and 11, Source: www.bfo-fbo.be/moutonfrans.html)

Since the year 1945 (Figure 7), with every new crop, an artist has been invited to create a new image for the wine's label and this made Baron Philippe de Rothschild's company, a global brand. Famous artists of the visual art as: 1924 *Jean Carlu* , 1945 *Philippe Jullian*, 1946 Jean Hugo, 1947 Jean Cocteau, 1948 Marie Laurencin, 1949 Dignimont,1950 Arnulf, 1951 Marcel Vertès, 1952 Léonor Fini , 1953 Année du Centenaire*, 1954 Jean Carzou, 1955 Georges Braque, 1956 Pavel Tchelitchew, 1957 André Masson, 1958 Salvador Dali, 1959 Richard Lippold, 1960 Jacques Villon, 1961 Georges Mathieu, 1962 Matta, 1963 Bernard Dufour, 1964 Henry Moore, 1965 DorotheaTanning, 1966 Pierre Alechinsky, 1967 César, 1968 Bona, 1969 Juan Miró (Figure 12), 1970 Marc Chagall (Figure 13), 1971 Wassily Kandinsky, 1972 Serge Poliakoff, 1973 Pablo Picasso (Figure 15), 1974 Robert Motherwell, 1975 Andy Warhol (Figure 16), 1976 Pierre Soulages , 1977 *Hommage à Sa Majesté la Reine Mère d'Angleterre**, 1978 Jean-Paul Riopelle, 1979 Hisao Domoto, 1980 Hans Hartung, 1981 Arman, 1982 John Huston, 1983 Saul Steinberg, 1984 Agam, 1985 Paul Delvaux, 1986 Bernard Séjourné, 1987 Hans Erni (Figure 17), 1988 Keith Haring, 1989 Georg Baselitz, 1990 Francis Bacon, 1991 Setsuko, 1992 Per Kirkeby, 1993 *Balthus*, 1994 Karel Apple,

1995 Antoni Tàpies, 1996 Gu Gan, 1997, Niki de Saint Phalle, 1998 Rufino Tamayo, 1999 Raymond Savignac , 2000 *Le petit bélier d'Augsburg - bouteille sérigraphiée** , 2001 Robert Wilson, 2002 Ilya Kabakov , 2003 Hommage à un cent cinquantenaire*(Figure 18), 2004 100e anniversaire de l'Entente Cordiale entre l'Angleterre et la France*, Le Prince Charles dessine l'étiquette de Château Mouton Rothschild 2004, 2005 Giuseppe Penone, 2006 Lucian Freud, 2007 Bernard Venet, 2008 Xu Lei, 2009 Anish Kapoor, 2010 Jeff Koons, 2011 Guy de Rougemont, 2012 Miguel Barcelo, 2013, contributed with pictures of their own creation dedicated specially to the vineyard of Château Mouton Rothschild. The personality of so many artists, film directors, painters, sculptors, graphic artists, designers, or political figures, characterized by their unique creation leaves an imprint on the labels in terms of composition (Source:www.cepdivin.org/articles/phmargot01.html).

Figure 12. Label C. Mouton Rothschild design carried out by artist Juan Miró.

Figure 13. Label C. Mouton Rothschild design carried out by artist Marc Chagall

(Label 12, 13, Source: www.chateau-mouton-rothschild.com/label-art)

The percentage of the intervention in the image of the composition is 30%, the remaining 70% is intact in the classical label. Therefore, the coat of arms is preserved in the center of the foreground, with the shield flanked by two rams supported on the same Baroque decorative ornament as the royal crown. The symmetrical left / right pendant repeats the production year. The handwritten signature of "Philippe Rothschild", the graphic font or text color creates a balanced dialogue between brown, red and black together with the required technical data.

The background color, the "background" font is almost white or light shades, often without aggressive or strong spectral tint. The colors, if there are many, are chosen on the principle of the primary color, examples of red, as the main soloist, in a form of decorative expression alongside another primary color, the example of yellow, in a reduced amount, along with shades of complementary colors. The technique of the palette used does not visually interfere with the definition of the label from its origins to present times.

Figure 14. Great coat of arms granted to the members of the Rothschild family by Emperor Francis I Austria.
(Source: pearlsofprofundity.wordpress.com/2013/03/03/rothschild-family-tree)
Rothschild translates as “the red shield”

Jean Carlu maintains logo of family Rothschild, for label from year 1924 (Figure 6 in fourth page), in a manner cubist, bundle of five arrows (signifying the five heirs), castle image and add famous, already, aries of Mouton symbol. The colors used are: red, golden, blue and black.

The elegance of these labels, between the years 1945-2011, that have been keeping over hundreds of years the same form or imagistic content since the emergence of the vineyard, keeps a beneficial balance between the product and the label, telling us with professionalism and confidence about the value and originality of the product.

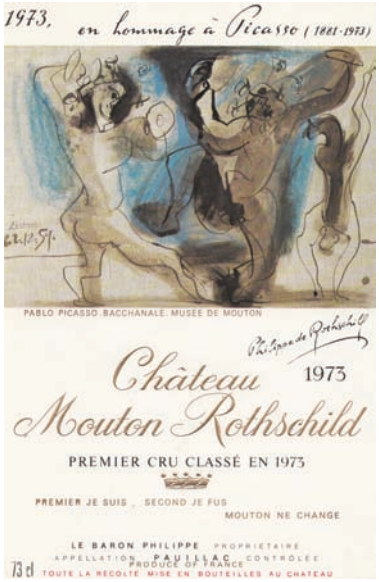


Figure 15. Label Château Mouton Rothschild design carried out by artist Pablo Picasso.

Figure 16. Label Mouton Rothschild design carried out by artist Andy Warhol

(Label 15 and 16. Source: www.chateau-mouton-rothschild.com/label-art)

Figure 17. Label Château Mouton Rothschild design carried out by artist Hans Erni. (source: wine-searcher.com)

Figure 18. Label's anniversaryyear 2003 Photography of Baron Nathaniel Rothschild (source: wine-searcher.com)

Artist Hans Erni associate portrait of Filippe Rothschild crowned with decorative ram horns end grapes (Figure 17). “Tribute to one hundred and fiftieth anniversary” (1853-2003) photography of Baron Nathaniel Rothschild superposed purchasing part of the document domain Chateau Brane Mouton a Pauillac renamed Château Mouton Rothschild (Figure 18). (Source: www.cepdivin.org/articles/phmargot01.html)

Figure 19. Label Château Mouton Rothschild design carried out by artist Jeff Koons (Source: www.mcnees.org/winesite/labels)

Figure 20. Label Château Mouton Rothschild design carried out by The Prince Charles (Source: www.mcnees.org/winesite/labels)

Year 2004 mark the Centenary, concluded by Britain and France on 8 April 1904, and forever transform two rival powers into sisters. The commemoration was the occasion for celebration with one label in watercolor a French Cote d* Azur landscape painted from The Prince Charles (Figure 19). Label year 1987, where artist Jeff Koons mixes classical, a ancient Pompeii fresco of 'The Birth of Venus', with contemporary design - with a silver line drawing of a ship sailing under a bright sun (Figure 20).

Figure 21. Label Château Mouton Rothschild design carried out by artist Giuseppe Penone (Source: www.mcnees.org/winesite/labels)

Figure 22. Label Château Mouton Rothschild design carried out by Lucian Freud (Source: www.mcnees.org/winesite/labels)

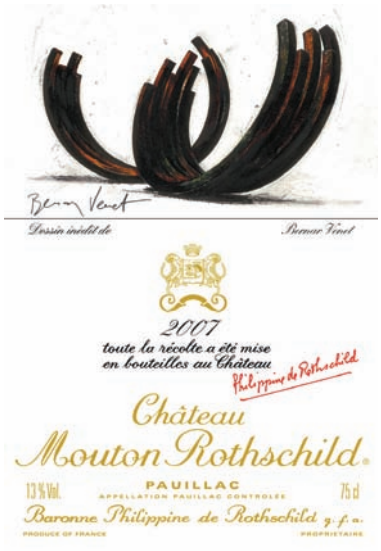


Figure 23. Label Château Mouton Rothschild design carried out by artist Bernar Venet (Source: www.mcnees.org/winesite/labels)

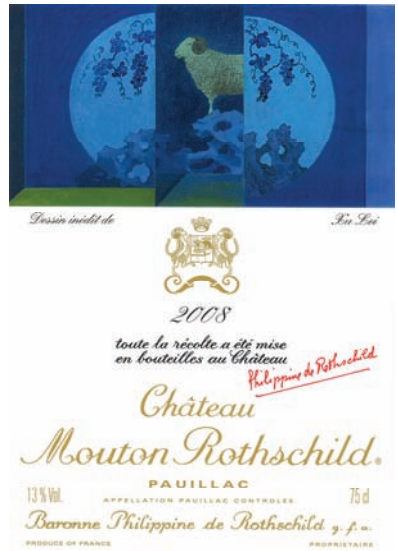


Figure 24. Label Château Mouton Rothschild design carried out by Xu Lei (Source: www.mcnees.org/winesite/labels)

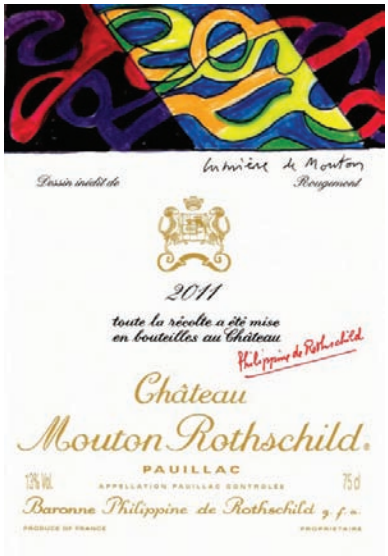


Figure 25. Label Château Mouton Rothschild design carried out by artist Guy de Rougemont

Figure 26. Label Château Mouton Rothschild design carried out by Miquel Barceló

Figure 25 and 26 (Source: www.chateau-mouton-rothschild.com/label-art/discover-the-artwork)

Handprint that combines with the spirit of the vine leaf (Figure 21). A happily winelover zebra with one vinestock palm tree (Figure 22) Chalices are rooted in the ground and open to the sky (Figure 23). Living planet blue, the two hemispheres, unite in the dictum " planet wine " (Figure 24). The vines in steps dance in the solar spectrum until the shadow from the cellars (Figure 25) As if in a cave drawing from caves, symmetrical Rams color harmony with wine, between Earth and sky (Figure 26).

CONCLUSIONS

The palpable examples speak of the elegance and conservatism of the labels from countries that are world leaders in producing and selling traditional wine as art, such as France, Italy, and Spain. The labels of these countries seem simple, containing graphics about the variety name, the image of the vineyard in addition to all the technical details. These images show us his sensibly talents, classical rigour associated with old symbols. All symbolic items of historical, geo-political significance, customized in these labels, outline a specific recognizable on a regional or national level.

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***www.90thidpg.us/Equipment/Downloads/AlcoholLabels

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✓*Ingineria mediului*

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GARANT – NEW TABLE GRAPES INTERSPECIES VARIETY

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Keywords: *vine, new table grapes variety, interspecies hybridization*

ABSTRACT

Garant is an early ripening white table grapes variety obtained by means of interspecies hybridization at the Institute of Viticulture and Enology - Pleven. It was approved by the Executive Agency *for* Variety *Testing, Field Inspection and Seed Control in 2009 and patented in 2010. Leaf blade is medium, large and thick, light green, trilobite to five-lobed. Cluster is medium large, conical, winged, loose to semi-compact. Berries are medium large, ovate, amber colored with wax coating. The texture is fleshy, juicy with harmonious taste and slight Muscat flavor. The variety is characterized by enhanced resistance to low winter temperatures, mildew and powdery mildew. Its increased resistance to biotic and abiotic stress makes it suitable to be grown in all viticultural regions of Bulgaria.*

INTRODUCTION

Obtaining of complex abiotic and biotic resistance of plants is exceptionally prestigious and contemporary trend of great economic and social importance. One of the main tasks in modern viticulture is the creation of varieties having high adaptive potential (Sanchez-Monge, 1993; Hmayrov et al., 2008). The numerous selection-genetic studies in the global viticultural science until now have revealed that only the classical selection methods of vine allow the creation of varieties resistant to diseases and pest in the most efficient and health safest way (Egorov, 2006). The interspecies hybridization in vine selection allows both from scientific and applied aspect, the obtaining of new immune and resistant varieties, analogues to *Vitis vinifera* L. cultivars (Kozma, 1974; Ivanov, 2011). As a result of the intensive selection works in this direction until the end of the last century in ILV- Pleven 13 new original interspecies vine varieties with increased resistance to low winter temperatures and fungal diseases were approved by the State Variety Commission. Detailed agrobiological characteristics of these varieties was done by Valchev (1978; 1990), Valchev et al., (1984), Valchev, Ivanov (1996), Roychev (2012).

The researches in this perspective direction of vine selection at IVE-Pleven had continued and as a result five new interspecies varieties with increased resistance to stressors were approved in 2009, and patented in 2010. Three of them were wine:

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Plevenska Rosa (Ivanov et al., 2011), Kaylashki Rubin (Ivanov et al., 2011) and Trapezitsa (Ivanov et al., 2012) and two table grapes varieties - Garant and Plevenski Favorit. These varieties did not differ in grapes quality and its products from the standard cultivars belonging to Vitis vinifera.

The objective of this study is to present detailed ampelographic characteristics of the newly-selected white table grapes interspecies variety Garant.

MATERIAL AND METHODS

The ampelographic study of the variety was carried out during the period 1990-2009, at the vine plantation (hybrid area) in the Experimental Base of ILV- Pleven. Vines were planted at a distance of 3.00 m and 1.30 m in the row. They were grown on modified Moser training system. The climate in this region is pronouncedly continental. The soils are slightly leached chernozem, formed on loam. The analysis of soil and weather conditions of the region had shown that they were favorable to vine growing and researches for obtaining new varieties. The methodology described in Bulgarian Ampelography vol.1 (Katerov et al., 1990) was used in the ampelographic study of the variety.

RESULTS AND DISCUSSIONS

ORIGIN. Garant variety was obtained from the crossing of Augustine variety (SV 12375 x Pleven) x Druzhba variety (complex interspecies hybrid) in the Experimental field of IVE - Pleven by M. Ivanov et al. It was recognized by Order No. RD 12.22/16.04.2009 of MAF and patented by the Patent Office as a new plant variety with certificate No. 10879/30.07.2010.

Botanic description. ***Young shoot.*** Crown is bare, light bronze. Young leaves are bare, yellow-greenish on the top side of the blade. The density of bristles between the nervation on the bottom side is rare. The density of the bristles along the main veins on the bottom side is average. The young shoot is fully open. The internode dorsal and ventral side is fully green. The shoot position before tying is semi-upright.

Mature shoot. The internodes are medium long (8.5 cm). Mature shoot is medium thick, slightly flat; its bark is light brown in colour. The surface is flat. The tendrils are medium long, slightly branched and often fall.

Leaf. Leaf blade is average (15.2/14.7 cm). It is medium thick, light green, three- to five-lobed. The top surface is slightly bristle and bare. The top notches are very deep, open with parallel sides and sharp bottom. The bottom notches are medium deep with parallel sides and an oval bottom. The petiole notch is open, with flat tapered bottom, not bordered by the nervation. The top teeth are large, sharp and long, while the bottom ones are medium large. They both are sharp-pointed with a wide base. The anthocyanin coloring of the main veins on the top side of the leaf blade is average and well expressed in the base. The bristles density on the main veins of the leaf blade is average. The petiole is long, purple at the base. Compared to the median vein length, it is slightly longer.

Inflorescence. The inflorescence is androgynous, with an average long, thin, upright stems. The pistil is medium. The stalk is medium long while the stigma is medium big, enlarged and oval. The flower buds are medium large, almost cylindrical.

Cluster. The cluster is medium to large (19.00/12.40 cm), conical, winged, loose to semi-compact. The average mass of the cluster is 444.7 g. The cluster stem is long, violet, tough at the base. The rachis is green. The berry stem is medium long, medium thick, with an average cone-shaped bed. The brush is medium long (Figure 1).

Berry. The berry is medium big (22.80/17.83 mm), ovoid, amber colored, with wax coating. The berry is easily detached from the stalk. The skin is thick but fragile. The texture is fleshy, juicy with harmonious taste and slight Muscat flavor. The average berry mass is 4.65 g (Figure 1).

Figure 1. Variety Garant

Seeds. The seeds are average (5.2/3.8), pear-shaped and tan. The beak is short, cone-shaped. The chalaza is well outlined, oval. The raphe is slightly convex.

Agrobiological characteristics

Vegetation period. Garant belongs to the group of early ripening varieties. In Pleven region grapes ripen in late July, early August. The duration of the period from budding to the grapes maturation is 125 -130 days. The first leaf appears around 15 April while the first inflorescence around 22 April (Table 1).

Table 1

Stages of vegetation of variety Garant average from 1990-2009 periode

Beginning of sap movement	Beginning of budding	Flowering		Softening of berries	Technological ripeness	Fall of the leaf
		beginning	final			
04.04.	11.04.	20.05.	31.05.	25.07.	05.08.	20.10.

The maturation degree of the annual growth. The annual shoots ripen very well until the end of the growing season. The shoot maturation starts around 15 August and ends by 1 October.

Vine growth strength. Vines have an average growth. They form a small number of side shoots and are less leafy.

Fertility and yield. Under ground and stem training systems the variety has high fertility and high yield. The ratio of developed eyes is high. The fruit shoots ratio is 71.50% while the fertility rate - 1.00. Fruit shoots with two clusters are prevailing. The yield per vine is 5.150 kg, and per hectare - 1980 kg.

Putting forth catkins and milerandage. The variety is not liable to putting forth catkins and milerandage**.**

***Disease resistance*.** Garant variety has high resistance to downy mildew and powdery mildew under field conditions (score 1).

***Agrotechnical characteristics*.** With ground training systems it can be used single or double Guillot. Mixed fruit units are left on stem training.

Suitable rootstocks. Vines grow and have good fruit-bearing capacity grafted to rootstocks Shasla x Berlandieri 41 B, Rupestris du Lot and CO4.

Response to environmental conditions. Garant variety has high resistance to low temperatures. In the studies for many years under field and laboratory conditions on the degree of resistance to low temperatures the variety has demonstrated a very high resistance to low temperatures and high regenerative capacity.

Technological characteristics

Mechanical composition. According to the mechanical composition of the cluster and berry, Garant variety is typically table grapes. The berry ratio in a cluster is 97.48 %, while skins are 2.93 %, seeds 1.52 %, and the mesocarp – 95.55 % (Table 2).

Table 2

Mechanical analysis of the grapes of variety Garant average from 1990-2009 periode

Mechanical analysis of cluster		
1.	Weight, g	444.7
2.	Length, cm	19.00
3.	Width, cm	12.40
4.	Rachis, %	2.52
5.	Berries, %	97.48
Mechanical analysis of berry		
1.	Weight, g	4.65
2.	Length, mm	22.80
3.	Width, mm	17.83
4.	Skins, %	2.93
5.	Seeds, %	1.52
6.	Flesh, %	95.55

***Must chemical composition*.** When grape is mature for consumption, it contains 16.10% sugar and 6.0 g/ dm^3 titratable acids. It is characterized by harmonious, fresh Muscat flavor. Its tasting score is 7.83 (on a 10-score scale) (Table 3).

Use of the grapes and the produce assessment. Grapes of Garant variety has good transportability, as the detachment resistance of the berries is 296.4 g, and to pressure 1295.8 g. It is suitable for satisfying the market demands with early, high-quality white Muscat table grapes at the end of July and beginning of August.

Table 3

Physicochemical analysis of grapes from variety Garant average from 1990-2009 periode

Sugars, %	Titratable acids, g/dm^3	Endurance of berries:	
		of pressure, g	of picking up, g
16.10	6.000	1295.8	296.4

CONCLUSIONS

General assessment of the variety. Garant variety is a very early, white Muscat table grapes variety. Its crown is bare, light bronze. Leaf blade is medium thick, light green, three- to five-lobed, slightly bristle and bare. The cluster is medium to large, conical, winged, from loose to semi-compact. The berry is medium large, oval, amber colored with wax coating. The texture is succulent and juicy with harmonious taste and slight Muscat flavor. Grapes have very good transportability. Vines are characterized by very intense growth, high fertility and yield. The variety has increased resistance to low winter temperatures, downy mildew and powdery mildew. It is suitable for organic table grapes production. The variety could be grown in all vine-growing regions in R Bulgaria.

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STUDY ON THE BEHAVIOUR OF *BELAMCANDA CHINENSIS* L. DC. SPECIES, IN ORDER TO DIVERSIFY THE FLOWERING GEOPHYTES ASSORTMENT

Manda Manuela[1], Nicu Carmen[1]

Keywords*: Belamcanda chinensis, field cultivation, protected, foliar biofertilizers*

ABSTRACT

Belamcanda chinensis is very little known in Europe, although the cultivation of this bulbous species has some advantages: a long period of decoration (ornament and decoration with flower and fruits), relatively easy propagation (through seeds or plant division), and resistance to drought, low maintenance processes, multiple types of usage. From the few existing data in the literature on the ecological requirements of this species, it appears that Belamcanda can be grown outdoors, in the conditions specific to our country and the only limiting factor would be the temperature. In this regard, there are some recommendations which are contradictory and unsupported by data. To promote and cultivate this species, first we have to determine if in the conditions of our country it behaves like a rustic perennial geophyte (with or without protection) or semi-rustic (it requires removing the bulbs from the soil in autumn and store them in winter, and then replanting them in spring). From the data presented it can be concluded that in the climatic conditions between 2012 and 2013, B. chinenesis behaved like a rustic geophyte, the best results being obtained in the unprotected culture. Applying foliar fertilizer treatments had a positive influence on the main analyzed morphological characteristics, especially on the blooming (blooming trigger, percentage of blooming plants, flower quality) in both systems of culture.

INTRODUCTION

Belamcanda chinensis L. DC. (Iridaceae), Syn. - *Ixia chinensis* L. (1753), *Belamcanda punctata* Moench (1794), *Pardanthus chinensis* (L.) Ker Gawler (1804), *Gemmingia chinensis* (L.) O. Kuntze (1891), *Iris domestica* (L.) Goldblatt & Mabb; common names – blackberry lily, leopard flower (Engl),: Fleur-leopard (French), Abanico (Span.), Jiao jian cao (Chin.) (Godblatt 2005; Goldblatt &Manning 2008; Wen Jun 2009).

Belamcanda chinensis is native to eastern Asia (China, Japan, Himalayas) and is a perennial geophyte, with strong rhizomes, fleshy, yellow or orange and it can grow up to 60-90 cm height. The stem is erect or ascending and branched. The leaves are alternate, distichous, linear-lanceolate, 25-50 cm long, apex acuminate to acute, sheathing at base, glaucous-green. It has a terminal inflorescence, branched corymbose, 10-30 cm long. Flowers reddish orange with dark spots, 3-4 cm in diameter. Outer perianth segments

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obovate or elliptic, base cuneate, apex obtuse. It blooms in June-August. Individual flowers only live for one day, but the plant produces a succession of blooms over a period of several weeks (Wen Jun 2009, Shao-Shun 2000).

Blackberry Lily can be used for the decoration of green spaces, as isolated plant or in groups on lawns, but also in flower beds, perennial border or rock gardens (Gilman 1999). It can be also used as a cut flower and the seed heads can be cut and dried, making an unusual addition to dried flower arrangements.

Its underground parts have been used as Chinese traditional medicine to treat a variety of inflammation related diseases, as well as an inhibitor of some common skin fungi. One of the potential mechanisms of its action may involve antioxidant and genoprotective properties that are important for the prevention of many degenerative diseases (Wozniak et al. 2006, Wozniak et al. 2008, Gilman et al. 1999, Matkowski et al. 2009).

With respect to this species, there has been a boom in the number of papers in the recent years 27 papers in the last five years. The boosting interest in this plant should be an additional indication to the therapeutic potential of this plant, very little known outside Asia (Wozniak et al. 2011, Buta et al. 2010).

Belamcanda grow best in areas with long hot summers, in light to moderate shade. Good drainage is required, or the plants rot. Some organic matter should be incorporated if the soil is sandy or rocky. Is a fairly hardy plant, tolerating temperatures down to about -15°C, but in some areas is considered a short-lived perennial plant (Garofalo 2002).

From the few existing data in the literature on the ecological requirements of this species, it appears that *Belamcanda* can be grown outdoors, in the conditions specific to our country and the only limiting factor would be the temperature. In this regard, there are some recommendations which are contradictory and unsupported by data. To promote and cultivate this species, first we have to determine if in the conditions of our country it behaves like a rustic perennial geophyte (with or without protection) or semi-rustic (it requires removing the bulbs from the soil in autumn and store them in winter, and then replanting them in spring).

The application of foliar fertilization is an important crop management strategy, which may help maximizing crop yield and quality. Observed effects of foliar fertilization have included yield increases, resistance to diseases and insect pests, improved drought tolerance, and enhanced crop quality. Applications may also be used to aid plants recovering from transplant shock, hail damage, and other damaging environmental conditions (Nicu & Manda 2014, Haytova 2013, Borlan 1989).

The new foliar biofertilizers, with a complex content of nutrients, macro and microelements protein-bound, are considered ecological products. That is why, they represent modern means, alternative and non-conventional use for quantitative and qualitative improvement of agricultural production. Moreover, they improve the decorative aspects of ornamental plants (Draghia et al. 2004, Draghia et al. 2009, Manda et al. 2009).

MATERIAL AND METHODS

The biological material was represented by uniform plants of *Belamcanda chinensis*, of 1 year old, existent in the collection of the Floriculture subject matter, located in the didactic field of Al. Buia Botanical Garden, Craiova. The plants were obtained by generative propagation.

The sector is located on a level ground with loam – sandy texture, protected from the streams of air. The temperate climate of Craiova city is characterized by very hot, torrid summers and less severe winters. The average annual temperature is 10.9^{o}C, and the

average amount of rainfall is 550 mm annually. The climate is of steppe with rapid changes from winter to summer and slower changes from summer to fall with Mediterranean influences typical for the plains.

The setting of the experiment, the observations and the determinations were conducted in interval 2012-2013. We studied the effect of foliar fertilizing products, combined with the effect of protecting the plants during winter, on the growth and development of *Belamcanda*.

There were taken into consideration two experimental factors with the following graduations: factor A - protecting the plants with 2 graduations: a1. protected plants (P), a2. unprotected plants (N), factor B - fertilization with 4 graduations: b1. Untreated control plants (water); b2. Humusil 0,5%; b3. Bionat 0,2%; b4. Cropmax 0,1%.

From the combination of these two factors it resulted the following variants: V11 (Co1) -N/water; V12-N/Humusil; V13-N/Bionat; V14-N/Cropmax, V21 (C2) -P/water, V22-P/Humusil; V23-P/Bionat; V24-P/Cropmax.

Humusil is a product based on Lumbricompost - a biofertilizer obtained from the Californian red worm (*Lumbrocum Rubellis*). It can be defined as an active humic fertilizer that stimulates plant growth and resistance. It contains salts of humic acids, humic acids, fulvo acids, amino acids, micro and macro-elements, live bacteria and other easy-to-absorb substances. It is recommended for the ecologic agriculture and it can be applied both foliar and on roots.

Bionat product is an unpolluted bio-fertilizer, obtained from plants extracts. *Tagetes patula* plants react favourable to the treatments with Bionat, in the way of increasing the ramification degree and the number of inflorescences (Draghia et al. 2008).

Cropmax is a 100% natural fertilizer produced in the Netherlands, which is formed of both macro-and microelements and growth stimulators. Cropmax aids in the prevention of elemental deficiencies in field crops and may strengthen the plants and increase cell division, metabolism, photosynthetic capacity and resistance to climate stress.

The foliar treatments started three weeks after planting and they were repeated at two weeks intervals (four treatments). The plant protection in winter (November to March) was done with perforated polyethylene.

The observations consisted of biometric measurements during plants vegetation period (the percentage of plants survival , the average height of the plants , the average number of branches/plant, the average length of leaf , the percentage of blooming plants, the average diameter of the flower, the average height of the flower stems).

RESULTS AND DISCUSSIONS

In the first stage we considered it a rustic perennial geophyte to test the underground organs resistance at the low temperatures during winter, in a protected and unprotected system. In addition, we studied the effect of foliar biofertilizers, which besides the fact that they represent a directly food intake at the level of the foliage, they enhance and stimulate the absorption through roots, thus increasing the plant resistance to the stress factors. As we observe in Table 1, the percentage of plants survival depending on the analyzed experimental factors had a maximum value for all the unprotected variants and the protected variants recorded losses of 20% (V23) and 40% (V21).

The average height of the plants was clearly influenced by the treatments applied and less influenced by the culture conditions (unprotected/protected). Thus, the control variants V11(C1)-N/water and V21(C2)-P/water recorded the lowest value of the average plant height (41 cm) in comparison to the treated variants that recorded higher values ranging between 58 and 69 cm for the unprotected culture (V14, V13, V12) and between 48

and 69 cm for the protected culture (V22, V23, V24). The highest value of this parameter (69 cm) was recorded by V12-N/Humusil and V24-P/Cropmax (figure 1).

In the unprotected system the highest number of leaves/plant was recorded by the plants treated with Humusil (V12-14 leaves), and the lowest value in this respect corresponds to the variant in which Cropmax was applied (V14-10 leaves/plant) with a very small difference in comparison to the other variants (V11(C1), V13-Bionat-11 leaves/plant). The average number of leaves/plant at the protected variants ranged between 10 leaves/plant at V21(C2), V22-PHumusil and 11 leaves/plant at V23-P/Bionat, V24-P/Cropmax (figure 1).

Table 1

Phenological observations and the percentage of plants survival made in 2012-2013

Variants	Start of flowering	Difference	% blooming plants 22.07.2012	% survival (15.04.2013)
V11 (C1)-N/water	14.07	-	18.7	100
V12-N/Humusil	27.06	- 27	52.3	100
V13-N/Bionat	30.06	- 16	47	100
V14-N/Cropmax	27.06	- 13	24	100
V21 (C2)-P/water	16.07	-	12	60
V22-P/Humusil	30.06	- 16	24	100
V23-P/Bionat	02.07	- 14	20	80
V24-P/Cropmax	30.06	- 16	25	100

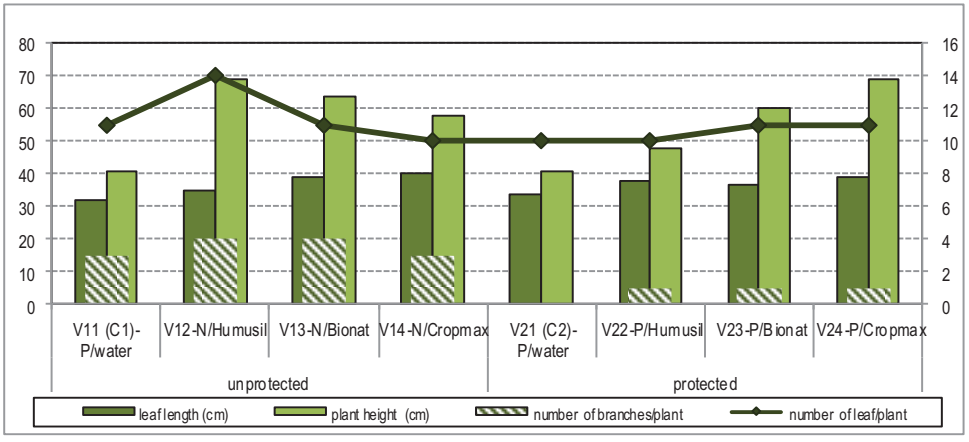

Figure 1. The influence of culture conditions and fertilization on the main morphological characters of the plant

The average length of leaf recorded the highest values (39-40 cm) at the variants treated with Cropmax (V14, V24), both in protected and unprotected system and at V13-N/Bionat. The lowest values of the leaf size (32-34 cm) were recorded by the control variants (V11, V21) (figure 1).

As we observe in figure 1, the average number of branches/plant was minimal for the protected variants (1 branch/plant). The largest number of branches/plant (4 branches/plant) corresponds to the unprotected variants treated with Humusil (V12) and Bionat (V13). The V11(C1), V14-N/Cropmax, V24- P/Cropmax recorded 3 branches/bush.

From the results presented in Table 1 we observed that the blooming started in the period 27-30.06.2012 for all the fertilized variants, in comparison to the control variants which blooming started later (14 -16. 07.2012).

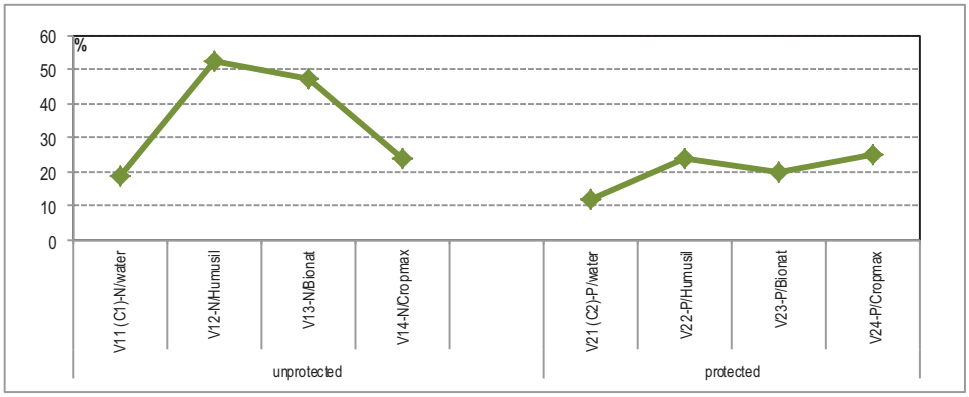

Figure 2. The influence of the treatments on the percentage of blooming plants (22.07.2012)

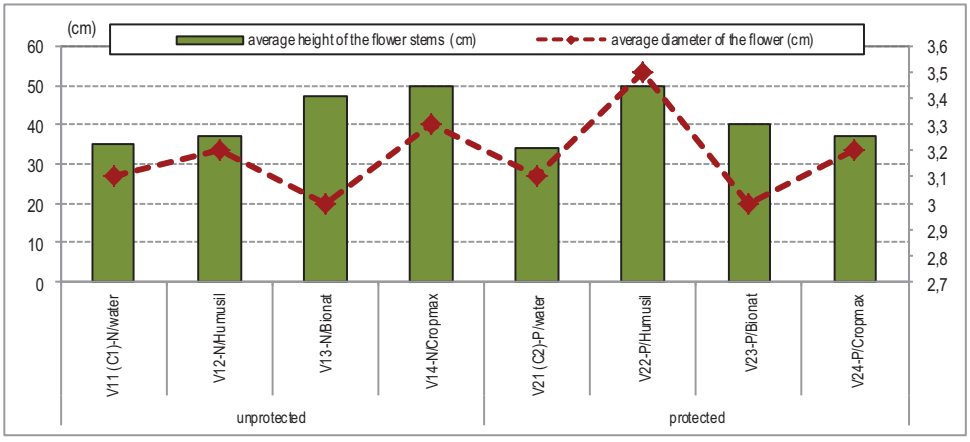

Figure 3. The average height of the flower stems and the average diameter of the flower according to the applied treatments (22.07.2011)

In the unprotected culture, the percentage of blooming plants ranged between 18,7% (V11-C1) and 52,3% (V12-N/Humusil), and for the protected plants the values ranged between 12% (V21-C2) and 24-25% for V22-P/Humusil and V24-P/Cropmax (figure2).

Regarding the quality of the flowers, expressed through the average diameter of the flower, there were recorded similar values, ranging between 3 cm (V11 (C1), V21 (C2), V13- N/Bionat, V23-P/Bionat) and 3.5 cm (V22-P/Humusil) (figure 3).

Given that *B. chinensis* can be used as a cut flower, both fresh and dried, after the fruit formation, there were made observations regarding the average height of the flower stems. The data presented in figure 3 show that the highest values in this regard were recorded by the variants V14-N/Cropmax/N (50 cm) and V22-P/Humusil (50 cm), and the lowest values were recorded by the two control variants (34-35 cm).

CONCLUSIONS

The percentage of plants survival depending on the analyzed experimental factors had a maximum value (100%) for all the unprotected variants and the protected variants recorded losses of 20% (V21-P/water) and 40% (V23-P/Bionat).

The best evolution of the average plant height corresponds to V12-N/Humusil and V24-P/Cropmax.

The highest average number of leaves/plant was recorded in unprotected system for the plants treated with Humusil (V12-14 leaves), and the average size of leaves recorded the highest values for the variants treated with Cropmax, both in protected and unprotected system (V14-N/Cropmax, V24-P/Cropmax). The lowest values were recorded by the untreated control plants (V11, V21).

The average number of branches/plant was minimal for the protected variants (1 branch/plant), and the highest number of branches/plant corresponds to the variants treated with Humusil (V12), Bionat (V13) in an unprotected culture (4 branches/bush).

The beginning of blooming started on 30.06.2011 for all the fertilized variants compared with the untreated control plants which blooming started later (14.07.2011).

The percentage of blooming plants was higher for the unprotected plants (18,7%-52,3%) compared to the protected plants (12-25%). The average diameter of the flowers varied within tight limits, from 3 cm (V12- N/Bionat, V22- P/Bionat) to 3,5 cm (V21-P/Humusil). The average height of the flower stems recorded maximum values of 50 cm for the V14-N/Cropmax and V22-P/Humusil, and the lowest values for the control variants (34-35 cm).

Applying foliar fertilizer treatments had a positive influence on the main analyzed morphological characteristics, especially on the blooming (blooming trigger, percentage of blooming plants, flower quality) in both systems of culture.

From the data presented it can be concluded that in the climatic conditions between 2012 and 2013, *B. chinenesis* behaved like a rustic geophyte, the best results being obtained in the unprotected culture. In the literature it is described sporadically as rustic geophyte of short duration (2-5 years), especially in the areas with low temperatures during winter (below -15^0C), aspect that we will analyze in the next period.

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MINIATURE LANDSCAPES

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Keywords*: landscape miniaturization, history, Orient, Occident*

ABSTRACT

The current work studies the diverse types of miniature landscape and the diverse esthetical aspects from classical forms to modern ones.The bonsai art and miniature gardens originate in the Far East. Although many believe they originate in Japan, the Bonsai appeared for the first time is China. Nowadays the bonsai remains part of the Chinese culture, but also of countries such as Taiwan, Thailand, Singapore and Vietnam. If in China they are called pun-sai and penjing (pun-ching), in Japan there are the terms of bonsai, bonkei, hachi-niwa and saikei; the penjing represents a landscape like saikei and the pun-sai, which is the ancestor of bonsai, is a tree from nature, but without other elements that might evoke a landscape. Thus, the miniature landscape takes different forms in the western world: from those from the oriental tradition - pun-sai, bonsai, saikei to modern variants, known as "dish gardens", "fairy gardens," "teacup gardens", "minigardens" which can cover a very wide range of consumer demands.

INTRODUCTION

Landscape miniaturization as a special art form has its roots in Far East design philosophy. Combining philosophy, painting, sculpture, architecture and gardening only recently has it made its way to the European arena with great success. Based on simplicity, asymmetry, irregularity, ambiguity and in line with large scale architecture it becomes an interesting and very popular trend in landscape architecture (Pietraszko & Sobota 2008b).

A miniature garden is a mixture of trees, plants, hardscaping and small accessories, which are combined to create a lasting landscape.

Such a garden can give life to interiors, terraces, and balconies or even to small gardens, by placing pots with decorative plants, combined to fill the needs of recreating nature for those who do not have space to arrange a garden, or for the winter interior decor.

The miniature garden has its own inner life; it is a world in flux that grows and changes. It has clear limits and a consistent level of abstraction to make miniature world credible, comprehensive and malleable both for its designers and for those who see it.

These gardens often contain a variety of backgrounds such as mountains, water or forests. They show compact worlds in which the viewer can immerse. The miniature gardens are a way of thinking of the aesthetics, cognitive and representation aspects of nature.

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MATERIAL AND METHODS

As a phenomenon, gardens miniaturization has been little studied, especially landscapers, archaeologists and psychologists. Based on some common characteristics of miniature landscape in different periods and civilizations, this paper presents an overview on the evolution of miniature gardens in East and West.

RESULTS AND DISCUSSIONS

1. The evolution of miniature gardens in Orient

The bonsai art and miniature gardens originate in the Far East. Although many assume that it began in Japan, the bonsai appeared for the first time in China. The Chinese were the first who planted the miniature trees in small pots or trays. Nowadays the bonsai remains part of the Chinese culture, but also of some countries such as Taiwan, Thailand, Singapore and Vietnam.

Before the Japanese to discover and develop the techniques of Bonsai, the Chinese raised the bonsai at the level of art. They used the”pun-sai” and”pun-ching" terms to describe their creations. The "pun-sai" term resembles the Japanese word "bonsai", the first meaning a tree planted in a pot without landscape and ”pun-ching” means a tree planted in a pot together with other landscape elements (Pietraszko & Sobota 2008a).

This early form of bonsai or "pun-sai" appeared during the Ch'in Dynasty (221-206 B.C.). If at the beginning pun-sai meant on a larger scale the cultivation of plants in pots, eventually it led to the miniaturization of trees. The Chinese were fascinated by the trees growing in the mountains in extreme climatic conditions and tried to capture these landscapes in a minimalist approach. Forming a pun-sai involves a skillful cutting of the roots and branches to limit the growth without affecting the overall health of the tree. In addition, the root system development is limited by using small pots on the same principle as the shrinking of the Chinese women's feet.

During the Han Dynasty (200 BC-220 AD) the ”pun-ching" appears too when the Chinese landscape artists started to design miniature versions of famous gardens with rocks, by arranging several trees incorporated in a flat tray. These landscapes were diversified using accent plants (herbaceous plants), water (a river or the shoreline of a lake) and ceramic figures depicting pagodas, animals and humans.

The following 3 drawings represent the 3 forms of penjing practiced in today's China:

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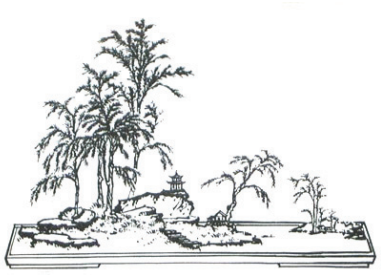

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1.Tree Penjing (shumu penjing): This form is most similar to the Japanese concept of bonsai. The composition consists of one, two or several trees; rocks may or may not be used as supportive design elements. 2. Landscape Penjing (shanshui penjing): In this form, an idealized landscape is created using rock as the main artistic medium. Small trees or accent plants may or may not be incorporated in the design. 3. Water-and-Land Penjing

(shuihan penjing): This relatively new form combines the former two types of penjing and uses both trees and rocks to represent a forest scene. (surce:http://www.artofbonsai.org/)

Common penjing designs include evocation of dragons and the strokes of well-omened characters. At its highest level, the artistic value of penjing is on par with that of poetry, calligraphy, brush painting and garden art (Hu Yunhua, 1982).

If in China we talk about pun-sai and penjing (pun-ching), in Japan there are the terms of bonkei, bonsai, hachi-niwa (box-garden) and saikei; the penjing imitated a landscape like the saikei and the pun-sai, which is the ancestor of bonsai, imitates a tree in nature, but without other elements that might evoke a landscape. The bonsai distinguished itself from the pun-sai through numerous styles, shapes and techniques.

To better understand this idea, Table 1 summarizes information regarding the terms and development of miniature landscapes.

Table 1

The origin of the terms used in presenting the evolution of miniature landscapes (adapted after Baran 2013, Baran 2010, Jonker et al. 2014, DuCane 1920, Kawamoto & Kurihara 1963, Terry Cheng 2009, Rahmann & Jonas, 2009)

Chinese	Japanese	Literal translation	Description
pun or p'un pen or p'en	bon	tray, pot	Tray or pot
	bonseki	tray stone	Landscape on a tray with stone and sand
pun-ching/ penjing	bonkei	tray landscape	Landscape in a container
pun-sai/ pun-tsai	bonsai	tray plant	Dwarf potted tree; artistic pot plant; table culture plant
	hachi-niwa/ hako-niwa	box garden	Japanese miniature garden; dish-garden
	saikei	planted landscape	Miniature living landscape (often using trees not yet developed enough to stand alone as bonsai, and without as many formal rules)
	tsubo-niwa	small gardens and courtyards	Courtyard garden or pocket garden

From the historical point of view, it is considered that the Japanese have experienced this form of cultivation by the end of the 13th century, when the Chinese traders introduced these miniature trees in Japan. Although the oldest representations of bonsai in Japan date back to 1300 AD, it is possible that the bonsai have been introduced in Japan by the Buddhist monks before this period (10^{th} -11^{th} century).

Since the mid-17th century, the interest of Japonese in bonsai started to increase. A large development of bonsai occurred in Japan during the Edo period (1603-1868). The story of trees and landscapes planted in pots was widespread in poems, paintings and drawings too. The illustrations of miniature trees from the Edo period demonstrate the gardening experience and the unique aesthetic sense of Japanese. They treated the bonsai as a microcosm being in accordance with the philosopher Lao Tsy, who claimed that "man can discover the world without leaving his house" (Katō S. 1988).

The Japanese as a nation open to new things, not only have rapidly adopted this art, but they also established rules for forming the bonsai and styles that are used nowadays.

It was not until the mid 18th century that the Japanese art of bonsai has progressed in the fine form known today, according to the paintings from the 19th century. One of the largest events for bonsai occurred in March 1934 when the first Kokufu-Kai exhibition took place in Ueno Park, Tokyo. Then two such exhibitions were organized in Ueno Park annually (fall and spring), being suspended only during the World War II and resumed in 1947.

In 1890, a group of four Japanese nurserymen established the Yokohama Gardeners Association for the direct exportation of numerous varieties of Japanese plants, seeds, bulbs and varieties of their miniature trees in pots. In 1920 the Yokohama nursery also offered miniature rock gardens for sale. These landscape plantings consisted of several smaller trees and rock formations, along with several tiny replicas of pagodas, bridges, and/or huts. These resemble the early Japanese bonkei or tray landscapes rather than present-day saikei (Elias. 2005).

The minimalism in Japanese art lies not only in the miniaturization of trees (bonsai) but also in creating miniature gardens (saikei and hachi-niwa) that evoke natural landscapes, combining miniature trees with soil, rocks, water and vegetation in a single container.

Saikei (planted landscape) is the art of creating miniature landscapes, reminding the viewer of a natural location both by topography and by the used materials and species. Saikei focuses on evoking a natural landscape, rather than individual trees appearance, as outlined in bonsai. Short ceramic trays are used for saikei in which the vegetation and rocks are arranged. In saikei there can be used herbaceous plants species (ground covering plants, wild plants) that contribute to the evocation of the landscape.

Hachi-Niwa (box garden, miniature Japanese garden) are lilliputian landscapes which include items such as: mountain, cliff or hill; water pool with island, a waterfall or a stream with bridge; alleys, gates, a house; trees and shrubs, small plants; figurines etc.

Tsubo Niwa is courtyard garden or pocket garden in Japanese, one tsubo is equally 3.3 square meters in Japanese measurement. In the Heian Era, tsubo means a area surrounded by fences and buildings with different landscapes for the pleasure of viewing. The first courtyard gardens were designed and made in-between houses and storage in the 15th century. The main elements to design a Tsubo Niwa are trees, stepping stones, rocks, flowers, grass and water feature (Terry, 2009).

One of the reasons why bonsai and miniature landscapes remain so popular in Japan is the lack of space; gardens often need to be brought indoors or addressed as miniature landscapes in a small courtyard, balcony, container, evoking larger landscapes.

2. The evolution of miniature gardens in Occident

The miniature landscape as a form of art has its roots in the design philosophy from the Far East. The landscape gardeners in Japan were accustomed to offer miniature gardens as models of proposed garden plans for wealthy clients. The Japanese have developed this art form that was later introduced in the Occident, where the interest in bonsai grew slowly but surely.

The Americans discovered the Japanese art after opening the Japanese pavilion in the exhibition of Chicago in 1893. The gardens in pots with the theme "Mania minor" were part of this trend, and the visitors took home such miniature landscapes from Japan, or have recreated them after their return. An increased interest was shown in the United States during the American occupation forces in Japan.

In Europe, the Bonsai were exposed for the first time at the Paris World Fair in 1878, then in the 1889 and 1900 exibitions. These exhibitions events have increased the interest of Occidentals for bonsai so the first big bonsai exhibition took place in London in 1909.

A 1932 illustration that appeared in the French magazine *L'Illustration*, suggests that the miniature gardens fashion appeared in Europe too (Figure 2).

Figure 2: Mini-garden appeared in an illustration in 1932
(Source: http://www.bowoodfarms.com)

However, until the World War II, there was reluctance in Europe towards this form of oriental art. The first Bonsai companies appeared in the UK in early 1970. Currently, there are over ninety bonsai companies and every year a large number of exhibitions are proving to be increasingly popular in the Occident.

Combining painting, sculpture, architecture, horticulture and philosophy, the miniature landscape made its successful entry into the European area, especially in recent decades. Based on simplicity, asymmetry, irregular character, it is announced as a very interesting and popular trend in the architectural landscaping.

The current European miniaturization art has a tendency of forgetting about the classical far-eastern rules of designing *Bonsai* forms. Eager to create stronger and more dynamic forms, the Europeans abandon the classic and sedate forms of displaying the art of miniaturization commonly used in the Land of Rising Sun (Pietraszko & Sobota, 2008a).

Thus, the miniature landscape takes different forms in the western world: from those from the oriental tradition - pun-sai, bonsai, saikei to modern variants, known as "dish gardens", "fairy gardens," "teacup gardens", "minigardens" which can cover a very wide range of consumer demands.

In general, the miniature Western gardens are done in simple or colourful containers, more fanciful and there are used: trees, shrubs, small plants with decorative flowers (*Saintpaulia ionantha, Begonia, Geranium, Saxifraga, Viola* etc.) or leaves (small size ferns, succulents, *Hedera*), moss, stones, decorative design etc.

In the miniature gardens the same principles are applied as in the natural gardens: balance, shape, texture, colour, focal point - only that they are resized in miniature and the logic which governs the miniaturization must of course be adapted. The focus of these

gardens can be given by the splash of colour or different flowering plants or by different accesories. Un important aspect is maintaining the proportions between plants, pot and the represented landscape.

CONCLUSIONS

Hachi-Niwa Japanese Gardens, penjing in Chinese or "dish gardens" in English (gardens in pot) are miniature landscapes, which can be a perfect decoration both indoors and outdoors.

The miniature landscape made its successful entry into the European area, especially in recent decades and promises to be a very interesting and popular trend in the landscape architecture. In Occident the miniature landscape takes various forms: from the oriental tradition - saikei, hachi-niwa to modern variants, known as "dish gardens", "fairy gardens," "teacup gardens", ”minigardens" that can cover a broader range of consumer demands.

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ACTION OF NATURAL ANTIOXIDANTS ON THE OXIDATION OF FAT IN RAW-DRIED MEAT PRODUCTS

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Keywords: *antioxidant capacity, raw-dried sausages, lipid oxidation*

ABSTRACT

The present study was carried out for research purposes antioxidant capacity of condiment herbs used to obtaining dried raw meat products without additives obtained by chemical synthesis. Manufacture of raw-dried meat products requires successive stages of maturation, during which may to occur lipid autooxidation. To prevent lipid oxidation and to ensure the optimal the conservation rosemary, oregano, pine seeds, pomegranate juice, fresh blueberries, grape seed extract natural antioxidants were used. After processing meat and natural ingredients were analyzed in terms of physicochemical obtained dry raw sausage. Methods of analysis had in view the state of lipid peroxidation by determining the peroxide value, Kreiss reaction and acidity. The results obtained during 30 days of storage of sausages showed that the highest antioxidant effect have had the grape seed extract and blueberries. Unsatisfactory results were obtained at dried raw sausages with added pomegranate juice and pine seeds.

INTRODUCTION

The lipid oxidation is a significant cause of the food quality deterioration, being a challenge for the food scientists and manufacturers from the food industry. Lipids are susceptible to oxidation, especially in the processes catalyzed by light, heat, enzymes, metals, metal -proteins, and micro-organisms, which lead to the development of the bad flavors and to the loss of essential amino acids, fat soluble vitamins and other bioactive compounds (Ladikos D., 1990; De Owen R., 1996; Velasco J. et al., 2010).

The lipids can be subjected to auto-oxidation, photo-oxidation, thermal oxidation, respectively, in different conditions, to enzymatic oxidation. Autooxidation - the most frequent process that lead to oxidative damage - is defined as the spontaneous reaction of the atmospheric oxygen with the unsaturated fatty acids from lipids during three stages: initiation, propagation and end. The hydro-peroxides are identified as primary products of auto-oxidation, which by decomposition leads to aldehydes, ketones, alcohols, hydrocarbons, organic acids and volatile epoxy compounds, known as products of secondary oxidation. These compounds, together with the free radicals, represent the support for the evaluation of the oxidative stage of the food lipids (Dominguez R. et al.,

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2014; Park S.Y. et al., 2013; Nieto G. et al., 2010; Wasowicz E. et al., 2004). Lipid oxidation reduces meat quality by a number of ways, including off-flavour formation, drip loss, colour changes.

During lipid oxidation poly-unsaturated fatty acids are degraded to volatile short-chain oxidation products, which lead to off-odour and off-flavour formation (Kemin Europa N.V., 2009). In order to diminish the lipid oxidation in raw-dried meat products there are used artificial antioxidants (Manea I., 2008; Wojdylo A. et al., 2007). Because a number of these chemical substances are related to an increased risk of cancer, research focuses towards the development of a new class of additives based on plant extracts (Shah M.A. et al., 2014 Paun G. Et al., 2013; Karre L. et al., 2013; Neagu E. et al., 2013). These ones can be used as substitutes for nitrates and nitrites in raw-dried meat products, having antioxidant, preservative and flavoring role. The consumers can benefit both by the nutrients from meat and the biologically active compounds from spicy and antioxidant supplements, witch can reduced the risk of developing chronic diseases.

Throughout history spices were known to possess antibacterial and antioxidant properties (Mitić S. et al., 2013). Garlic and clove are effective against some common strains of *E.coli* (http://www.meatsandsausages.com/sausage-types). The total antioxidant capacity of fruit and vegetable extracts reflects concentrations of ascorbic acid (vitamin C), alpha-tocopherol (vitamin E), beta-carotene (vitamin A precursor), various flavonoids, and other phenolic compounds (Velasco V., Williams P., 2010, 2011; Zheng G. et al., 2009; Tabart J. et al., 2009; Kahkonen M.P. et al., 2001; Scalzo J. et al., 2005).

Use of the natural antioxidants pose a real challenge to manufacturers who, in the face of scientific evidence on the health problems caused by artificial additives, can no longer however much increase the quantities they use in production without considering the potential consequences.

MATERIALS AND METHODS

Materials. To obtain the raw dried sausages were used pork, fat back, salt, pepper, sugar and natural hog membranes. As an added with natural antiseptic and antioxidant role were used oregano, rosemary, pomegranate, blueberry, pine seeds and grape seed extract. Oregano and rosemary were used as dry powder, in proportion of 1%, the same for the pine buds. Fresh blueberries were crushed to a size of 4 mm and used 5%. Grape seed extract was purchased from drugstore and used in proportion of 1%. Raw materials and additives were dosed and properly shredded using appliances, then obtained composition, which was introduced in processed pig intestines.

The meat products are smoked at temperatures ranging between 9-12°C, and the control factors for drying are temperature (15-16°C), relative humidity (75-80%), air speed (0.1-0.2%). Ripening of sausages was performed at 12°C for 21 days. Samples were identified as follow:

- Blank sample without antioxidant additives mentioned (M);
- Sample with added grape seed extract in a 1% (MES);
- Sample with added fresh blueberries in a 5% (MA);
- Sample with added fresh pomegranate juice in a 5% (MSR);
- Sample with added chopped pine nuts in a 1% (MP);
- Sample with added rosemary in a 1% (MR);
- Sample with added oregano in a 1% (MO).

Methods. The analysis methods reflected lipid oxidation state by determining the peroxide value, Kreiss reaction acidity. It was also determined humidity finished products and weight loss during ripening and drying of sausages.

The peroxide value (PV) is used for determining the peroxide oxygen (especially hydroperoxides). It is expressed in milliequivalents of active oxygen per kg of fat, according with AOCS Standard Method. Solvent and later potassium iodide is added to the fat that has to be examined. In the presence of peroxide oxygen, iodide will be discharged in the sample. It is this amount of iodide that represents the peroxide content, allowing its exact determination.

Kreiss reactions identify aldehydes results in advanced stages of fat oxidation. Kreiss reaction occurs in acidic medium between epihidrinic aldehyde and phluoroglucine. Resulting color intensity is directly proportional to the amount of epihidrinic aldehyde, and therefore the oxidation process.

Determining acidity is the basic criterion for assessing the installation and intensity of hydrolysis and consists in the neutralization of free fatty acids with sodium hydroxide 0.1 N, in the presence of phenolphthalein as indicator. Acidity was expressed in oleic acid grams to 100 g of fat. The pH values were measured with a HACH pHmeter.

RESULTS AND DISCUSSIONS

In purpose of assessing antioxidant capacity of used ingredients were performed following chemical analysis: the peroxide value, the acidity, Kreiss reaction, the moisture and pH.

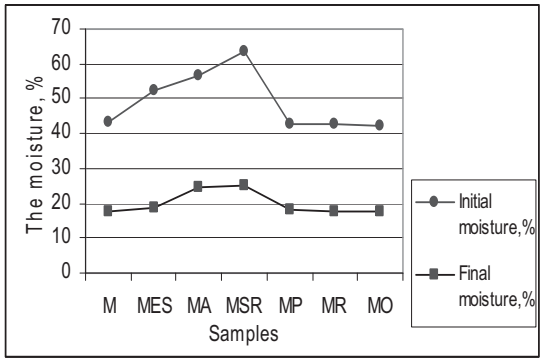

Figure 1. The moisture values in the analyzed samples

Water, by its presence in food, affects sausage stability in time. The finished products are analyzed before and after the step of curing-drying in terms of moisture content (figure 1). The initial moisture was determined before the maturation of sausages. Highest moisture content was recorded when blueberries 56.55% and pomegranate juice 63.53% was added. The final moisture was determined after 21 days of maturing sausages.

The raw-dried sausages with powder supplements had the lowest moisture (17.78% for MR sample and 17.61% for MO sample) so highest stability. The average weight of the sausages decreased to 59.08% during maturation. The peroxide value was determined after 21 days of aging and had the values specified in figure 2.

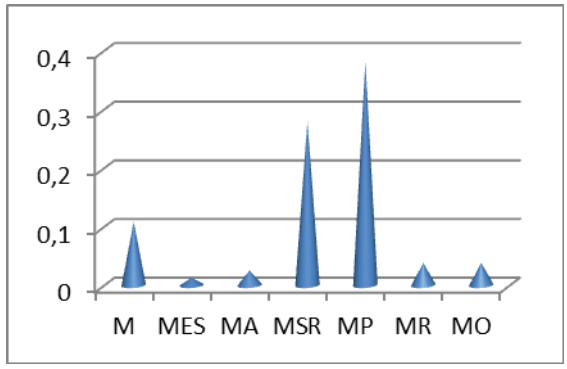

Figure 2. The peroxide values in the samples

The peroxide index of the sample MP (sausages with added pine seeds) was the highest 0.3815, and the lowest value found in the sample with grape seed extract being 0.0126. In the other samples a decrease of the peroxide value was observed compared to the control sample with 88.33% for the sample with grape seed extract, 76.57% for the sample with blueberries, 64.81% for the sausages with oregano and rosemary.

According to Savu &Petcu, 2002, the altered fats have the peroxide value more than 0.1%. Relatively fresh fat have the peroxide value 0.1-0.06% and the fresh fat less than 0.06%.

The samples obtained with the addition of antioxidants have had Kreiss reaction negative and the blank sample was positive. The acidity is an important property in food quality assessment because it contributes directly to the formation of taste (sour taste is given by the presence of acids in the product) and for raw-dried sausages acidity was an indicator of their freshness.

The abnormal growth of it to over maximum permissible values is an indication of the beginning of alteration and degradation of sausages. The control sample showed the highest value of the acidity 2.115% (figure 3).

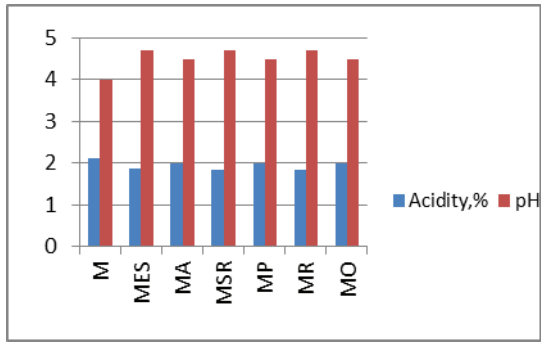

Figure 3. The acidity value of sample after maturation-dried stage

The lipid hydrolysis had a lower intensity in the case of sausages with vegetable additions and rosemary determined lowest hydrolytic degradation of lipids (1.833 oleic acid/100g).

CONCLUSIONS

The raw-dried meat products have positive sensory qualities, characteristics which are well defined. The high quality is given by safe raw and auxiliary materials, and the absence of the chemical additives.

The results obtained during 30 days of storage of raw-dried sausages showed that grape seed extract and blueberries had the highest antioxidant effect. Unsatisfactory results were obtained for raw-dried sausages with added pomegranate juice and pine seeds.

Antioxidant and antiseptic effect of natural additives was observed in all samples analyzed, compared with the control, which had the lowest peroxide value and Kreiss reaction was positive. Pine nuts and pomegranate juice were not strong enough to prevent lipid oxidation, because, even if Kreiss reaction was negative, peroxide index and acidity were higher and sensory properties were deteriorated.

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SOLANUM LYCOPERSICUM VAR. *CERASIFORME* - HARMONY AND BEAUTY

Maria Dinu[1], Rodica Soare[2], Dorina Bonea[2]

Keywords: *Cherry tomatoes, growing, flowers, fruits*

ABSTRACT

This study highlight morphological and crop characteristics to an assortment of 7 tomato cultivars type cherry. These cultivars can be grown not only for culinary properties but also for ornamental purposes, this being a "segment" insufficiently valorified nationally and even international. These cultivars are distinguished by the growing season, plant size and most obvious by the size shape and color of fruits. In addition relative to the rich content of vitamins, minerals and other active ingredients we can highlights the large number of flowers per plant (from 17.8 to 77.7) and consequently number of fruit / plant (from 13.0 for Red Lighning to 66.3 for Italy).

The assortment studied includes tomato cultivar from Romania (Camelia), from Italy (Italy) and the US (Yellow Pear, Italian Ice, Red Lighning, Honey Delight and Tumbling Tom Yellow). These cultivars have performed very well in environmental conditions of our country, considering that were grown in a cold solar and also because of the range of the vegetation period between 63 days (Tumbling Tom Yellow) and 100 days (Camelia) can form a very good selection for a familial garden.

INTRODUCTION

Tomatoes (*Solanum lycopersicum*) is the species that belongs to the Solanaceae family, which includes tobacco, pepper, eggplant, potato and physalis. Tomato is originally from Central America, on the territory of present Mexico.

They have large leaves and impair-pinnat-sected in different shades of green, the corolla are yellow, the fruits are berries of different sizes, shapes and colors. They cultivated mostly for nutritional value of the fruit riches in: sugars, protides, fat, and large amounts of vitamins A, B1, B2, K, PP and C and also for their ornamental appearance.

Cherry type tomatoes are a variety distinguished by fruit size, they are smaller and shaped like cherries. Biochemical composition very varied and sweet tasty aroma make to adapt very well to different gourmet dishes. All these tomatoes and processed tomato have led to be a key component products of the Mediterranean diet, which is recognized as being particularly heathy and strongly associated with a reduced risk of chronic degenerative diseases (Fernandez-Ruiz et al., 2011; Ray et al., 2011 and Pinel et al., 2012). Whole these

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are influenced by climatic conditions and crop technology. (Elena Dobrin et al., 2014; Rodica Soare et al., 2011).

In addition, tomatoes cherry are natural sources of vitamin A, B, C, E, K, Fe, Ca, P, Mg, Mn, K, Zn, Cu, Na, I and Co, antioxidants, fiber, folic acid and lycopene (Lenucci et al., 2006; Ray et al., 2011). But, in addition, they offer more nutrients than tomatoes with big fruit, the regularly use of cherry tomato helps maintain healthy muscles, nervous system and the health of the eyes. It favors the elimination of liquids and thanks to its low calories, are ideal for diet.

Major antioxidant is vitamin C contained in tomatoes (ascorbic acid). According to Hart and Scott (1995), the antioxidant content of tomatoes depends on many factors, especially of varieties, stage of maturity and growing conditions. After Adalid et al., 2010, vitamin C content is determined by cultivar and environmental conditions.

The content of lycopene varieties vary significantly between varieties of tomatoes; the largest content existing to varieties that fruit type cherry (Kuti and Konuru, 2005).

There are currently a large number of cultivars of tomatoes which have different morphological and sensorial thereby causing their usage (Maria Dinu et al., 2015). There are numerous studies referring to the nutritional value and antioxidant properties of these tomatoes made in the Czech Republic (Kotkov et al., 2009, 2011), France (Gautier et al., 2008), Italy (Ilahy et al., 2011), Spain (Guil-Guerrero et Rebolloso-Fuentas, 2009; Vallverdu-Queralt et al., 2012) and Taiwan (Chang et al., 2006; Juroszek et al., 2009).

In addition to the above, for tomatoes type cherry, the size, shape and attractive color of fruits makes them very recommended to be eaten with pleasure by children, facilitating their consumption.

In Europe, it has long been grown only as ornamental and exotic plants. The first tomatoes were brought to this continent were yellow and adapt very well in the Mediterranean climate. Only two decades after their introduction, the botanist Andreea Pietro Mattioli write first time about tomatoes and they considered these a new variety of eggplant. But, ten years later he also renamed them "Apples of Gold - Pomo d'Oro" term preserved until today in Italian language.

In Romania, the tomatoes came much later, in mid-XIX century. The first document written in Romanian, which commemorates the tomato is a letter of Ion Ghica (1880), at this time was ambassador to London, describing his lifelong friend Vasile Alecsandri, the ornamental tomatoes. And today, because many families migrate from the city to the country, where has a limited area of land on which they build a house and then want to consume healthy vegetables, using many varieties of tomatoes, especially those with fruit cherry; in both ornamental and edible purposes.

MATERIAL AND METHODS

Cultivars of tomato studied: Camelia F1, Italy, Yellow Pear, Italian Ice F1, Red Lighning F1, Honey Delight F1 and Tumbling Tom Yellow F1 were cultivated in a cool solar, located in the south-west of Romania (experimental fields “Banu Mărăcine” of the University of Craiova) in year 2015. They differ among themselves through: vegetation period, plant height and the size, shape and color of the fruits (see Table 1 and 2). Culture was founded in solar on May 11 according to the following flowchart: 50 + 100 (9) + 50 x 35 cm. A classical culture technology was applied to tomatoes in solar (general and special maintenance works).

Camelia F_1

Italia

Yellow Pear

Italian Ice F_1

Red Lighning F_1

Honey Delight F_1

Tumbling Tom Yellow F_1

Figure 1. Cultivars of tomato (original)

RESULTS AND DISCUSSIONS

The present study, by results raported there highligh the fact that tomatoes with fruit cherry, through their morphological and crop characters and the type of inflorescences and physical characteristics of fruit can be used successfully for both consumtion and ornamental purposes.

It is noted that, by measurements performed, for seven varieties studied, plant size ranged between 73.2 cm and 237 cm, three cultivars are above the average of variants. Plant height demonstrated that they lend themselves to various methods of support, either individual stakes in plants, either group of 3-5 plants led in pyramid form or fruit-bearing fence or pots (for variety Tumbling Tom Yellow which can be hung in terraces or balconies, see Figure 1).

In this study we made reference to the average of variants because studied cultivars are new in the culture of our country.

The diameter of the stem also had values quite different: from 11.01 mm for Tumbling Tom Yellow to 16.59 mm for Yellow Pear, which means that the plants can be carried out in many ways due to the fact that the stem is flexible and allows it.

The average number of leaves per plant ranged from 17.2 to 27.6 points out that these varieties covered very well and beautiful the space in which they are located. Also, different shades of green of the leaves (Figure 1) and their shape are factors in setting a yard or gardens. Plant leaves are 10-25 cm long, of the form pinnate-compose, 5-9 leaflets, each having up to 8 cm long, with serrated edges. Both the stem and side shoots and leaves are covered with fine hairs lighter colored and they contribute to the decorative effect of the plant. The flowers are small, about 1-2 cm, yellow, with five sepals and the corolla consists of five petals, grouped in simple or compose inflorescences with a very varied number of flowers.

Table 1

Morphological characters of Cherry tomatoes type used also for ornamental (averages)

Specification	Plant height			Plant diameter			Number of leaves		
	cm	%	± dif. as to Mt.(cm)	mm	%	± dif. as to Mt. (mm)	nr.	%	± dif. as to Mt. (nr.)
Camelia F_1	222.0	126.7	+ 46.9	14.76	103.0	+ 0.41	23.8	100.0	+ 0.5
Italia	237.0	135.3	+ 61.9	12.78	89.18	- 1.55	25.6	109.8	+ 2.3
Yellow Pear	197.3	112.6	+ 22.2	16.59	115.7	+ 2.26	27.6	118.4	+ 4.3
Italian Ice F_1	131.5	75.0	- 43.6	14.79	103.2	+ 0.46	21.2	90.9	- 2.1
Red Lighning F_1	195.2	111.4	+ 20.1	13.23	92.3	- 1.10	22.7	97.4	- 0.6
Honey Delight F_1	170.0	97.0	- 5.1	17.18	119.8	+ 2.85	25.0	107.2	+ 1.7
Tumbling Tom Yellow F_1	73.2	41.8	- 101.9	11.01	76.83	- 3.32	17.2	73.8	- 6.1
Media variants	175.1	100.0	Mt.	14.33	100.0	Mt.	23.3	100.0	Mt.

The decorative effect of these varieties of tomato is given especialy by the number of inflorescences per plant, ranged from 10.3 to 6.7 (see Table 2) and the plurality of

flowers in the inflorescence (data not shown). The highest average number of flowers on plans was recorded on the variety Italy with 77.6 flowers, followed by Camelia 56.4 flowers and then by Pea Yellow with 39.6 flowers / plant, Tumbling Tom Yellow with 38.2 flowers / plant and Honey Delight with 31.2 flower / plant. We should be noted that for Tumbling Tom Yellow cultivar the fructification is cascaded, the plant have growth determined and when is full of colored yellow lemons fruit is it irresistibly beautiful.

The fruits are very decorative by color, shape and especially by the rather large number on existing plant. And for this indicator, also, the first is the variety Italy who had 66.3 fruits / plant, followed by Camelia and Yellow Pear varieties.

Table 2

Crop characters for Cherry type tomatoes used for ornamental purposes (averages)

Specification	Vegeta -tion period (days)	No. infl ores cens	Flowers/plant			Fruit/plant		
			No.	%	± dif. as to Mt.(%)	No.	%	± dif. as to M (%)
Camelia	100	8.4	56.4	141.0	+ 41.0	54.4	159.5	+ 59.5
Italia	92	8.0	77.8	194.5	+ 94.5	66.3	194.4	+ 94.4
Yellow Pear	75	9.6	39.6	99.0	- 1.0	36.1	105.8	+ 5.8
Italian Ice	65	7.0	19.2	48.0	- 52.0	16.5	48.3	- 51.7
Red Lighning	82	6.7	17.8	44.5	- 55.5	13.0	38.1	- 61.9
Honey Delight	87	7.8	31.2	78.0	- 22.0	17.3	50.7	- 49.3
Tumbling Tom Yellow	63	10.3	38.2	95.5	- 4.5	35.1	102.9	+ 2.9
Media variants	-	8.2	40.0	100.0	Mt.	34.1	100.0	Mt.

CONCLUSIONS

In conclusion, we can say that the 7 tomato cultivars type Cherry studied behaved very well under the climatic conditions of the Banu Mărăcine. Food and ornamental value of these cultivars recommend them both for commercial as well as ornamental value because "hobby market" is beginning to be felt in Romania.

Pear-shaped fruit, from the cultivar Yellow Pear and the round shape from other cultivars enable a interleaving culture. The defining characteristics are: different forms of fruit, very attractive colors of fruits and the most important, the growing season who allow a very long time consumption and aesthetic a very pleasant garden.

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STUDIES AND RESEARCH ON ESTABLISHING THE LENGTH OF ORNAMENTAL ATTRIBUTES IN VEGETABLE SPECIES CULTIVATED ON GREEN WALLS

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Keywords*: ornamental traits, vegetables, duration*

ABSTRACT

In order to determine the decorative qualities of some vegetable species grown in urban green walls it is important to establish the length of duration plants prove ornamental traits proportional to the time spent in these structures. Depending of desired characteristics certain species obtained percentages superior to others - Beta vulgaris L. var cicla L > 85 %, Lactuca sativa > 80 %, Solanum lycopersicum > 65 %, Phaseolus vulgaris < 40 %, Cucumis sativus < 35 %. These results lead to the conclusion that it is necessary to have a very good selection of vegetable species used when the main interest is aesthetic.

INTRODUCTION

The urban area has an increasing population in Romania, which cannot be accommodated but in larger build area. This fact is creating more problems to the environment, at an ecological and a social level, by lacking an eco-friendly approach to building technologies and local sources of necessary food (Viljoen et al., 2005). In the search of a solution to both these problems green walls appear to be a good option, by restoring a healthy way of living and offering the possibility of growing one's own food (Cockrall-King, 2012). Aside from these, green walls cultivated with vegetables can have an aesthetic side which can be accomplished by the usage of the right species and cultivars (Blanc,2008). This paper presents an experimental approach to establishing the length of the duration in which plants prove ornamental traits proportional to the time spent in green walls. As the technology is a fairly new one, beside the practical side of the cultivation of vegetables, an aesthetical side could ease the introduction on a large scale in cities. To sustain such an ideal case, a correct array of vegetable species should be selected and this is one of the direction in which this experiment goes, by searching different species in correlation to their capacity to have ornamental traits for a long period during their cultivation time. The loss of ornamental qualities by incidents (pests, diseases, environmental stress factors) will not be taken into consideration as being too variable.

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MATERIAL AND METHODS

The experimental green wall was set up in Bucharest, on a west oriented exterior wall of a building, which is shadowed by another building and is receiving a limited amount of direct solar radiation, between 6 and 7 hours in the middle of the summer season. The green wall consists in 6 rows of 6 felt pockets (see Figure 1), filled with growing medium and planted with vegetable species which have ornamental value.

Figure 1. The green wall with felt pockets.

Among other used species this paper will take into account only 5 of them: *Beta vulgaris L.* var cicla, *Lactuca sativa*, *Solanum lycopersicum*, *Phaseolus vulgaris*, *Cucumis sativus*. All of them have some strong ornamental traits such as leaf, stem, flower and fruit form and color and were planted in the form of seedlings (see Figure 2).

Figure 2. The display of some of the used seedlings.

Planting was executed in 08.05.2015 and the resulted plants were harvested at full maturity for their species. Weekly measurements were done and also the display was photographed for undertaking aesthetical evaluations of all decorative aspects.

RESULTS AND DISCUSSIONS

The analyzed measurements were performed during April, May, June, July, August and September 2015. The obtained values could be observed as very different due to the mass of the existing vegetables on the wall during the cultivation time, as they had different lengths of cultivation period (see Figures 3, 4 and 5).

Figure 3. The green wall with the undeveloped vegetables immediately after planting, photographed from above.

Figure 4. The green wall in an intermediate stage of developing.

Figure 5. The green wall with the fully developed vegetables.

The lenght of cultivation and lenght of the ornamental period were obtained as an average of dates mesured from several plants of the same species, planted in the same day. The species with decorative leaves began their ornamental period soon after planting and they kept it throught the entire season, but the ones that have decorative flowers or fruits had gaps in ornamental phases during growing season.(see Table 1).

Table 1

Percentage of the ornamental period during the length of cultivation for some vegetable species cultivated on a green wall

No.	Cultivated species	Length of cultivation on green wall	Length of the ornamental period	Percentage of the ornamental period during cultivation
1	Beta vulgaris L. var. cicla	150	130	87%
2	Lactuca sativa	55	45	81%
3	Solanum lycopersicum	150	100	67%
4	Phaseolus vulgaris	60	23	38%
5	Cucumis sativus	60	20	33%

Analysing the results we can see that it is an obvious correlation between the presence of an organ on the plant and the decorating qualities of it. This develops the ideea that for a small area it's best to choose those cultivars of the wanted species that have ornamental traits as much as possible.

CONCLUSIONS

During the cultivation we have obtained the percentages for the length of ornamental period for several species: Beta vulgaris L. var cicla L > 85 %, Lactuca sativa > 80 %, Solanum lycopersicum > 65 %, Phaseolus vulgaris < 40 %, Cucumis sativus < 35 %. As this paper is trying to establish which of the used species have a better ornamental behavior cultivated on a green wall we can conclude that the best efficiency is the one of the species with ornamental foliage as those have an almost double period of decorating than the ones that have ornamental flowers or fruits. In this case, for having different species it's better to cultivate side-to-side species with different ornamental traits so they can overlap their ornamental periods.

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SELECTION OF VALUABLE GENOTYPES OF *ROSA CANINA* L. IN THE EASTERN AREA OF CRAIOVA

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Keywords*: Rosa canina, selection, biotypes, vitamin C*

ABSTRACT

In the Banu Maracine area, situated in the South-East of Craiova (Romania), there are numerous genotypes of Rosa canina L.; they have abvious diversity related to the phenology, bushes vigor, size, colour and shape of the rosehips and the seeds. Twenty two biotypes were selected. Seeds were harvested from each selected genotypes and sowed in the selection field belonging to the University of Craiova and Faculty of Agriculture and Horticulture. Out of the selected biotypes BM 24 selection registered the highest value related to the C vitamin content (831 mg/100g) and selection BM 11, BM 24, BM 48, and BM 70 have presented high values of fruit flesh (over 60%). The selected biological material might be considered important genetic resource for breeding rosehip useful for pharmaceutical and food industry.

INTRODUCTION

The current trend at consumer level is oriented towards identifying and use of healthy and natural products based on local natural resources. Present paper has the aim to propose wild rose as potential source of such products.

Wild roses are included into the group of plant species, which are harmful to agricultural land. As consequence of development of pharmaceutical, agricultural and forestry science, the wild rose was reconsidered as a stabilizing factor in case of soil erosion and valuable source for vitamins. Its flowers are used for preparing syrups, and even perfume, etc.

Wild rose known also as dog-rose (*Rosa canina* L.) belongs to the *Rosaceae* family, subfamily R*osoideae* subfamily, *Rosa* genus. It is a shrub found in the spontaneous flora, with a height between 1 and 5 m. The stem is covered with small barbs, pointed and hook-shaped. The leaves are pinnate, with 5 to 7 leaflets. The flowers are usually pink, but genotypes with white or pink-reddish flowers are also present. The flowers have 4-6 cm in diameter and five petals. The false fruit is called hip, has rounded ellipsoidal or pear-shaped form and red or dark orange skin (Sârbu et al., 2013).

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The area of distribution of dog-rose is located throughout Europe, including Scandinavia, up to 62° latitude in the North.

Rosa canina is a very variable species, with different features, Woll - Dod was able to identify over 60 botanical varieties and forms (Wagner 2002).

Dog-rose is appreciated for its fruits rich in vitamin C with beneficial effects on human health (Demir and Özcan, 2001; Kazaz, 2009; Neţoiu et al., 2008). In addition to the content of vitamin C, rosehip may contain: 4.1g % total protein, 24.6 % carbohydrates, 3.25% minerals, 5-7 mg % carotene and 12.9 - 35.2 mg/100 g lycopene (Brasovan et al, 2011, Barros Lillian, 2011).

Also, dog-rose fruits are considered natural sources of antioxidants having a high antioxidant potential (Yilmaz Ozturk, 2011; Orhan et al., 2009). Soare et al. (2015) identified genotypes high in polyphenols (48.07 mg GAE/g), flavonoids (6726.7 mg/100g) and antioxidant activity (μmTE 363.64 / g sp.).

A study on variability of dog-rose fruits was carried out by Gheorghiță et al. (2012) in the local populations located in Bacau, Neamț, and Vrancea counties from Romania. The genotypes analyzed showed high variability in terms of density of fruit / plant, shape, size, color and biomass, as well as vitamin C content of fruits.

Soare et al. (2015) conducted studies on *Rosa canina* populations from southwest Oltenia - Romania. The research activity was focused on the morphological and biochemical characteristics of dog-rose fruits.

In Turkey, Günes (2013) performed a study of pomology and phenological characteristics of 11 genotypes belonging to wild rose populations chosen from Tokat region in North Anatolia. The plants were propagated by cuttings and planted in 2000 at the Horticultural Research Station of the department of Gaziosmanpasa University in Turkey. Fruit characteristics and phenological observations were recorded in the years 2006 - 2007. The fruit weight varied from 2.3 g to 5.1 g , the proportion of fruit pulp ranged between 66.0 and 80.2 %, average fruit seeds ranged between 12.8 and 35.6 , the content of vitamin C was varied between 190 and 1223 mg / 100 g dry matter and soluble ranged from 15.3-26.0 %. The results confirmed that some of the selected genotypes, such as MR - 12 MR - 15, MR - 26, MR - 84 YL - 04 have been recommended for cultivation and qualification for certification.

Celik et al. (2009) studied the characteristics of promising genotypes of *Rosa* sp. from Van region in Turkey. The study was conducted on more than 5000 plants of which 26 were selected. Fruit weight, fruit length and fruit width were evaluated. These characteristics varied from 1.79 - 4.95 g, 15.28 – 33.83 mm and 13.11 to 19.26 mm, respectively. The content of soluble substance ranged from 17.73 % to 28.45 %. Ascorbic acid levels ranged from 517 - 1.032 mg/100 ml.

Taking into account the abundance of this species in Romania, present study was focused on selection of valuable dog-rose genotypes near Craiova for preservation and use in future rose breeding programs.

MATERIAL AND METHODS

The biological material consists in 1000 genotypes of *Rosa canina* L. located in several areas of Banu Mărăcine, near Craiova - Romania. Out of these, 22 were selected, tagged and tracked through the growing seasons of 2013 and 2014.

Phenology was recorded as long as main morphological characters. At fruit ripening time main biometrical data was recorded (length and width of fruits, thickness of flesh) and fruit content in vitamin C.

Statistical calculation was used for data collected in 2013 and 2014. Mean, variance, standard deviation and coefficient of variation were determined using Microsoft® Excel software (Botu et al., 2010).

In 2014 fruits were harvested from each dog-rose selection and seeds were collected in order to sow them in the hybrid selection plot. For the same selections cuttings for propagation were harvested.

RESULTS AND DISCUSSIONS

The research work carried out revealed great diversity inside the dog-rose population located in the Banu Mărăcine area, both in terms of phenology, morphology of the flowers and fruits (Figure 1, Figure 2) and fruit chemical composition. In terms of phenology great diversity in terms of flowering time, the date and time of fruit ripening was observed (Table 1).

The data presented show precocity in case of BM 42, BM 79 and BM 60 biotypes. Most biotypes bloomed from 2nd to 7th of May while BM 23 and BM 24 biotypes presented late blooming.

Fruit ripening took place from 25th of July till 18th of August while fruit maturation period happened from 17th till 29th of September.

Morphological characters were observed and measurements carried out concerning: fruit length, width and thickness of fruit flesh. Data was statistically processed and the results are shown in Table 2.

Mean fruit length recorded values between 1.39 cm at selection BM 79 and 3.18 in case of BM 24 selection. Similar values were registered in the Van region in Turkey by Celik (1.52-3.38 cm). In case of fruit width mean values were between 0.95 cm for BM 29 and 1.80 cm for BM 12 and BM 57 selections. Gheorghe et al. (2012) obtained values between 1.18 cm (Mija genotype) and 1.68 cm (Gheorghieni genotypes). Flesh thickness varied from 1.39 mm in case of BM 16 and 2.89 mm for BM 11. Arsenescu (2009) recorded values for flesh thickness between 2.0 and 2.4 mm, with an average of 2.2 mm.

Data from table 2 reveals that BM 33, BM 42, BM 59, BM 78, BM 14, BM 16, BM 24 and BM 60 selections present uniformity with regard to fruit length, the coefficient of variance being below 10%. High variability showed BM 25, BM 29 and BM 48 selections, with coefficients of variation of 25.35%; 21.32% and 20.10% respectively. Gheorghiță et al. (2012) recorded values of the coefficient of variation between 6.01% and 14.07% in case of fruit length

The shape index was determined for fruits as ratio between length and width as long as fruit weight, fruit flesh yield (%) and Vitamin C content in order to identify the valuable dog-rose biotypes (Table 4). The length / width ratio oscillated from 1.06 to 2.86. Soare et al. (2014) have found that length / width ratio range between 1.44 and 2.41.

Concerning the fruit weight, high values over 2.50 g were recorded in case of BM 33, BM 79, BM 25, BM 43 and BM 53 selections while for BM 12, BM 16, BM 35, BM 48 and observed values between 2.3 and 5.1 g. Similar results were found by Soare et al. in 2014 in case of other selections from Oltenia region from Romania, the fruits ranging from 0.77 g to 2.81g.

Ratio between fruit flesh and seeds had values above 60 % in case of BM 7, BM 11, BM 14, BM 16, BM 24, BM 21, BM 48 and BM 60 selections.

The lowest values were recorded in case of BM 42 and BM 78, with values of 47.82 and 49.88% respectively. Günes (2013) give values between 66.0 and 80.2% in case of dog-rose genotypes from Tokat region of Turkey.

BM 60 ones fruit weight did not overpass 1.50 g. The highest value in terms of fruit weight was recorded for BM 25 selection, its fruits had 2.68 g in average Günes (2013).

Vitamin C content varies between 443 and 831mg /100g fresh fruit flesh. The highest values were recorded in case of BM 24, BM 78, BM 12, BM 16, BM 23, BM 35, BM 43 and BM 53 selections, with values over 600 mg /100. For BM 11, BM 59, BM 14, BM 21, BM 27, BM 48 and BM 60 selections the values were below 500 mg /100 fresh fruit flesh. Soare et al. (2014) observed in case of some dog-rose genotypes from Oltenia vitamin C contents ranging between 423 mg/100 g and 639 mg/100g. Celik et al. (2009) recorded vitamin C values between 190 and 1223 mg/100g for dog-rose varieties in the Van region of Turkey.

CONCLUSIONS

BM 24 dog-rose selection recorded the highest value content in vitamin C (831 mg/100 g), this genotype could be used in future breeding programs as potential genetic resource.

The BM 11, BM 24, BM 48 and BM 70 selections proved to be rich in fruit flesh yield, and for this reason they can be recommended to be used in the food industry for making jams, jellies, etc.

Selection work carried out at Banu Mărăcine location had positive results; valuable genotypes with useful traits have been identified and might be used into a potential dog-rose breeding program.

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Table 1

Phenological data of Banu Mărăcine dog-rose selections recorded in the 2013-2014 period

Dog-rose selection		Phenophases					
		Blooming time		Fruit ripening		Fruit maturation	
		2013	2014	2013	2014	2013	2014
1	BM7	2.05	5.05	26.07	28.07	22.09	25.09
2	BM11	2.05	4.05	26.07	29.07	21.09	23.09
3	BM 33	3.05	6.05	07.08	10.08	22.09	24.09
4	BM 42	28.04	30.04	29.07	02.08	19.09	23.09
5	BM57	3.05	6.05	26.07	28.07	23.09	25.09
6	BM59	5.05	7.05	08.07	10.07	24.09	26.09
7	BM78	4.05	5.05	07.08	09.08	23.09	25.09
8	BM79	28.04	2.05	30.07	02.08	17.09	19.09
9	BM12	2.05	5.05	01.08	04.08	21.09	25.09
10	BM14	2.05	5.05	26.07	29.07	22.09	24.09
11	BM 16	3.05	7.05	26.07	30.07	24.09	27.09
12	BM 24	6.05	9.05	16.08	18.08	27.09	29.09
13	BM 25	2.05	6.05	27.07	30.07	21.09	24.09
14	BM 23	3.05	8.05	07.08	12.08	23.09	26.09
15	BM 21	3.05	5.05	26.07	28.07	22.09	24.09
16	BM 27	3.05	4.05	28.07	29.07	21.09	23.09
17	BM 29	2.05	4.05	26.07	28.07	20.09	22.09
18	BM 35	3.05	5.05	26.07	29.07	23.09	25.09
19	BM 43	4.05	7.05	07.08	10.08	24.09	27.09
20	BM 48	2.05	5.05	26.07	28.07	22.09	24.09
21	BM 53	2.05	6.05	25.07	27.07	21.09	23.09
22	BM 60	29.04	30.04	30.07	2.08	19.09	24.09

Table 2

Variability of main biometrical characteristics of dog-rose selections from Banu Mărăcine

Dog-rose selections	Fruit length (cm)	Coefficient of variation (s %)	Fruit width (cm)	Coefficient of variation (s %)	Flesh thickness (mm)	Coefficient of variation (s %)
BM 7	2.09±0.20	9.69	1.12±0.09	8.20	2.10±0.16	7.78
BM 11	1.97±0.28	13.96	1.46±0.12	8.04	2.89±0.11	3.81
BM 33	2.64±0.20	7.40	1.28±0.09	7.20	1.89±0.12	6.30
BM 42	1,66±0.16	9.50	1.44±0.13	8.80	1.73±0.16	9.50
BM 57	2.30±0.29	12.51	1.80±0.20	11.15	2.20±0.16	7.19
BM 59	2.06±0.16	7.99	1.21±0.11	9.10	1.53±0.20	13.09
BM 78	2.45±0.22	8.87	1.38±0.12	8.91	2.23±0.21	9.23
BM 79	1,39±0.16	11.48	1.31±0.07	5.63	1.88±0.10	5.49
BM 12	2.30±0.28	12.25	1.80±0.26	14.64	2.20±0.16	7.19
BM 14	2.16±0.14	6.62	1.49±0.10	6.67	2.13±0.21	9.91
BM 16	2.60±0.21	8.23	1.26±0.12	9.32	1.39±0.14	10.13
BM 24	3.18±0,26	8.09	1.11±0,12	10.79	2.44±0.20	8.24
BM 25	2.42±0.62	25.53	1.58±0.28	17.85	1.90±0.19	10.06
BM 23	2.69±0.31	11.55	1.23±0.14	11.53	1.98±0.13	6.65
BM 21	2.54±0.28	11.01	1.21±0.12	9.90	2.04±0.19	9.30
BM 27	2.16±0.23	10.74	1.40±0.23	16.15	2.04±0.28	13.71
BM 29	1.78±0.38	21.32	0.95±0.18	18.73	1.47±0.29	19.78
BM 35	2.49±0.27	10.78	1.41±0.14	10.28	2.42±0.37	15.44
BM 43	3.07±0.51	16,75	1.57±0,20	12.76	2.75±0.32	11.78
BM 48	2.01±0.40	20.10	1.24±0.18	14.82	1.97±0.41	20.87
BM 53	2.33±0.28	11.89	1.63±0.13	8.21	2.83±0.18	6.46
BM 60	1.76±0.14	8.11	1.18±0.12	10.20	2.48±0.39	15.86

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Table 3

The main morphological features selections of rosehips fruits and seeds

Dog-rose selection	Fruit shape	Colour of	
		Fruits	Seeds
BM 7	ellipsoidal	red	cream
BM 11	ellipsoidal	red	cream
BM 33	elongate-ellipsoidal	red orange	cream
BM 42	ellipsoidal	red	cream
BM57	piriform-shaped	red	cream
BM 59	piriform-flattened	dark red	cream
BM 78	piriform-flattened	red orange	cream
BM 79	elongate-ellipsoidal	dark red	cream
BM 12	piriform-flattened	dark red	cream
BM 14	tronconic piriform	red	purple
BM 16	flattened round	dark red	cream
BM 24	elongate-ellipsoidal	orange	cream
BM 25	ellipsoidal	orange	purple
BM 23	ellipsoidal	red intens	cream
BM 21	elongate-ellipsoidal	red orange	cream
BM 27	elongate-ellipsoidal	dark red	purple
BM 29	ellipsoidal	orange	cream
BM 35	piriform	dark red	cream
BM 43	ellipsoidal	red orange	cream
BM 48	ellipsoidal	orange	cream
BM 53	ellipsoidal	red	cream
BM 60	elipsoidal	dark red	cream

Table 4

Fruit shape index, weight, flesh yield and vitamin C content of Banu Mărăcine dog-rose selections

Dog-rose selections	Fruit shape index (length/width)	Fruit weight (g)	Fruit flesh yield (%)	Vitamine C content (mg/100g)
BM7	1.86	2.26	70.76	563
BM11	1.35	1.96	65.80	426
BM 33	2.06	2.61	57.66	513
BM 42	1.70	2.15	47.82	558
BM57	1.77	2.35	56.57	521
BM59	1.27	2.21	51.71	432
BM78	1.44	1.98	49.88	690
BM79	2.06	2.72	51.65	519
BM12	1.15	1.46	58.05	656
BM14	1.27	2.17	61.42	420
BM 16	1.06	1.29	62.07	770
BM 24	2.86	2.10	73.29	831
BM 25	1.95	2.68	59.32	530
BM 23	1.53	2.35	57.62	638
BM 21	2.18	1.63	64.18	437
BM 27	2.09	1.61	54.68	491
BM 29	1.54	1.71	54.78	598
BM 35	1.87	0.85	52.82	632
BM 43	1.76	2.67	42.29	697
BM 48	1.62	1.35	67.68	493
BM 53	1.42	2.99	54.26	659
BM 60	1.49	1.38	60.78	443

Figure 1. Fruits of BM 24 dog-rose (*Rosa canina* L.) selection.

Figure 2. Fruits of BM 25 dog-rose (*Rosa canina* L.) selection.

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DEVELOPMENT AND STABILITY STUDY OF VITAMIN D FORTIFIED ORANGE JUICE

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Keywords: *orange juice; stability; fortified food; HPLC; vitamin D deficiency*

ABSTRACT

Vitamin D insufficiency is common in many countries and is associated with increased incidence of serious diseases. Main source of vitamin D is synthesis on the skin with the action of sunlight as nutrition with non-fortified foods does not usually contain enough vitamin D to ensure sufficiency. However since large population groups are not regularly exposed to sunlight, vitamin D insufficiency has become an epidemic. The use of fortified foods for addressing vitamin D insufficiency is a necessity. Orange juice is consumed by relatively large proportion of the population and thus is suitable for fortification. A type of fresh orange juice fortified with vitamin D_3 was developed. This type of fortified juice can be produced by fresh pasteurized juice and is kept refrigerated throughout its suggested shelf life of two weeks. The fortification of the juice is done with a water dispersible formulation of vitamin D_3. The stability of vitamin D in the juice was determined at 1, 2, 6 and 20 days after production. Analytical methodology with the use of HPLC was developed and used for the stability study. Vitamin D remains sufficiently stable in the juice during the shelf life of the product, thus this juice is a good source of the vitamin. The developed vitamin D fortified juice, along with other fortified foods and beverages, is suitable for addressing vitamin D insufficiency.

INTRODUCTION

Vitamin D is a prohormone that plays an important role in the absorption and metabolism of calcium and phosphorus and is involved in several cell functions including maturation and proliferation. There is evidence that vitamin D deficiency is associated with increasing risk of several common serious disorders including osteoporosis, cardiovascular diseases, diabetes, infections and the incidence of several solid tumors, such as breast, colon and prostate cancer (Holick, 2004, Christakos et al, 2013, Wacker et al, 2013).

Vitamin D exists in two distinct forms, ergocalciferol (vitamin D_2) and cholecalciferol (vitamin D_3). Main source of vitamin D in humans is the conversion of 7-dehydrocholesterol to vitamin D_3 in the skin with the action of solar radiation whereas diet consists a limited source of vitamin D, with the exception of some oily fish such as salmon, cod liver oil and sun-dried mushrooms (Wacker et al, 2013). However, due to modern

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lifestyles and concerns about the dangers of sun exposure, a large percentage of the world's population is vitamin D deficient or insufficient (Brouwer-Brolsma et al, 2013). Sub-clinical vitamin D deficiency is quite common in large population groups even in sunny countries like Greece. Previous studies from our laboratory showed that in Greece 47% of adolescents have serious vitamin D deficiency during winter while corresponding figures have been reported for the adult population and in other Mediterranean countries, revealing that the lack of vitamin D in Greece and worldwide is a modern epidemic (Moulas et al, 1997, Lapatsanis et al, 2005). The fortification of foods with Vitamin D arises as a necessity for addressing deficiency (Lapatsanis et al, 2005, Cashman et al, 2014, Cashman et al, 2015).

During the 20th century, fortification of dairy products with vitamin D in some countries contributed to eradication of rickets (Biancuzzo et al, 2010). In countries like the USA, programs for enrichment of foods with vitamin D, especially milk, have been successfully implemented. However, fortified milk is not alone enough for preventing vitamin D insufficiency, due to relatively high prevalence of lactose maldigestion in ethnic groups like Asians, blacks and Native Americans (Holick et al, 1992; Simoons et al, 1978; Zeiger et al, 2000) and probably due to the insufficient amount that is used for fortification. Fresh pasteurized juice is a good candidate beverage for fortification with vitamin D, since it is consumed by relatively large population groups and vitamin D from fortified orange juice has been shown to be bioavailable (Tangpricha et al, 2003).

The vast majority of existing fortified juices are either prepared from concentrate and/or are of the long-life type that are sterilized in high temperature. There is a type of juice that is prepared from fresh orange juice, pasteurized at lower temperature and is kept refrigerated throughout the shelf-life. These juices are considered of better quality and have an increasing popularity between the consumers. In the present study we describe the development of a juice of this category fortified with vitamin D that is produced from fresh pasteurized juice. Analytical methodology for the measurement of vitamin D content with the use of High Performance Liquid Chromatography was developed and the stability of vitamin D in juice was studied.

MATERIALS AND METHODS

Reagents: Vitamins D_2 (ergocalciferol) and D_3 (cholecalciferol), KOH, sodium ascorbate, ethyl ether, petroleum ether 40-60, absolute ethanol and HPLC grade solvents (acetonitrile, methanol) were purchased from Sigma-Aldrich.

Preparation of orange juice: Vitamin D_3 was added in the orange juice under aseptic conditions in the form of a water dispersible formulation. The product was mixed and examined for homogeneity. The vitamin D content of the juice that is intended for commercial distribution was 200 International Units (IU) per 240 mL (1 IU=0.025 ug). During development and for the stability study, the preparation of juice with vitamin D concentrations up to 10000 IU per 240 mL was tested successfully, in terms of homogeneity and stability.

Stability study: For the stability study, orange juice with a vitamin D_3 content of 1.000 IU (25 ug)/100 mL was prepared as described above. The vitamin D_3 content of the juice was determined immediately after preparation (0 days) and after 1, 2, 6 and 20 days. The determination of vitamin D in juice was done by High-Performance Liquid Chromatography (HPLC) with UV detection as described below.

Vitamin D analysis: Orange juice samples (10.0 mL) were mixed with 1 mL of internal standard solution containing 1000 ng/mL vitamin D_2 and 3 mL of a 10% w/v sodium ascorbate solution as antioxidant. Each sample was saponified overnight in the dark

at ambient temperature with 15 mL of an alkaline KOH solution (16% w/v KOH in 80% v/v ethanol in water) under continuous stirring. The saponified solution was extracted successively twice with 15 mL ethyl ether and 15 mL petroleum ether. The organic extracts were collected, mixed together and washed at least three times with deionized water until the washing water was not alkaline. The washed organic extract was evaporated with a rotary evaporator until almost dry and the residue was diluted with 1 mL of a 70:30 v/v mixture of acetonitrile and methanol and filtered with 0.2 um syringe filter. 10 uL of the sample was injected into the HPLC system.

Chromatography was conducted on an Agilent 1100 HPLC system (Agilent Technologies, Palo Alto CA, USA) consisting of a G1379B degasser, a G1312A binary pump, a G1329A autosampler, a G1316A variable temperature column section a G1314A UV detector and Chemstation software for data acquisition and processing. A Thermo C_{18}, 250x4.6mm column was used. The injection volume was 100 uL. The elution was isocratic with a mixture of acetonitrile: methanol 30:70 by volume at a flow rate 1mL/min and the detection was made at 265 nm. The elution times for vitamins D_2 and D_3 were determined with injection of pure standards diluted in the elution solvent mixture. The two forms of vitamin D were well separated and their retention times were 15.9 and 17.2 minutes respectively.

Initial vitamin D_2 and D_3 stock solutions were prepared by dissolving each form of vitamin D in absolute ethanol. The concentrations of the stock solutions were confirmed with the use of a spectrophotometer based on the molecular extinction coefficients. Aliquots of the stock solutions were diluted with ethanol to give the working standard solutions with nominal concentration of 1000 ng/mL. For the calibration curve, the working solutions were dissolved in a solvent consisting of 70% methanol - 30% acetonitrile by volume, to obtain the following concentrations: 20, 50, 100, 150, 200 and 250 ng / mL. The standards were injected in triplicate and the average peak heights were used for the standard curve. The method was linear in the range examined (r^2=0.999). The limit of detection the chromatographic method was 15 ng/mL and the limit of quantification was 45 ng/mL. These limits correspond to concentrations of 1.5 ng/mL and 7.5 ng/mL respectively in the juice samples after correction for the concentration during the extraction procedure.

RESULTS AND DISCUSSIONS

Preparation of orange juice: Several methods for preparing the fortified juice and different vitamin D formulations were tested. The parameters that were examined were the raw material, the time of the addition and the form of the added vitamin D.

Both regular and concentrated pasteurized juices were tested as base raw materials. Diluted juice was prepared under aseptic conditions by diluting concentrated orange juice with deionized water. The initial concentrated product had a sugar content of 65 brix that corresponds to 7 times concentration of the regular juice. Fresh pasteurized juice was used without any other treatment. Both types were found to be suitable for fortification. The purpose of the present study however was to develop a fresh fortified juice that would allow the local industry to take full advantage of the prolonged period of orange production in Greece and also to have a superior quality raw material. For this reason, regular fresh non-concentrated pasteurized orange juice was used for further study.

Orange juice is available in the market in several types that may differ in several aspects including the raw material used (concentrated or non-concentrated juice), the pulp content, the way of homogenization and pasteurization (heating, ultra high pressure or combination). Two major types, namely refrigerator juices and long-life juices, are

dominant in several European markets. The difference between these two types is the temperature and conditions of pasteurization. Long-life juices are sterilized in higher temperature and for longer times and packaged in aseptic conditions in order to prolong the shelf-life in ambient temperature. Refrigerator juices are pasteurized in lower temperatures and for this reason they have a shorter shelf-life and need to be refrigerated.

We have chosen to develop a product that is conserved in the refrigerator at a nominal temperature of 4 degrees Celsius, with a shelf life of approximately 20 days. This type of juice is quite popular in Greece and elsewhere. With this approach, vitamin D can be added either before or after the pasteurization. The addition of vitamin D after the pasteurization under aseptic conditions minimizes the losses of the vitamin during the production process and helps maintain the desired concentration in the product.

The addition of a fat soluble vitamin in a water-based product represents a technical challenge. Vitamin D is commercially available in different forms that include solid crystalline, oily solutions and water-dispersible formulations. Tangpricha et al (2003) have reported the use of vitamin D fortified juice in a bioavailability study, but the method of preparation of the juice was not disclosed (Tangpricha et al, 2003). We used a water-dispersible formulation containing starch and gum for the fortification of the juice. This formulation was easily dispersed in the juice and the resulting product was quite homogenous.

Analysis of vitamin D and stability in orange juice: A method for the determination of vitamins D_2 and D_3 in orange juice was developed. The sample preparation involves saponification at ambient temperature in order to minimize losses and is followed by liquid extraction with ethyl ether and petroleum ether. This extraction method was an adaptation and modification from the official AOAC method 992.26 (AOAC, 1999). Vitamin D_2 is used as internal standard for determination of vitamin D_3 and vice versa. Using this approach the result can be corrected for the recovery of the vitamin during the extraction process. The chromatographic system used achieved a very good separation of the two forms of vitamin D in a single run within 20 minutes using isocratic elution thus avoiding the complexity of gradient elution. Figure 1 shows a typical chromatogram of orange juice containing vitamin D_3.

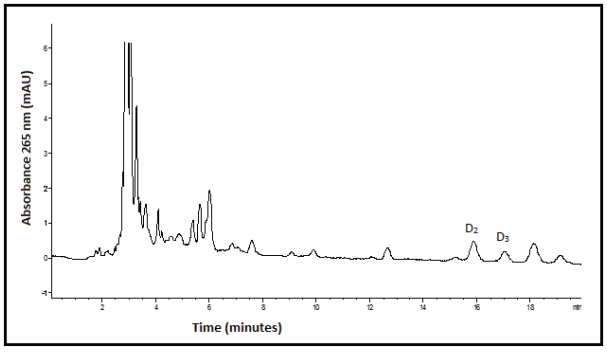

Figure 1: Typical chromatogram of the HPLC determination of vitamin D_3 in orange juice. Peaks for vitamin D_3 that was contained in the juice and vitamin D_2 that was used as internal standard are shown

A peak for vitamin D_2 that was used as internal standard is also shown in the chromatogram. The developed analytical method is simple, accurate, sensitive and easy to

implement with essential chromatographic equipment that is available in almost every laboratory that uses HPLC.

Stability of vitamin D in orange juice: Orange juice was analyzed for vitamin D_3 content immediately after fortification and after 1, 2, 6 and 20 days. This period exceeds the proposed shelf-life of the product, which is two weeks. According to our results, vitamin D is quite stable in the orange juice for at least 20 days at 4°C despite the relatively low pH (~3.5) of this product. At 1 and 2 days, 100% of the added quantity was determined in the juice, while at 6 and 20 days the remaining percentage was 96% and 92% respectively. The results of the stability study are presented in figure 2.

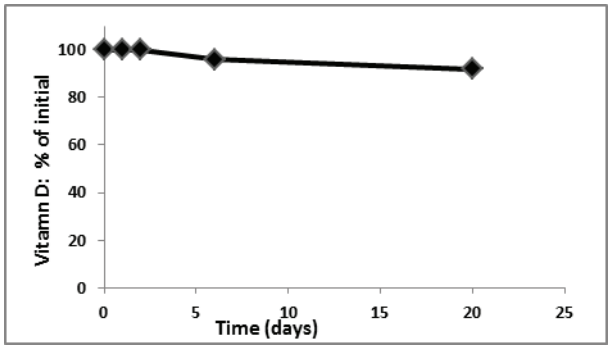

Figure 2: Stability of vitamin D_3 in fortified juice. The vitamin D content of juice was determined by HPLC immediately after fortification (day 0) and after 1,2,6 and 20 days. Values represent the average of duplicate measurements

Use of fortified orange juice for addressing vitamin D deficiency: Recent studies have shown that fortified orange juice with 1000 IU/240 mL vitamin D for 12 wk resulted in 25(OH)D_3 concentrations increase in adults, representing a potential promising source of vitamin D for a significant proportion of population who is lactose intolerant (Tangpricha et al, 2003). Biancuzzo et al. have demonstrated that vitamin D_2 and vitamin D_3 are equally bioavailable in orange juice and capsules (Biancuzzo et al, 2010). In a randomized controlled school-based trial study calcium-vitamin D-fortified milk was shown to be as effective on circulating bone biomarkers as fortified juice and supplement but had less acceptance (Neyestani et al, 2014). A fresh pasteurized orange juice fortified with vitamin D has been developed and the vitamin D stability during the shelf-life has been evaluated. This type of juice has an increasing popularity amongst consumers and, along with other fortified foods and beverages, can be used for addressing vitamin D deficiency.

CONCLUSIONS

A method for preparation of fresh pasteurized orange juice fortified with vitamin D was developed and the stability of the vitamin in the juice was studied with a chromatographic method that was developed for this purpose. The stability study demonstrated that vitamin D in the enriched orange juice remains relatively stable during a period of 20 days. The developed vitamin D fortified juice, along with other fortified foods, can be used for achieving vitamin D sufficiency.

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AMPELOGRAPHIC CHARACTERISTICS OF CANDIDATE-CLONE MUSCAT OTTONEL ILV 7-46

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Key words*: vine, Muscat Ottonel, clone, ampelographic characteristics*

ABSTRACT

During the period 1998–2011 at the Institute of Viticulture and Enology - Pleven comprehensive researches were carried out of selected clones of Muscat Ottonel variety. On the basis of the obtained results one candidate clone was identified - Muscat Ottonet clone ILV 7-46, that was proposed in 2015 for review and approval by Executive *Agency for Variety Testing, Field Inspection and Seed Control. Muscat Ottonel clone ILV 7-46 is a medium ripening variety. Grapes reach technological maturity in early September (04.09.). The clone has a medium large cluster (12,5/8,1 cm), cylindrical-conical or conical, with a well-shaped wing, semi-compact. The average mass per cluster is 156,1 g. The vines are of average growth, very good fertility and productivity. Muscat Ottonel clone ILV 7-46 accumulates enough quantity of sugars - 20.60 % at titratable acidity – 6.24 g/dm^3. Wine from clone ILV 7-46 has fine, pleasant muscat aroma, with moderate freshness; it is dense and harmonious.*

INTRODUCTION

Muscat Ottonel variety was selected in 1852 by Robert Moreau from seed of unknown parents in France (Viala et Vermorel, 1909; Constantinesku et al., 1960). In Bulgaria by the end of 1950s, it was grown in ampelographic collections and private vineyards in Dobrudzha (Kondarev et al., 1962; Katerov, Kostov, 1964; Katerov, Donchev, 1968). After the zoning of viticulture in the country (Stoev et al., 1960), it was started the establishment of commercial plantations, first in Shumen region, and later in other vine-growing regions in the country.

The studies carried out by Kondarev (1975), Mihaylov (1977) and Simeonov et al. (2015) showed that Muscat Ottonel variety had a great inter-varietal diversity due to the occurring mutational changes under the influence of various stressors. The variations found differed mainly in the cluster size and density (from very loose to semi-compact), in berry size (from small to medium), in degree of putting forth catkins, intensity of sugars accumulation and the amount of titratable acidity in the grapes. The negative variations

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significantly reduced yield and grapes quality. That necessitated the improvement of some economic indicators of Muscat Ottonel variety by the method of clonal selection.

During the period 1998 – 2014 at the Institute of Viticulture and Enology - Pleven comprehensive researches were carried out on agro-biological indicators and technological qualities of a set of selected clones of Muscat Ottonel variety. On the basis of the obtained results it was identified and proposed in 2015 for testing by the Executive Agency for Variety Testing, Field Inspection and Seed Control for distinguishing, homogeneity and stability one candidate-clone Muscat Ottonel ILV 7-46.

The objective of the study is to present full ampelographic characteristics of the candidate-clone Muscat Ottonel ILV 7-46.

MATERIAL AND METHODS

The comparative study and full ampelographic description of candidate-clone Muscat Ottonel ILV 7-46 was carried out in the period 1998 – 2014 in the clonal section of the Experimental Base at the Institute of Viticulture and Enology – Pleven, according to the approved methodology for clonal selection in the country (Katerov 1990). The population of Muscat Ottonel variety was used for control.

The clonal section was established in 1990 with certified vines grafted to Shasla x Berlandieri 41B rootstock. The vines were planted at a distance of 3.00/1.30 m and grown with Umbrella training system. Mixed pruning was performed on the vines with equal loading – 32 winter eyes (6 spurs of 2 eyes and 2 fruit canes of 10 eyes).

Phenological observations and botanical description was made of Muscat Ottonel clone ILV 7-46. The actual fertility indicators were accounted. The dynamics of sugars accumulation was followed during the phase of "grapes maturing". The indicators of yield and grapes quality were recorded during grapes technological maturity. Mechanical analysis of grapes was made for finding out the structure and composition of the cluster and berry.

At the experimental cellar IVE - Pleven 30 kg grapes from the candidate-clone and the variety population were processed from each vintage according to the classical technology for the production of dry white wines by the method of microvinification (Yankov, 1992). Physical-chemical analysis of wine was made by the conventional methods in enology (Ivanov, 1979) and organoleptic evaluation according to the 20-score scale.

RESULTS AND DISCUSSIONS

Origin. Muscat Ottonel clone ILV 7-46 was obtained by the method of clonal selection at the Institute of Viticulture and Enology- Pleven.

Incidence. Muscat Ottonel clone ILV 7-46 is spread in the clonal collection at the Experimental Base of the Institute of Viticulture and Enology – Pleven.

Botanic description

Young shoot. Crown is green, with copper red hue and rare pappuses. The first, second and third leaves are intensively copper red in colour, and the fourth and fifth ones - green with copper red hue and spread pappuses. The shoot is burgundy, sometimes green, almost bare.

Mature shoot. Internodes are long, medium thick. The bark is light-brown, ridged.

Developed leaf. Leaf blade is medium to small, five-lobed, sometimes tri-lobed, slightly net-like wrinkled, almost bare on top with pappuses on the bottom veins. The top side notches are medium deep, often closed, with elliptical opening, sometimes open, lyre-shaped. The bottom side notches are shallow, open, in the form of a sharp angle or barely

noticeable and the leaf blade seems tri-lobed. The stem notch is open, with narrow elliptical opening. The top teeth are medium-sized, with broad base, sharp while the end ones are small, with broad base transiently dome-like. The veins are green on both sides, average protruding. The autumn colour is yellow.

Inflorescence. Androgynous, with 5 stamens.

Cluster. Cluster is medium big (13.4/8.1 cm; its length varies from 12.3 cm to 15.4 cm, the width from 7.6 cm to 8.6 cm), cylindrical-conical or conical, with one well-shaped wing, semi-compact. The average mass of a cluster is 156.1 g.

Berry. Berry is medium big (14.81/14.66 mm; its length varies from 14.56 mm to 15.00 mm, the width from 14.38 mm to 15.00 mm). The average mass of 100 berries is 224.6 g.

Agrobiological characteristics

Vegetation period. Muscat Ottonel clone ILV 4-74 is medium ripening white wine grapevine variety. Grapes reaches technological maturity at the beginning of September – 04.09., and depending on the weather conditions of the year it varies from the end of August (21.08.) to mid September (16.09.). The vegetation period duration is about 155 days. Blossoming starts on 26.05. (22 - 28.05.), while the beginning of grapes maturation – on 24.07. (14.07. – 01.08.) , Table 1.

Table 1

Phenological observations of Misket Ottonel clon ILV 7-46 for 1998 – 2011 periode

Start of flowering	Start of softening of berries	Technological ripeness
date	date	date
26.05	24.07	04.09

Growth strength. Vines have medium growth strength.

Fertility and yield. Muscat Ottonel clone ILV 7-46 is characterized by very good fertility. With Umbrella stem training system, the ratio of developed winter eyes is 80.55 % (from 70.83 % to 89.58 %) and of fruit shoots – 85.69 % (from 83.95 % to 87.21 %) from which 28.04 % (from 20.59 % to 40.98 %) had 1 cluster, 55.95 % (from 49.18 % to 61.33 %) - 2 clusters and 16.00 % (from 9.84 % to 22.06 %) - 3 clusters. The fertility ratio is high - 1.64 per developed and 1.91 % per fruit shoot. The average yield with that training is 6.473 kg (from 5.134 kg to 7.740 kg) (Table 2).

Table 2

Actual fertility indices of Misket Ottonel clon ILV 7-46 for 1998 – 2011 periode

Developed winter buds	Fruiting shoots:				Fertility coefficient of:	
	total	with 1 cluster	with 2 clusters	with 3 clusters	developed shoot	fruiting shoot
%	%	%	%	%		
80.55	85.69	28.04	55.95	16.00	1.64	1.91

Putting forth catkins and milerandage. During the period of the study it was not found liability to putting forth catkins and milerandage.

Disease resistance. The clone is susceptible to downy mildew and powdery mildew. Grapes are rarely damaged by grey rot because of its early ripening.

Agrotechnical characteristics. High yield and quality grapes is obtained from Muscat Ottonel clone ILV 7-46 under mixed pruning (6 spurs of 2 eyes each and 2 fruit canes of 8-10 eyes), total 28 - 32 winter eyes.

Suitable rootstocks. Muscat Ottonel clone ILV 7-46 grows well and have good fruit-bearing capacity grafted to rootstocks Shasla x Berlandieri 41 B and Berlandieri x Riparia CO4.

Response to environmental conditions. Muscat Ottonel clone ILV 7-46 is characterized by good cold resistance. At extremely low winter temperatures (-20 – -23°C), recorded in the Pleven region in the period 14 – 18.01.2004, it was found that 62.67 % of the main and 51.56 % of the substitute buds in the winter eyes were damaged. Consequently the ratio of developed winter eyes during the vegetation season was 55.33 % and of the fruit shoots – 67.09 %. The actual fertility ratio and yield during that year was mainly determined by the shoots of 1 (51.67 %) and 2 clusters (48.33 %). There were no developed shoots with 3 clusters. The fertility ratio was 1.11 per developed and 1.61 per fruit shoot.

Technological characteristics

Grapes mechanical composition. In the mechanical composition of the cluster Muscat Ottonel clone ILV 7-46 is a typical wine variety, having high content of solid fraction in the berries. The rachis ratio in a cluster is 3.52 % (from 2.80 % to 4.64 %), of the berries – 96.48 % (from 97.20 % to 95.36 %). Skin content in the berry is 7.10 % (from 5.96 % to 8.13 %); of seeds – 3.36 % (from 3.06 to 3.72 %) and of mesocarp – 89.54 % (from 88.81 % to 90.95 %). The theoretical output is high – 86.39 % (from 85.39 % to 88.40 %) (Table 3 and 4).

Table 3

Mechanical analisis of cluster of Misket Ottonel clon ILV 7-46 for 1998 – 2011 periode

Mechanical analisis of cluster					Yield per vine
weight	length	width	rachis	berries	
g	cm	cm	%	%	kg
156.1	13.4	8.1	3.52	96.48	6.473

Table 4

Mechanical and chemical analisis of berry of Misket Ottonel clon ILV 7-46 for 1998 – 2011 periode

Mechanical analisis of berry						Theore-tical yield	Sugars	Titratable acids
100 berries weight	length	width	skins	seeds	flesh			
g	mm	mm	%	%	%	%	%	g/dm^3
224.6	14.81	14.66	7.10	3.36	89.54	86.39	20.60	6.24

Must chemical composition. The grapes of Muscat Ottonel clone ILV 7-46 accumulates enough sugars – 20.60 %, with good titratable acidity – 6.24 g/dm^3, which determines pleasant freshness of wine. Depending on the weather conditions of the year, the sugars content varies from 19.50 % to 22.70 %, and the titratable acids from 5.43 g/dm^3 to 6.88 g/dm^3 (Table 5).

Table 5

Physical and chemical analysis of dry white wine of Misket Ottonel clon ILV 7-46 for 1998 – 2011 periode

Indexes	Misket Ottonel clon ILV 7-46
Alcohol, %	12.30
Sugars, g/dm^3	1.19
Titratable acids, g/dm^3	5.77
Volatile acids, g/dm^3	0.64
Ph	3.12
Sugar-free extract, g/dm^3	19.13
Phenolic substances, g/dm^3	0.138
Tasting assessment	75.70

CONCLUSIONS

General assessment of the variety. Muscat Ottonel clone ILV 7-46 is a medium ripening white wine variety. It was obtained by the method of clonal selection at the Institute of Viticulture and Enology – Pleven. Cluster is medium big (12.5/8.1 cm), cylindrical-conical or conical, with a well-shaped wing, semi-compact. Berry is average big (14.81/14.66 mm). Vines are of average growth, not liable to putting forth catkins and milerandage. It is susceptible to the fungal diseases powdery mildew and downy mildew. Vines have good resistance to low winter temperatures. Muscat Ottonel clone ILV 7-46 grows well and have good fruit-bearing capacity grafted to rootstocks Shasla x Berlandieri 41 B and Berlandieri x Riparia CO4. The clone accumulates enough sugars while preserving higher titratable acidity. Grapes are suitable for the production of high quality white wines with Muscat aroma. Its good cold resistance allows it to be grown on different training systems in all vine-growing regions within the country.

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EFFECT OF PLANT GROWTH RETARDANTS ON VEGETATIVE GROWTH OF CHINESE HIBISCUS PLANTS

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Keywords: *Hibiscus rosa sinensis* L., *propagation, Cycocel, foliar treatments*

ABSTRACT

The plant height control, the production of branched, compact, vigorous plants with a uniform growth of shoots and a more intense colouring of the leaves are very important aspects in the production of ornamental plants, so it is necessary to apply growth retardants in order to produce plants with a particularly commercial aspect.

The paper aims to present the results of research on vegetative propagation and the determination of the Hibiscus rosa sinensis L. plants response, which were obtained from cuttings, to Cycocel 0.1% (1,000 ppm) and Cycocel 0.3% (3,000 ppm). The best results in terms of the rooting percentage and the rooted cuttings quality were obtained in the perlite substrate. The results show that the foliar treatments with Cycocel caused the reduction of plant height and of leaves size, which had a dark shiny green colour, enhancing the decorative plants appearance. The effect of Cycocel was more pronounced on the plants treated with a concentration of 0.3%.

INTRODUCTION

Hibiscus rosa sinensis L. (Chinese hibiscus), from the Malvaceae family is an ornamental shrub, 1.5-3 m tall, native to tropical Asia. It has persistent, oval, alternate, glossy leaves, 10-15 cm long, with margins more or less toothed. The large, solitary flowers are funnel-shaped and short-lived, however, occur in stages throughout the summer, sometimes almost throughout the year. There are many varieties, cultivars and hybrids, with single or double flowers and a wide range of colours - white, pink, red, yellow, orange, violet and various combinations of shades. The flowers are edible and used for culinary purposes, being very nutritious and rich in vitamins and minerals (Yashaswini et al., 2011).

The Chinese hibiscus propagates vegetatively by shoot tip cuttings, during spring or fall. The cuttings root in 4-5 weeks in a substrate made from a mixture of peat and perlite or peat and sand, under optimum conditions of temperature and humidity and treatment with rooting biostimulators (Wells, 1985; Carpenter, 1989; Wang & Skytt Andersen, 1989; Bertram, 1991; Kamruzzaman & Quadir, 1998; Shadparvar et al., 2011; Torkashvand & Shadparvar, 2012; Yang et al., 2012).

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In many hybrids and varieties commercially available, the propagation is done by grafting because it is difficult by cuttings due to the fact they hardly root (Scott, 1975; Kelety, 1984; Bayly, 1989). *In vitro* culture (Christensen et al., 2008; Airo et al., 2009) and air layering are vegetative propagation methods less used for this species.

In order to produce quality plants with proper commercial aspects, treatments are applied with some retardant substances in various concentrations that affect the plant growth and development, leading to: obtaining small plants by reducing the elongation of the stem (Criley, 1981; Maus, 1987; Wang & Gregg, 1989, 1991; Papafotiou & Tzortzinis, 2001; Warner & Erwin, 2003; Yu Shuzhong et al., 2011); stimulation of branching and uniform growth of shoots, the plants being more compact (Gogoláková & Štrba, 2009); earlier flowering, formation of a greater number of flowers and flower buds per plant (Ahmad Nazarudin, 2012); darkening the leaves colour due to the increased content of chlorophyll pigments (Wilkins & Kotechi, 1982; Yu Shuzhong et al., 2012); increase of the plant tolerance to stress during handling and transport (Mackay & Sankhla, 2006); reducing the infestation degree by reducing the populations of major pests - aphids, whiteflies, mites and diseases severity (Chase et al., 1987; Chase, 1988; Osborne & Chase, 1990).

The paper presents the results obtained on vegetative propagation and the effect of Cycocel treatments on the growth of *Hibiscus rosa-sinensis* L., ornamental species with flowers, highly appreciated for its ornamental value and used in the decoration of interiors, terraces and balconies or located in the gardens during summer. The Chinese hibiscus has a medical importance too being used to treat many diseases. The researches have shown that the flowers, leaves and roots of the plant have therapeutic properties (Venkatesh et al., 2008; Soni & Gupta, 2011; Ruban & Gajalakshmi, 2012; Pekamwar et al., 2013; Khan et al., 2014; Patel, 2014).

MATERIAL AND METHODS

The biological material was formed of cuttings from plants of *Hibiscus rosa sinensis* L. from the collection of the Floriculture discipline from the Faculty of Agriculture and Horticulture of Craiova, grown in pots in the greenhouse.

In March, shoots were harvested from mature plants, from which there were formed cuttings that have been treated with Radistim to stimulate the rooting and then they were planted in three substrates such as: sand, a mixture of peat and perlite (1:1), and perlite, the rooting substrate temperature being of 20-22^{0}C.

The rooted cuttings were planted in pots with a diameter of 12 cm, in a substrate made of peat and perlite (2:1) in May 2013. Two weeks after planting in pots, Cycocel (CCC) foliar treatments were apllied in various concentrations, the experimental variants being: V_1 - control plant (water); V_2 - Cycocel 0.1% (1,000 ppm); V_3 - Cycocel 0.3% (3,000 ppm). There were apllied three treatments at intervals of two weeks and there were done ordinary maintenance works for plants.

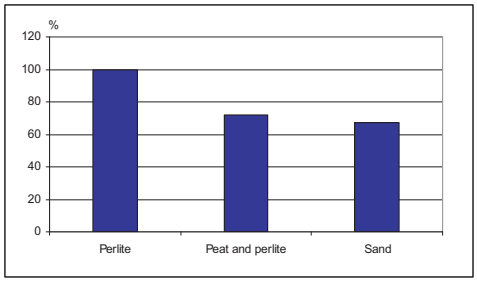
During 6 months from the experiment placement, there were noticed the rhythm of vegetative growth under the influence of applied treatments. The taken observations and measurements regarded: the average height of the plant, the average number of internodes, the average number of shoots, the average number of leaves per plant, the average length and width of the leaves, in order to assess the effect of treatments with Cycocel on the process of *Hibiscus rosa sinensis* L. plants growth.

RESULTS AND DISCUSSIONS

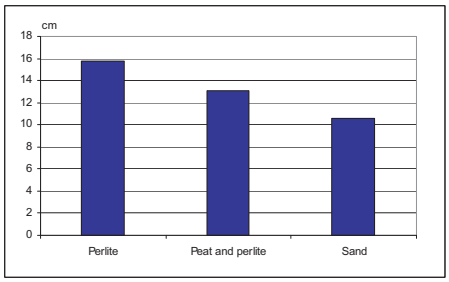
Regarding the vegetative propagation, there was found that the rooting percentage appreciated after 60 days from the cuttings harvest and planting in the rooting substrate was

100% in perlite, 72% in the substrate formed from a mixture of peat and perlite and 67% in sand (graph 1). The perlite substrate had a positive impact both on the rooting percentage of the cuttings, and on the the root system and on the length of the rooted cuttings. The average length of rooted cuttings ranged between 10.6 cm in sandy substrate and 15.8 cm in perlite (graph 2).

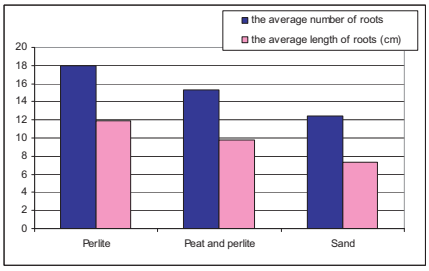
Regarding the average number of formed roots, the best results were obtained from the rooted cuttings in perlite (18.0) and the lowest value (12.5) was recorded by the rooted cuttings in the sand. The average length of roots was different depending on the rooting substrate of cuttings, with values ranging between 7.3 cm in sand and 11.9 cm in perlite (graph 3).



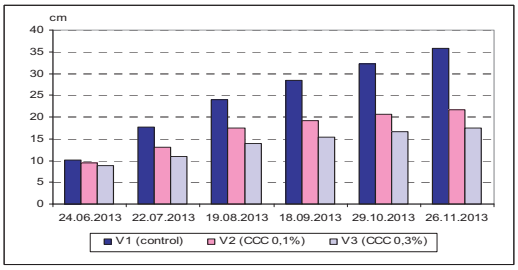
Graph 1. Percentage of rooting



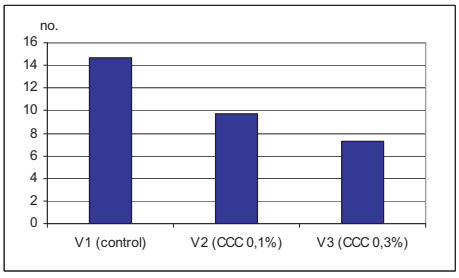
Graph 2. The average length of rooted cuttings



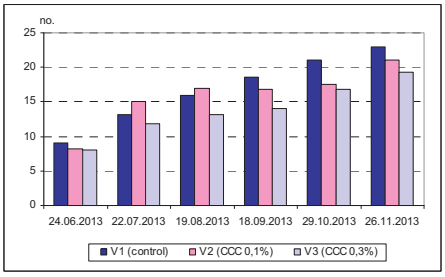
Graph 3. The influence of substrate type on rooting of the cuttings



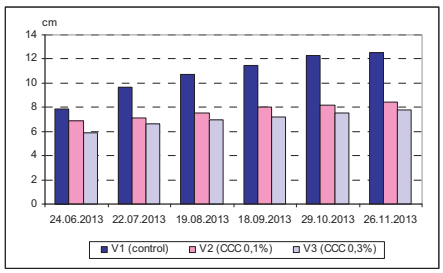
Graph 4. The average height of plants



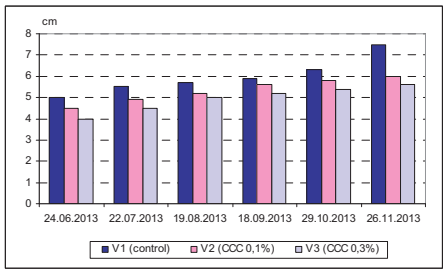
Graph 5. The average number of internodes



Graph 6. The average number of leaves/plant



Graph 7. The average length of the leaves



Graph 8. The average width of the leaves

The results show that for the *Hibiscus rosa sinensis* L. species, the Cycocel foliar treatments caused the reduction of plant height, which had a slow growth throughout the evaluation period of the applied treatments influence. At the end of experiment, the lowest values of the average plant height were recorded at V_3 - Cycocel 0.3% (17.5 cm) and the highest value (35.8 cm) was recorded at control plants (graph 4).

The average number of internodes was lower in the treated plants, the highest value being recorded at control plant (14.7) and the lowest value at V_3 - 7.3 (graph 5).

The Cycocel did not stimulate the branching of the plants and shoots did not form during conducting the experiment, the plants were not pinched after planting in pots. The number of shoots contributes to the increase of the plant quality and the degree of plant branching depends on the Cycocel treatment in combination with pinching. It is required the repeated pinching of the plants in order to stimulate plant branching, after that Cycocel treatments are applied, for the production of plants with high decorative properties.

The average number of leaves per plant was not affected by the treatments with Cycocel, finding similar values in all the variants, ranging between 19.3 and 23.0 (graph 6).

The Cycocel action on the leaves size was produced by their decrease in the treated plants compared to the control plant. The graphs 7 and 8 show that the lowest values regarding the average size of the leaves were recorded at V_3 - Cycocel 0.3% (7.8 cm long and 5.6 cm wide), followed by V_2 - Cycocel 0.1% with very small differences, and the highest values at V_1 - control plant (12.5 cm long and 7.5 cm wide).

CONCLUSIONS

The rooting percentage of cuttings was 100% in the perlite substrate, which had a positive influence on the root system and on the length of the rooted cuttings.

The Cycocel foliar treatment effect was manifested at *Hibiscus rosa sinensis* L. species by reducing the plant height and leaf sizes, being more pronounced in plants where concentrations of 0.3% were applied, and where the lowest values were recorded.

Intensification in the colour of leaves was observed at the plants treated with Cycocel compared with the control plants, indicating an increase in the content of chlorophyll pigments. The leaves were thicker, dark green, shiny, the plants having a highly decorative aspect.

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STUDY REGARDING THE MEASUREMENT OF CARROTS ANISOTROPY

Paduret S.*[1], Gutt Gh.[1]

Keywords: *hardness, anisotropy, carrot, perpendicular, parallel*

ABSTRACT

This paper presents the influence of boiling time (15, 20, 25, 30 and 35 minutes) on the anisotropic properties of carrot samples. The coefficient of anisotropy (Ka) is influenced positively by the time of boiling. Both perpendicular and parallel hardness and perpendicular and parallel mechanical works are negatively correlated with carrot anisotropy. The analysis of variance ANOVA showed a significant difference between the perpendicular hardness and parallel hardness ($P<0.05$) measured with three different penetration devices, the disc with 50 mm diameter and the spherical penetrometer with 10 mm diameter are the appropriate devices to highlight the carrot anisotropy.

INTRODUCTION

Food texture represents all the mechanical geometric and surface properties of a food product or raw materials, being one of the most important attributes used by consumers to assess the food quality (SR ISO 11036:2007, ISO 5492 – 2008).

Studying the texture of food is important in assessing the strength of a product to mechanical stress, such as mechanical harvesting of fruits and vegetables, to determine the resistance to deformation of products subject to processing, transport and storage, or to determine the mechanical behavior of a food when it is consumed (Chen & Opara 2013).

The texture of vegetables is often related to the structure and composition of the cell wall, but also related to other factors, including cell morphology, size, shape, cell content and turgor pressure (Olivera et al. 2013). Among the texture characteristics of fruit and vegetables, hardness is one of the most important parameters (Oroian et al. 2015).

The measurement of food hardness (firmness) is generally performed by puncture tests where the compression force is determined as the function of the deformation, force–distance curve (Jha et al. 2013, Lana et al. 2007).

Carrots are valuable raw material in fruit and vegetable processing because they are rich in nutrients, but their roots causes a number of technical problems due to specific morphological structure, high hardness and firmness, compared with other vegetables. It is quite difficult to follow structural changes in the carrot root and its texture because it is

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composed of morphological parts (phloem and xylem) which differ in microscopic structure (Budrewicz et al. 2005).

A problem in food texture measurement is represented by food anisotropy; some foods are isotropic whereas other foods are anisotropic. For isotropic foods it does not matter in which direction it is tested, but for anisotropic foods it is essential always to test the food from the same direction (Bourne 2002). Food products of animal origin (meat) show a pronounced anisotropy while vegetable products shows a moderate anisotropy due polyhedral cells form (Bulancea et al. 2006).

The objective of this study was to highlight the importance of sampling direction in texture measurement and to measure the carrot anisotropy. To the author knowledge no other study related to anisotropy measurement has been reported.

MATERIAL AND METHODS

The carrots were purchased from a local producer near Suceava (Romania), all of them had the same shape and size with a diameter of 50 mm each. After washing and cleaning the carrots were cut into pieces (greater than 30 mm) and placed in boiling water. The carrot samples were boiled for: 15, 20, 25, 30, 35 minutes and after they have cooled were cut in cubes with sides of 30 mm.

The hardness (*H)* measurement was carried out with a texturometer Mark 10, (Mark 10 Corporation, USA) with a loading speed of 10 mm·min^{-1}, fitted with 100 or 500 N load cell, using compression discs with 50 mm diameter, a spherical penetrometer with 10 mm diameter and a cone penetrometer with vertex angle of 60°; the penetration depth was 5 mm. The hardness was express as the ratio of the strength (*F*) and penetration depth (*h*). The mechanical work was calculated as the area under the force-deformation curve (figure 2) (Amariei et al. 2015, Gutt et al. 2014).

$$H = \frac{F}{h} \tag{1}$$

Another destructive test used in this study to highlight the carrot anisotropy was the creep test. For analysis was used a creep method without preload, stress time was 1000 seconds and the weight stress was 1300 g (Paduret & Gutt 2015).

To measure the carrots anisotropy was built and patented an optoelectronic measuring device figure 1, which measures the unevenness of the carrot sample deformation in two directions perpendicular to each other during the stress of compression and transform through specialized software that deformation values in a coefficient of anisotropy (K_a). For the anisotropy measurement the carrot samples were compressed 5 mm with a disc with 50 mm diameter (Amariei et al.2013).

$$K_a = \frac{P_{a+b}}{P_{c+d}} \geq 1 \tag{2}$$

Where: P_{a+b} - the highest amount of two opposing ellipse segments; P_{c+d} – the lower amount of the other two opposing ellipse segments.

All the determinations were made in perpendicular and parallel direction to growing sense and each measurement was taken 3 times.

Statistical analysis.

The Pearson correlation has been made up using SPSS 13 (USA) and the analysis of variance (ANOVA) test ($\alpha = 0.05$), with the least significant testing difference (LSD) was carried out using the Statgraphics Centurion softwere XVII.

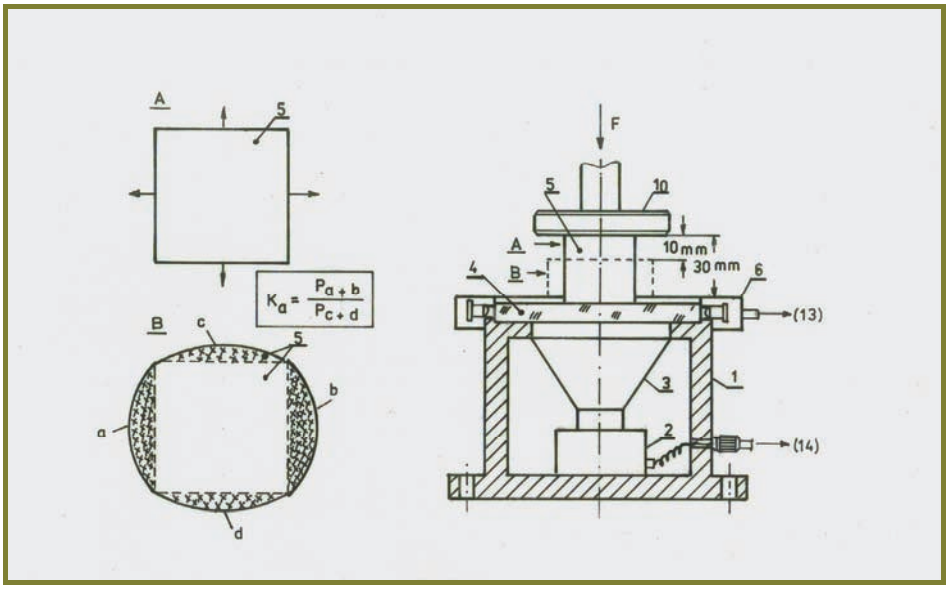

Figure 1. Device for determining the food anisotropy: 1-metal box, 2- video camera, 3- capture and shielding con, 4- thick glass disc, 5- food sample, 6- ring of LEDs, 10- compression discs, 13- electronic power source, 14- PC (Amariei et al.2013).

RESULTS AND DISCUSSIONS

Most of the food products and also the raw materials have a higher or lower degree of anisotropy, which leads to errors in measuring the food texture parameters. Food anisotropy was highlighted too by Ak, M. M., & Gunasekaran, S, on the mozzarella cheese (Ak, & Gunasekaran, 1997), but the anisotropy was not measured.

In table 1 are presented the hardness and mechanical work values of carrots samples measured with three different penetrometers on two directions: perpendicular and parallel. High hardness values were recorded by the 50 mm disc (52.78 N/mm) and the lowest values were measured with the cone penetrometers (0.84 N/mm). All the carrot strength (hardness) decreases with the boiling time (figure 2) because in case of fruits and vegetables the thermal processing causes a significant degradation of pectic substances resulting in a reduced intracellular adhesion and therefore lowers hardness (Olivera et al. 2013).

Pearson correlation, indicates a significant positive correlation between all the hardness values and mechanical work ($p<0.01$) and a negative correlation between all the hardness values and mechanical work measured by these three penetrating devices and boiling time ($p<0.01$). The textural characteristics of the perpendicular creep tests (penetration depth and mechanical work of compression) are correlated positively with the boiling time ($p<0.01$) and negatively with all the hardness values and mechanical work ($p<0.05$).

The anisotropy coefficient of carrots samples and the textural characteristics of the perpendicular and parallel creep tests are shown in table 2. The carrot sample with the highest coefficient of anisotropy was the one subjected to boiling for 30 minutes (K_a =1.136).

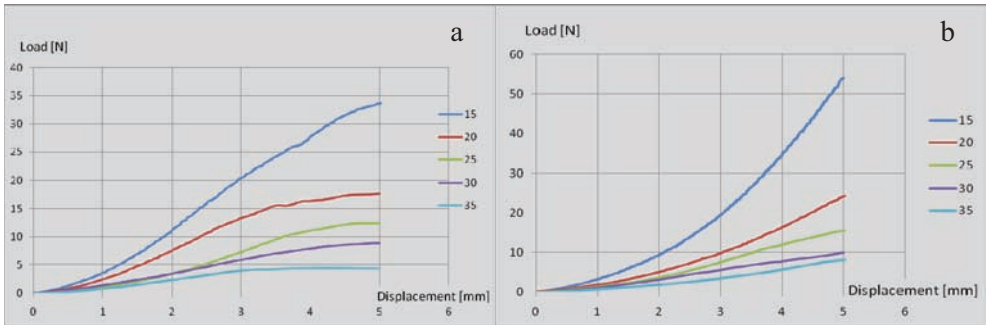

Figure 2. Typical force-deformation curve obtained with spherical 10 mm penetrometer: a-parallel b-perpendicular

Table 1

The variation of carrot hardness and mechanical work depending on the direction of testing: perpendicular and parallel

	Boiling time	Perpendicular hardness [N/mm]	Parallel hardness [N/mm]	Perpendicular mechanical work [N·mm]	Parallel mechanical work [N·mm]	ANOVA	
						F	P
Cone	15	2.006±0.03	1.942±0.268	16.26±0.92	12.25±1.54	2.29	0.204
	20	1.532±0.109	1.684±0.28	11.51±=1.01	8.759±1.91	0.09	0.781
	25	1.332±0.08	1.328±0.116	8.96±0.92	6.98±0.52	0.34	0.592
	30	1.15±0.186	1.008±0.09	7.15±0.82	5.23±0.62	1.76	0.254
	35	0.928±0.09	0.84±0.102	5.68±0.53	3.42±0.45	4.36	0.105
Sphere	15	10.226±0.628	6.498±0.767	91.13±2.25	79.61±1.38	102.72	0.0005
	20	4.448±0.582	3.646±0.806	46.2±1.99	48.36±1.71	10.34	0.03
	25	3.218±0.215	2.242±0.626	32.27±0.85	29.37±1.35	44.56	0.002
	30	2.024±0.311	1.748±0.282	22.82±0.53	23.25±0.37	64.63	0.001
	35	1.635±0.077	1.228±0.205	15.69±0.12	13.78±0.95	22.56	0.009
Disc	15	52.78±0.628	47.4±1.98	449.5±2.87	362.5±2.05	96.34	0.006
	20	35.4±0.246	33.08±1.02	263.7±1.53	251±0.99	35.43	0.004
	25	26.16±0.68	23.76±0.58	212.3±1.02	207.2±0.87	58.36	0.001
	30	16.1±1.58	11.52±0.98	174.9±1.35	100.48±1.21	130.65	0.0003
	35	9.04±0.87	7.1±1.02	87.93±0.98	61.2±1.35	41.91	0.002

* Values are the average of triplicates ± standard deviation

A positive Pearson correlation is between carrots anisotropy, boiling time respectively penetration depth and mechanical work of perpendicular creep test ($p<0.05$).

The values of hardness and mechanical work measured with cone penetrometer, spherical penetrometer and disc both parallel and perpendicular are negatively influenced by the carrot anisotropy ($p<0.01$).

Table 2

The coefficient of anisotropy and the characteristics of the carrot creep tests

Boiling time	K_a	Creep test			
		Perpendicular penetration depth [mm]	Parallel penetration depth [mm]	Perpendicular mechanical work [N·mm]	Parallel mechanical work [N·mm]
15	1.041±0.01	2.23±0.31	2.38±0.45	1863±0.59	2238±0.98
20	1.069±0.01	2.53±0.40	1.76±0.03	1991±0.58	1603±1.23
25	1.084±0.01	3.95±0.68	2.27±0.45	3005±1.02	2180±0.65
30	1.136±0.01	6.27±1.41	3.26±0.60	4133±1.89	2981±0.87
35	1.111±0.02	6.51±1.31	4.455±1.88	4901±1.67	3432±1.05

* Values are the average of triplicates ± standard deviation; K_a - the coefficient of anisotropy

In figure 3 is presented a typical anisotropy measurement of carrot samples boiled for 20 minutes.

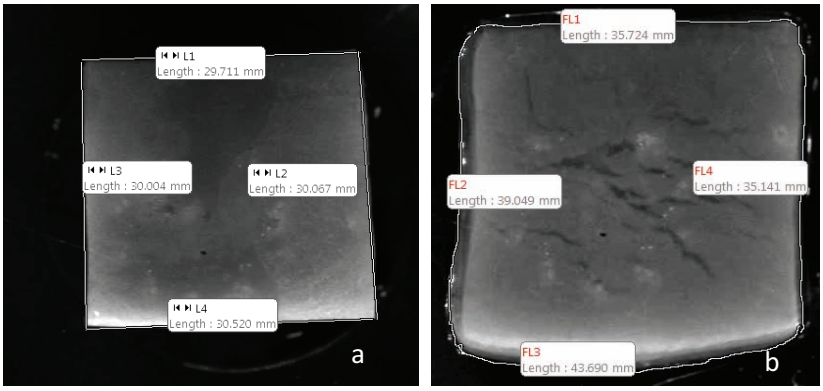

Figure 3. The carrot sample used for measuring the coefficient of anisotropy: a- prior compression, b-after compression

The hardness values strengthened by the results of ANOVA analysis (Table 1) showed that the testing direction is very important in hardness measurement, there was significant difference between perpendicular and parallel hardness. The most appropriate testing devices used to emphasize the fact that carrots hardness (texture parameters) varies with the direction of the sample testing parallel or perpendicular (anisotropy) were the disc with 50 mm diameter ($P<0.006$) and the spherical penetrometer with 10 mm diameter ($P<0.03$).

CONCLUSIONS

The carrot samples analyzed in this study displayed a hardness values and an anisotropy coefficient influenced by the boiling time.

From all methods used for hardness, mechanical work and penetration depth measurement only the disc and spherical penetrometer showed that the mechanical properties of carrot varies with the testing direction, respectively that the carrot is anisotropic. The perpendicular hardness measured with disc and spherical penetrometer is significantly different compared to the parallel hardness ($p < 0.05$).

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Technologies, 20(3), 257-262.

*** - ISO 5492 - 2008 Senzory analysis - Vocabulary

*** - SR ISO 11036:2007 Analiza senzorială. Metodologie. Profil de textură.

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EFFICIENCY OF FRUITLET THINNING APPLE „GOLDEN REINDERS" BY USE NAD AND ETHIPHON

Pesteanu Ananie[1]

Keywords*: Thinning, NAD, Ethiphon, yield, size classes.*

ABSTRACT

The experimental plot is placed in the orchard "Codru-ST" Ltd. founded in 2009 with trees of a „knip boom" canopy type. The study subject of the experience was Golden Reinders apple variety grafted on rootstock M 9. The distance of plantation is 3.5 x 1.2 m. The research was conducted during the period of 2012 year. The tested agents were NAD (Geramid-New) and Ethiphon (Cerone 480SL), which was sprayed in different thinning period. During the research, it was studied the yield, mean fruit weight, average fruit diameter, the number of first class fruits. It was established that, in the 2012 year the spray with Geramid-New in dose 1.5 l/ha when 80% of the petals have fallen + 2-3 days, or Cerone 480SL in dose 0.4 l/ha at 10 - 20 days after full flowering have a significant effect on yield, mean fruit weight and on the distribution of apples in size classes.

INTRODUCTION

'Golden delicious' and its clones was one of the most popular and commercially important apple cultivars in Moldova where it makes up about 20% of the national crop (Babuc et al. 2013, Cimpoieş 2012, Pesteanu 2013).

The chemical fruit thinning is one of the major agro-technical measures recommended in horticulture, which influences the differentiation bud fruiting, excludes alternation phenomenon and allows to obtain high yields, consistency and quality (Babuc et al. 2013, Cimpoieş 2012, Green 2002, Pesteanu 2013, Stopar 2000).

The traditionally products used worldwide to thinning apples are NAD, ANA and BA, following which can be recorded favorable results. However, there are times when these preparations efficacy depends on weather conditions during treatment and how menus flowering trees. These products sometimes cause a strong thinning of fruits and fruit production can be jeopardized that year (Denis 2000, Greene 1993, Pesteanu 2014, Robinson et al. 1998, Tromp 2000).

The use of fruit thinning product with another active ingredient, also allows designing and developing strategies for chemical thinning for different varieties. One of these active ingredients is ethephon, which can be recommended for chemical thinning of fruits (Stopar et al. 2007, Widmer et al. 2008).

The main advantages of ethephon are that it greatly improves return bloom and

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that it can be applied over a longer period. The treatment with ethephon is recommended in dose of 0.3 to 0.6 l/ha (Widmer et al. 2008). Ethephon can be applied in 3 phases: status of the white balloon, when the first flowers are open; when king fruits have 8-12 mm diameter, 10 – 20 days after flowering; the fruits have a diameter 20 - 22 mm (Stopar et al. 2007, Pfammatter et al. 2000, Widmer et al. 2008).

However, the thinning effect of ethephon can vary considerably depending on the temperature. Ethephon gives inconsistent results and can even cause over thinning (Wertheim 2000). For these reasons, it is not approved for use in many countries (Link 1986)

The scientific novelty of the results is that for the first time in Republic of Moldova are trying recommending chemical thinning of Golden Reinders apple variety with NAD and Ethiphon.

MATERIAL AND METHODS

The researches were conducted during the period of 2012 year in the apple orchard founded at the "Codru-ST" Ltd. in the autumn of 2009, with trees of a „knip boom" type.

The study subject was Golden Reinders apple variety grafted on M 9 rootstock. The trees were trained as slender spindles. The distance of plantation is 3,5 x 1,2 m.

The chemical growth regulators used was Geramid – New, (44.8 g/l NAD), the preparation by the „L. Gobbi Ltd.", Italy and Cerone 480SL (480 g/l Ethephon), the preparation by the „BAYER Crops Science AG", Germany.

To optimize the fruit load of the apple trees were experimented the following variants (tab. 1).

Table 1

Scheme of the experiences to determine the efficiency of growth regulators regarding the optimization fruit load of Golden Reinders apple variety

No.	Experience variants	Active ingredient	The application
1	Control, without treatment	-	-
2	Geramid-New, 1.5 l/ha	NAD (44.8 g/l)-	Spraying, the petals fall to 80% + 2-3 days.
3	Cerone 480SL, 0.4 l/ha	Ethephon (480g/l)	By spraying 10 to 20 days after full flowering.
4	Cerone 480SL, 0.6 l/ha	Ethephon (480g/l)	By spraying 10 to 20 days after full flowering.

The soil was maintained with grass on intervals between rows and herbicided field between trees on row with a width of 1,2 m. It was used the drip irrigation system.

The plots placement was made in blocks, each variant having three repetitions. Each repetition consisted of 7 trees. At the boundaries between the plots and the experimental repetitions was left per 1 untreated tree.

On the experimental sector, in conformity with the experiences scheme (tab. 1), in the second variant the treatment with Geramid-New was done when 80% of petals were fallen + 2-3 days (06/05/12) and the third and fourth variants were spray with Cerone 480SL 10 to 20 days after full flowering (15/05/1215).

The treatment of trees starting at the temperature of +16°C and finessing at the temperature of +25°C.The recommended amount of solution per unit of surface preparation treat with New Geramid was 1000 l/ha and with Cerone 480SL - 1500 l/ha.

The effects on the fruit set, the yield, fruit quality at harvest and subsequent blooming were recorded and evaluated according to the following measurements: the number of inflorescences and the number of fruitlets on each tree; the fruit yield produced by each tree, and, for 1 ha orchard of apples; weight of 1 apple; the share of fruits (in %) in size classes based on their diameter from 50 mm to 85 mm with the intervals of 5 mm.

RESULTS AND DISCUSSIONS

The investigations demonstrate that Golden Reinders variety trees differentiated a great amount of fruit buds and formed 137-141 flowering inflorescences (tab. 2). The amount of obtained inflorescences demonstrates that trees have a uniform development and recommend growth regulators can be utilize for chemical thinning of fruit.

If, in the control, where the fruits were not thinned, the difference between the total number of inflorescences and related one is not essential, constituting respectively 140 and 126 pcs / tree. This constitutes 90.0% of the total number of inflorescences that have bound and it is a typical phenomenon for Golden Reinders variety.

Table 2

The number of total inflorescences (TIN), formed (FIN) in the crown of apple trees of the variety Golden Reinders and fruit weight in a inflorescence

No.	Experience variants	TIN, pcs/tree	FIN, pcs/tree	The share fruit in a inflorescence, %			
				1 pc.	2 pcs.	3 pcs.	>4 pcs.
1	Control, without treatment	140	126	57.3	28.9	9.0	4.8
2	Geramid - New, 1.5 l/ha	139	52	76.9	13.5	9.6	-
3	Cerone 480SL, 0.4 l/ha	141	41	39.1	46.3	12.2	2.4
4	Cerone 480SL, 0.6 l/ha	137	28	39.3	35.7	25.0	-

In order not to overload the Golden Reinders trees, it is necessary to carry out standardization of fruits cargo using growth regulators.

The results listed in table 2 demonstrate that growth regulators Geramid - New and Cerone 480SL influence on the number of inflorescences in the trees crown.

When treating with the preparation Geramid - New in dose 1.5 l/ha, the number of inflorescences was about 52 pcs/tree, which it's in decrease of 142.3% compared with the control variant.

When using growth regulator Cerone 480SL in dose 0.4 l/ha, the number of inflorescences was 41 pcs/tree, registering a decrease of 207.3% compared to the control. When spraying with Cerone 480SL in dose of 0.6 l/ha, there is an essential decrease in the number of inflorescences related, constituting 23 pcs/tree, or a decrease of 564.2% compared to the control variant.

Studying the share of fruits in the inflorescence, record, that in the control variant 53.7% of inflorescences have one fruit, 28.9% - two fruits, 9.0% -three fruits and 4.8% - four fruits.

During the research, a more rational location was recorded in the variant treated with the preparation Geramid - New in dose 1.5 l/ha, where 76.9% of inflorescence has one fruit, 13.5% - two fruits and 9.6% - three fruits.

When treating trees with growth regulator Cerone 480SL, the share of inflorescence with one fruit diminishes increasing the share of those with 2, 3 and 4 fruits. When spraying with Cerone 480SL in dose 04 l/ha, the share of inflorescence with one fruit was 39.1%, with two fruits - 46.3%, with three fruits - 12.2% and with four fruits – 2.4%.

When using growth regulator Cerone 480SL in dose 0.6 l/ha, the share of inflorescences with a fruit is identical as the previous variant, constituting 39.3%, but the one with 2 fruits diminished to 35.7% and with 3 increased to 25.0%.

The use of growth regulators Geramid - New and Cerone 480SL influence on the number of fruit in tree, fruit production, average weight and their quality.

The largest amount of fruits (tab. 3) was obtained in control variant - 166 pcs/tree. When spraying with Geramid - New in dose 1.5 l/ha, the amount decreased to 69 pcs/tree. The amount of fruit was 73 pcs/tree when using Cerone 480SL in dose 0.4 l/ha, and decreased to 52 pcs/tree when the treatment was made with Cerone 480SL in dose of 0.6 l/ha.

Table 3

The influence of growth regulators on production and fruit quality in the crown trees of Golden Reinders apple variety

No.	Experience variants	Number of fruits, pcs.		The production of fruits		Average weight, g	Average diameter, mm
		tree	100 infl.	kg/tree	t/ha		
1	Control, without treatment	166	118	12.63	30.05	76.1	56.4
2	Geramid - New, 1.5 l/ha	69	50	10.35	24.63	150.0	71.2
3	Cerone 480SL, 0.4 l/ha	73	52	10.55	25.11	148.7	70.8
4	Cerone 480SL, 0.6 l/ha	52	38	8.29	19.73	159.4	72.7
LSD 5%		3.25	-	0.33	1.37	1.69	-

Studying the number of fruits per 100 inflorescences, it records similar regularity to that described above. In the control variant, the number of fruits per 100 inflorescences was 118 pcs/tree. When using the growth regulator Geramid - New in dose 1.5 l/ha, the index was 50 pcs/tree, 52 pcs/tree when using Cerone 480SL in dose 0,4 l/ha and 38 pcs/tree when using Cerone 480SL in dose 0.6 l/ha.

Since the largest number of fruits per tree and 100 inflorescences was recorded in the control variant, respectively and higher production from a tree and a surface unit was obtained in the given variant, properly constituted 12.63 kg/tree and 30.05 t/ha.

The use of growth regulators Geramid - New in dose 1.5 l/ha and Cerone 480SL in dose of 0.4 and 0.6 l/ha decreased production on a tree and productivity on a unit area, but increased its quality.

When the treatment with Geramid preparation - New in dose 1.5 l/ha was made the production on a tree was 10.35 kg, and at one hectare - 24.63 t.

When spraying trees with growth regulator Cerone 480SL in dose 0.4 l/ha, it records that the fruit production increased insignificantly (10.55 kg/tree), statistically

unproven, or an increase of 0.48 t/ha compared to the variant where the treatment was made with Geramid - New in dose 1.5 l/ha.

The lowest production of fruits was recorded when using the growth regulator Cerone 480SL in dose of 0.6 l/ha, where the harvested on a tree was 8.29 kg and at a unit area 19.73 t.

The quality of the fruits correlates to the weight average and the diameter of the fruits. The study demonstrates that growth regulators Geramid - New and Cerone 480SL had an essential influence on quality of production.

The average fruit weight correlates directly with the number of fruits remaining in the tree. If in the control variant, the average weight of a fruit variety Golden Reinders was 76.1 g, then in the variant treated with growth regulator Geramid - New in dose 1.5 l/ha the average weight was 150.0 g, when using Cerone 480SL in dose 0.4 l/ha the spoken index was148.7 g, and when using Cerone 480SL in dose of 0.6 l/ha, it was 159.4 g.

The lowest values of the average diameter of a fruit were recorded in version control - 56.4 mm, where has not been practiced thinning of reproductive organs. Further, in the increasing scale where placed the variants where was used growth regulators such as: Cerone 480SL in dose 0.4 l/ha - 70.8 mm, Geramid - New in dose 1.5 l/ha - 71.2 mm and Cerone 480SL in dose 0.6 l/ha - 72.7 mm.

Our results demonstrate that between versions where chemical thinning was performed the largest fruit production was recorded when using Cerone 480SL preparations in dose 0.4 l/ha and Geramid - New in dose 1.5 l/ha.

The data in table 4 demonstrates that a lower quality fruit was obtained in control variant. The largest share of fruits (47.0%) has a diameter less than 55 mm, 42.8% is attributed to the diameter of 56-60 mm, and only 10.2% have a diameter of 61-65 mm. Therefore, in control variant, there were no fruits from first class and extra quality category.

Table 4

The influence of growth regulators on fruit redistribution depending on their diameter on Golden Reinders apple variety

No.	Experience variants	Fruit Share (%) depending on their diameter (mm)						
		55	56-60	61-65	66-70	71-75	76-80	81-85
1	Control, without treatment	47.0	42.8	10.2	-	-	-	-
2	Geramid - New, 1.5 l/ha	-	-	3.4	15.4	42.7	32.7	5.8
3	Cerone 480SL, 0.4 l/ha	-	-	4.0	12.8	44.5	36.1	2.6
4	Cerone 480SL, 0.6 l/ha	-	-	1.9	10.3	42.7	39.7	5.4

Basically, on all variants where chemical fruit thinning was performed, the largest share of production obtained is of category I and extra category of quality.

When treating with Geramid - New, the share of fruits with diameter 61-65 mm was 3.4%; with 66-70 mm diameter - 15.4%; with 71-75 mm diameter - 42.7%; with 76-80 mm diameter - 32.7%, and greater than 81 mm - 5.8% of the fruits. Therefor 96.6% of the fruits are first and extra category of quality.

When treating with the regulator Cerone 480SL in dose 0.4 l/ha, we registered the same results as in the version Geramid - New in dose 1.5 l/ha, with a slightly increases or

decreases on the diameter classes. When treating with Cerone 480SL in doses of 0.6 l/ha, the share of fruits with a diameter greater than 71 mm increased to 87.8%.

Therefore, convincing results were recorded in fruit diameter when using the growth regulator Cerone 480SL in dose of 0.6 l/ha.

CONCLUSIONS

The results have established that the treatments made for norming load bearing on Golden Reinders variety with growth regulators Geramid - New and Cerone 480SL had a positive influence on the number of inflorescences related in the trees crown, productivity and fruit quality compared to the variant without thinning.

The standardization of fruit load on Golden Reinders variety by chemical thinning, the highest fruit production and quality were recorded when using the growth regulator Geramid- New in dose of 1.5 l/ha to 1000 l/ha solution when the petals have fallen 80% plus 2-3 days.

In case of unfavorable weather conditions during treatment Golden Reinders variety with growth regulator Geramid-New, consider using Cerone 480SL in dose 0.4 l/ha to 1500 l/ha solution at 10 to 20 days after full flowering.

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ROLE OF METHOD VALIDATION IN ACCURATE EVALUATION OF FOOD QUALITY

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Keywords Keywords*: method validation, food safety, traceability*

ABSTRACT

To ensure food consumer protection, to avoid barriers to trade and unnecessary duplications of laboratory tests, to gain mutual recognition of results of analyses it is crucial that the quality of laboratories and test results to be guaranteed. To obtain results of adequate accuracy, the EC Council and the Commission have introduced provisions on measures for quality assurance as well as on the validation of test methods used to analyze foodstuffs and animals and fresh meat. Several EC Regulations and EU Directives requires the validation of methods of analysis used in official controls. In this frame, this paper presents some aspects regarding the role of method validation in improving the quality of the test results reported in the field. Critical aspects of method validations are reviewed and exemplified.

INTRODUCTION

Food safety is a flexible concept applied at different levels (national, regional, household or individual) covering food availability, access and usefulness. Measuring many indicators for food safety is a critical step in assessing the safety of food used in people's consumption.

During the last decades the European Union (EU) developed a detailed strategy regarding food safety from farm to fork (2004, European Comunities, From farm cu fork, ISBN 92-894-7772-5) including four main aspects:

- the rules regarding the safety of food and feed used for individuals and animals;
- a public, independent and available system for scientific counseling;
- implementing the agreed upon rules and further the process control;
- recognition the consumer right to choose based on complete information regarding the origin and the content of the food.

Present (http://ec.europa.eu/food/index_en.htm) EU integrated approach to food safety aims to assure a high level of food safety, animal health, animal welfare and plant health within the European Union through coherent farm-to-table measures and adequate monitoring, while ensuring the effective functioning of the internal market. The implementation of this approach involves the development of legislative and other actions:

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- to assure effective control systems and evaluate compliance with EU standards in the food safety and quality, animal health, animal welfare, animal nutrition and plant health sectors within the EU and in third countries in relation to their exports to the EU;
- to manage international relations concerning food safety, animal health, animal welfare, animal nutrition and plant health;
- to manage relations with the European Food Safety Authority (EFSA) and ensure science-based risk management**.**

Since food usefulness refers to health and nutritional benefits of food, an extremely important aspect to be considered is the reliability of test results reported on different parameters defining the acceptable quality of a certain type of food. One may note that, historically, the quality of food was perceived as the absence of defect, fraud and adulteration. Lately, this quality rested on expected properties (organoleptic and nutritional characteristics) and at present it designates desirable characteristics likely to justify added value (organic products, designation of origin, geographical production area, cultural traditions etc.).

To regulate chemical substances in food, legislation is divided into the several areas:
- on food additives: based on the principle that only additives that are explicitly authorised may be used, often in limited quantities in specific foodstuffs;
- on flavourings: setting limits on the presence of undesirable compounds, while for the chemically defined flavouring substances a vast safety evaluation programme is ongoing;
- on contaminants: based on scientific advice and the principle that contaminant levels shall be kept as low as can be reasonably achieved following good working practices. Maximum levels have been set for certain contaminants (e.g. mycotoxins, dioxins, heavy metals, nitrates, chloropropanols).
- on residues of veterinary medicinal products used in food producing animals and on residues of plant protection products (pesticides): for a scientific evaluation before respective products are authorised. If necessary, maximum residue limits (MRLs) are established and in some cases the use of substances is prohibited;
- on food contact materials.

On the other hand several regulations set up the performance criteria applicable to the methods of analysis of contaminants, as well as on method validation.

MATERIAL AND METHODS

As stated in Regulation 882/2004 (Regulation (EC) No 882/2004 of the European Parliament and of the Council of 29 April 2004 on official controls performed to ensure the verification of compliance with feed and food law, animal health and animal welfare rules), adopted also in Romanian legislation, methods of analysis should be characterised by the following criteria: (a) accuracy; (b) applicability (matrix and concentration range); (c) limit of detection; (d) limit of determination; (e) precision; (f) repeatability; (g) reproducibility; (h) recovery; (i) selectivity; (j) sensitivity; (k) linearity; (l) measurement uncertainty; (m) other criteria that may be selected as required. In situations where methods of analysis can only be validated within a single laboratory then they should be validated in accordance with e.g. IUPAC Harmonised Guidelines, or where performance criteria for analytical methods have been established, be based on criteria compliance tests.

Method validation is an important requirement in the practice of chemical analysis since only reliable analytical results fit for intended use can underpin decision taken with confidence based on them. The concept is defined differently in SR EN ISO 9000, SR EN ISO/CEI 17025 or in International Vocabulary of Metrology (VIM 3rd edition (International Vocabulary of Metrology – Basic and General Concepts and Associated

Terms (VIM 3rd edition) JCGM 200:2012). In accordance with the EURACHEM Guide (2014, EURACHEM Guide, The Fitness for Purpose of Analytical Methods), it is basically the process of defining an analytical requirement, and confirming that the method under consideration has capabilities consistent with what the application requires.

It is implicit in the method validation process that the studies to determine method performance characteristics are carried out using equipment that is within specification, working correctly, and adequately calibrated.

As a rule, a method should be validated when it is necessary to demonstrate that its performance characteristics are adequate for use for a particular purpose. For example, it is stated in Clause 5.4.5.2 of SR EN ISO/IEC 17025 that the laboratory shall validate:

- non-standard methods;
- laboratory-designed/developed methods;
- standard methods used outside their intended scope;
- amplifications and modifications of standard methods.

Validation must be as extensive as necessary to meet the requirements in connection with the given use or the given application. Note that validation is also required when it is necessary to demonstrate the equivalence of results obtained by two methods, for instance a newly developed method and an already existing standard/regulatory method.

There are two main approaches to method validation; the interlaboratory comparison approach and the single-laboratory approach (2014, EURACHEM Guide, The Fitness for Purpose of Analytical Methods).

Several published references are available concerning method validation by dedicated interlaboratory comparisons often referred to as ‘collaborative studies’ or ‘cooperative studies’. There are also a number of protocols relating to this type of validation, as well as the ISO 5725 standards which can be regarded as the most generally applicable. In cases a method is developed for use in one laboratory, for example because there is no general interest in the method or because other laboratories are competitors, the single laboratory approach is appropriate.

Analytical selectivity indicates “the extent to which the method can be used to determine particular analytes in mixtures or matrices without interferences from other components of similar behavior”. The selectivity of a specific method is usually investigated by studying its ability to measure the analyte of interest present in samples to which specific interferences have been introduced.

In broad terms, the detection limit (limit of detection) is the smallest amount or concentration of analyte in the test sample that can be reliably distinguished from zero

The ‘working range’ is the interval over which the method provides results with an acceptable uncertainty. The lower end of the working range is bounded by the limit of quantification (set by IUPAC as ten times limit of detection). The upper end of the working range is defined by concentrations at which significant anomalies in the analytical sensitivity are observed.

Analytical sensitivity is the change in instrument response which corresponds to a change in the measured analyte concentration.

Trueness is the closeness of agreement between a test result and the accepted reference value of the property being measured. Quantitatively, it is often stated in terms of “bias”, typically determined by comparing the response of the method to a reference material with the known value assigned to the material.

Precision is a measure of how close test results are to one another and is usually expressed by statistical parameters which describe the spread of results obtained by carrying out replicate measurements on a suitable material under specified conditions.

Measurement uncertainty is a parameter, associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurand. The formal approach to measurement uncertainty estimation calculates a measurement uncertainty estimate from an equation, or mathematical model.

The 'ruggedness' ('robustness') of an analytical procedure is "a measure of its capacity to remain unaffected by small, but deliberate variations in method parameters. Ruggedness provides an indication of the method's reliability during normal usage".

The 2002/657/EC: Commission Decision of 12 August 2002 implementing Council Directive 96/23/EC concerning the performance of analytical methods and the interpretation of results (2002, The 2002/657/EC: Commission Decision of 12 August 2002 implementing Council Directive 96/23/EC concerning the performance of analytical methods and the interpretation of results), also adopted in national legislation, provides several rules for the analytical methods to be used in the testing of official samples and specifies common criteria for the interpretation of analytical results of official control laboratories for such samples.

Performance characteristic to be verified for different type of method are shown in table 1.

Table 1

Analytical methods and performance characteristics that have to be determined

		Detection limit CCß	Decision limit CCα	Trueness/ recovery	Precision	Selectivity/ specificity	Applicability/ ruggedness/ stability
Qualitative methods	S	+	–	–	–	+	+
	C	+	+	–	–	+	+
Quantitative methods	S	+	–	–	+	+	+
	C	+	+	+	+	+	+
S = screening methods; C = confirmatory methods; + = determination is mandatory							

Table 2

Validation parameters of the analytical method developed for determining trace elements in peach juice

Element	Validation parameters					
	Recovery, %	Working range, µg/kg	LOD, µg/kg	LOQ, µg/kg	Precision	
					Repeatability, %	Reproductibility, %
Cu	80-110	500	0.002	0.02	5.7	8.0
Cd	80-120	200	0.002	0.02	8.5	10.2
Mn	80-120	500	0.007	0.07	6.0	8.0

To determine trace elements in different types of food the ICP-MS methods are lately extensive used in practice. The determination of elements of average atomic mass, such as chromium, copper and nickel may be subject to strong interference from other isobaric and polyatomic ions. This can be circumvented only when a resolution power of at least 7 000-8 000 is available. Difficulties associated with the MS techniques include also

instrumental drift, matrix effects and molecular ion interference (2002, The 2002/657/EC: Commission Decision of 12 August 2002 implementing Council Directive 96/23/EC concerning the performance of analytical methods and the interpretation of results).

An example of validation parameters of an analytical method used to determine heavy metals in peach juice is summarized in table 2. After microwave acid digestion of a commercial peach juice, the mass fraction of the Cu, Cd and Mn in the final solution was measured using an ICP MS Perkin Elmer ELAN DRC type. The instrumental conditions were optimized as indicated. The recovery was estimated after spiking the digested solution with standard solutions.

RESULTS AND DISCUSSIONS

To ensure the fact that the quality food is accurate assessed, a broad range of stakeholders are involved in all steps contributing to reliable test results. Thus the stakeholders community includes food and processing industry, regulation bodies, national, reference and working laboratories for food testing, region reference laboratories, specialized commissions regional organized (such as CODEX Alimentarius Commission and IAM operating at EC level), sector organisations (such as IOV and IOOC), standardization bodies, accreditation bodies, metrology institutes and BIPM, reference materials producers, and professional associations (such as EURACHEM, CITAC, etc.).

At European level, EFSA established an international scientific cooperation multi-annual program to support the EU in its international commitments. On multilateral relations, EFSA supports the EC in its Codex-related activities, collaborates with Joint FAO/WHO Expert Committees and cooperates with EU agencies and institutions in areas of international relevance and challenge. On bilateral relations, EFSA cooperates with risk assessment bodies in Australia, Canada, Japan, New Zealand and the USA.

At international level, early in 2004 - when a CCQM workshop hosted by the BIPM on ‘Comparability and Traceability in Food Analysis’ identified and discussed main challenges in obtaining reliable test/measurement results – a wide cooperation was established between main stakeholders. In figure 1 an example presented on that occasion (Michael Carl, Reference Measurement System Part1: International systems for dairy analysis, CCQM Workshop on Comparability and Traceability in Food Analysis, 13.09.2004) of harmonization of Reference Measurement Systems for Food Analysis Systems available for diary routine analysis is illustrated.

Regular meetings of international organisations working in the field of methods of analysis and sampling (inter-agency meeting) are organized with the participation of: AOAC, AOAC RI, AOCS, CEN-European Committee for Standardization, CIPAC-Collaborative International Pesticides Analytical Council, CODEX-Codex Alimentarius Commission of the FAO/UN, EOQ-European Organisation on Quality, EURACHEM, IAEA-International Atomic Energy Agency, ICC-International Association for Cereal Science & Technology, ICUMSA-International Commission for Uniform Methods of Sugar Analysis, IDF-International Dairy Federation, ISO-International Organization for Standardization, IUPAC-International Union of Pure and Applied Chemistry, NFPA-National Food Processors’ Association, NMKL-Nordic Committee on Food Analysis, OIV-International Organisation for Wine and Vine, WHO-World Health Organisation.

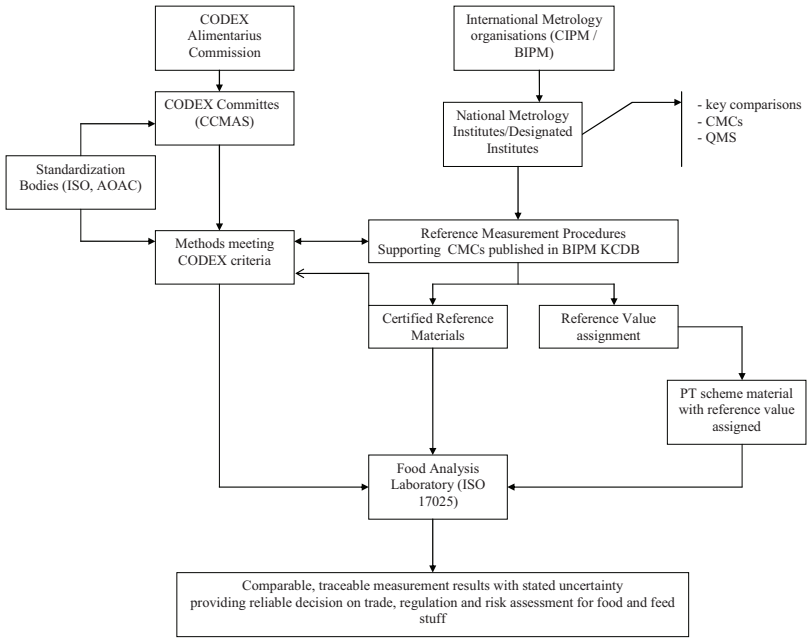

Figure 1. Example of harmonization of Reference Measurement Systems for Food Analysis for dairy routine analysis

CONCLUSIONS

Beside the extended regulated requirements, method validation is essential for obtaining accurate and reliable test/measurement results in assessing the quality of food and feed. Main parameters needed to be validated were reviewed and an example of validation parameters of the analytical method developed for determining trace elements in peach juice was presented. Methods should be validated /verified to demonstrate that theirs performance characteristics are adequate for use for a particular purpose, preferable by means of interlaboratory comparisons.

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BIOMETRICAL INDICATORS OF GRAFTED ROOTED VINES AFTER TREATMENT OF THE NURSERY WITH STOMP 33 EC AND WING P

Neli Prodanova-Marinova[1]

Key words: *vine nursery, herbicides, mature annual growth, internodes, roots*

ABSTRACT

A comparative study was carried out in 2011-2013, at IVE - Pleven to identify the impact of Stomp 33 EC (330 g/l pendimethalin) and Wing P (250 g/l pendimetalin + 212,5 g/l dimetenamid P) on the growth and development of grafted vine cuttings during their rooting. The herbicides were applied at rates of 0.4 and 0.6 l/da during the production of grapevine propagation material of variety Bolgar/Berlandieri X Riparia CO4. The mature growth of vines obtained from the treated variants in length and weight did not differ significantly compared to the untreated control. However, higher values were reported for Wing P. The tested herbicides did not have an adverse effect on root formation and the vines from all variants and the control had equal number of roots. Stomp 33 EC and Wing P did not cause shortening of the shoot internodes.

INTRODUCTION

Weeds management in vineyards and nurseries requires the combination of different technological solutions. An important part of integrated control is the selection of suitable active substances and dose rates allowing not only the maintenance of the soil surface, but also creating optimal conditions for the biological processes in grapevine.

It has been found that pendimethalin (in the form of various commercially available products under the name Stomp), at a dose rate of 0.3- 0.4 l/da efficiently control annual graminaceous weeds and some broadleaf weeds for at least ten weeks and could be applied in vineyards both on heavy and light soils (Tucker and Chambers, 1990; Prodanova-Marinova, 2014, etc.). In some studies, the efficiency of Stomp 330 EC had reached 98-99% (Sarpe, 2011). Except for weed control in fruit-bearing plantations, studies of IVE - Pleven had shown pendimethalin was suitable to be used in vine nurseries (Prodanova-Marinova, 2012; Prodanova-Marinova et al., 2014). It has been found that the direct contact of the leaves and shoots with the working solution has caused mild symptoms of phytotoxicity (Beuret and Niggli, 1990). The effect was relatively short lasting and after overcoming the stress, the grafted cuttings developed absolutely normal and even exceeded the untreated control in biometric indicators (Prodanova- Marinova, 2012).

The objective of this study was to compare the effects of Stomp 33 EC and Wing P on root development of the grafted cuttings and formation of aboveground vegetative mass during the rooting period.

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MATERIAL AND METHODS

The trial was carried out for three years (2011 – 2013) at the Institute of Viticulture and Enology - Pleven. The impact of the herbicides Stomp 33 EC *(330 g/l pendimethalin*) and Wing P *(250 g/l pendimetalin + 212,5 g/l dimetenamid P)* on the biometrical indicators of rooted vines obtained from grafted cuttings was studied. For the objectives of the study the combination Bolgar/Berlandieri x Riparia CO4 was used. The grafted and stratified cuttings were rooted in accordance with the adopted technology at IVE – Pleven (Dimitrova et al., 2007). The herbicides were applied once, immediately before planting of the cuttings in the nursery. Sprinkling was performed after the treatment. Stomp 33 EC and Wing P were introduced in two rates and the trial variants were as follows: V1 Stomp 33 EC (0.4 l/da), V2 Stomp 33 EC (0.6 l/da), V3 Wing P (0.4 l/da), V4 Wing P (0.6 l/da) and untreated, weeded (technological) control - C.

Biometric characteristic was made by measuring the average sample of twelve vines per variant after the end of the vegetative season and removing the vines from the nursery. It was counted mature growth length, average per vine (cm), mature growth weight, average per vine (g), the average length of internodes (mm), diameter of internodes (mm) and the number of tap roots, average per vine.

Data were processed by analysis of variance (Dimova and Marinkov, 1999).

RESULTS AND DISCUSSIONS

The three-year data analysis showed that at the end of vegetative the mature growth of the treated variants in length and weight did not differ significantly compared to the untreated control (table 1). Vine shoots obtained from untreated cuttings (C) exceeded insignificantly in length those treated with Wing P at a dose rate of 0.4 l/da (V3), and in weight they were actually equal. The correlation between these two indicators was particularly well expressed in the variants with Stomp 33 EC. Lower values and greater differences compared to the control were recorded for these variants as in V1 it was measured the shortest length of mature growth and the lowest weight. However, based on the mathematical analysis of the data, it could be stated that the two tested herbicides did not inhibit the formation of above-ground vegetative mass and its ripening - the differences compared to the control remained unproven. Unproven were the differences between the variants (Table. 2). The effect of the different doses on the length and weight of mature growth was insignificant – for Wing P the values of V3 and V4 were almost equal, while for Stomp 33 EC the variant with a lower dose V1 was slightly inferior to V2.

Table 1

Mature growth length and weight of rooted vines obtained from grafted cuttings after treatment with Stomp 22 EC and Wing P – comparison with technological control.

Length (cm)			Weight (g)		
V	$\overline{X}$	Proved	V	$\overline{X}$	Proved
C	109.7	*	V3	23.0	ns
V3	108.9	ns	K	22.9	*
V4	108.2	ns	V4	21.0	ns
V2	100.8	ns	V2	20.6	ns
V1	96.1	ns	V1	18.6	ns
GD 5% = 18.085 GD 1% = 26.312 GD 0,1% = 39.534			GD 5% = 7.915 GD 1% = 11.516 GD 0.1% = 17.304		

Table 2

Mature growth length and weight of rooted vines obtained from grafted cuttings after treatment with Stomp 22 EC and Wing P – comparison between the variants

V / V	C		V1		V2		V3		V4	
	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight
V1	ns	ns	x	x	ns	ns	ns	ns	ns	ns
V2	ns	ns	ns	ns	x	x	ns	ns	ns	ns
V3	ns	ns	ns	ns	ns	ns	x	x	ns	ns
V4	ns	ns	ns	ns	ns	ns	ns	ns	x	x

Length: GD 5% = 21.865; GD 1% = 33.123; GD 0.1% = 53.246
Weight: GD 5% = 9.286; GD 1% = 14.067;GD 0.1% = 22.613

As far as the length of the shoot internodes was determined by the varietal characteristics, its change was an indication of its phytotoxic response. The researches of many authors had shown that some herbicides induced morphological changes and shortening of internodes (Chelebiev and Encheva, 2007, etc.). Measurements made on grafted rooted vines of Bolgar variety revealed that Stomp 33 EC and Wing P did not affect the growth and maturation of internodes (Table 3). The difference in their length compared to the control varied within small range – from 0.3 mm (V1) to 0.1 mm (V2 and V3). During the study there were not found any changes in the shoots diameter induced by the tested herbicides. The minimum increase in the control was within the range of the statistical error (GD 5% = 0.866; GD 1% = 1.259; GD 0.1% = 1.892).

Table 3

Biometrical indicators for internodes and roots of vines obtained from grafted cuttings after treatment with Stomp 33 EC and Wing P

V	Internodes		Number of roots		
	Length (mm)	Diameter (mm)	D < 2 mm	D > 2 mm	Total number
C	3.3	6.1	5.5	7.2	12.7
V1	3.0	5.6	5.2	6.8	12.0
V2	3.2	5.3	5.3	6.9	12.2
V3	3.2	5.5	5.5	6.9	12.4
V4	3.1	5.4	5.3	6.9	12.2

Stomp 33 EC and Wing P were distributed in the surface soil layer (2-3 cm) and formed herbicide screen. When passing through it dimethenamid caused death to the germs of weeds, and pendimethalin penetrated through the roots of weeds (Tonev et al., 2007). The rooting technology for the grafted cuttings applied by us, allowed rooting to be formed out of this layer, at greater and safer depth. Thus it was avoided the effect of the tested

herbicides, and was provided the possibility for the formation and normal development of the root system. In none of the treated variants there was significant decrease in the number of roots both for the roots with diameter smaller than 2 mm, and larger than 2 mm (Table 3). The total number of tap roots of vines obtained after treatment of the lots with the tested herbicides was slightly inferior to that of the untreated lot however the minimal differences did not allow to be considered that this reduction was due to Stomp and Wing nor to their differentiation per doses (GD 5% = 2.149; GD 1% = 3.127; GD 0.1% = 4.698).

CONCLUSIONS

The herbicides Stomp 33 EC and Wing P at doses of 0.4 and 0.6 l/da did not cause any disturbances in the growth of the above-ground vegetative mass of grafted vine cuttings of Bolgar variety. The application of the tested products did not result in a reduction in the length and weight of mature growth, as well as in thinning and shortening of the shoot internodes.

With the applied technology Stomp 33 EC and Wing P did not inhibit the root-formation of the grafted cuttings and did not damage the root system of the obtained grafted vines.

The vines obtained from the lots treated with Wing P were equal in length of the mature growth with those of the technological control and exceeded those from the lots treated with Stomp 33 EC, however the data did not showed clear differences in the selectivity of both herbicides related to the grafted vine cuttings.

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THE INFLUENCE ON CLIMATIC CONDITIONS IN THE AGRICULTURAL YEAR 2013 – 2014 ON THE STATE OF VEGETATION IN SOME VARIETIES OF VINES WITH TABLE GRAPES IN VINEYARDS FROM SOUTHERN OLTENIA

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Key words: *sandy soils, abundance rain, foliar deases*

ABSTRACT

Climatic conditions during the growing season in 2014, characterized by heavy rain and dew daily until 11 to 12 hours were very favorable for the emergence and foliar main attack vines, Plasmopara viticola and Uncinula necator. In such conditions, none of sorts, even resistant varieties group, showed no immune but any tolerance. The varieties which showed some tolerance were Silvania with a degree of attack on leaves and bunches of 5%, and modern hybrid Perla de Zala, with degree of attack on leaves was 10% and zero on bunches. Tolerant was the hybrid modern Moldova, which conducted a production of grapes 12497 Kg/ha. Someșan and Transylvania varieties were among the most sensitive varieties with degree of attack was on leaves between 26% and 90% and 100% on the bunches to both varieties. The two varieties of grape production were totally compromised.

INTRODUCTION

The vine is a plant susceptible to attack by pests and diseases, so, plant protection measures are very important in the technology culture of the vine (Ulea E., 2001; 2003). The attack of pests and diseases is even more intense in hot and humid climate conditions.

Plasmopara viticola and *Uncinula necator* are the most dangerous diseases which attacks all organs of green vine (young shoots, leaves, flowers, grapes in training and even during the ripening grain and produce it affects ring shaking thereof (Lixandru M., Fendrihan S., 2009). The attack must be prevented because after infection has occurred, the fungus is very hard fight, only with systemic fungicides.

Plasmopara viticola oospores germinates on the surface soaked in water at temperatures over 10˚C, and conidia of the fungus *Uncinula necator* spread during the vegetation period, which may germinate at temperatures of 3-4˚C, the optimum temperature is around both diseases 15˚C (Săvulescu Tr., 1941, cited by Lazăr Al., et al., 1977).

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To prevent and combat major diseases of grapevine in normal running and warning treatments during rainy periods are weekly treatments (Lazăr al. et al., 1977; Oşlobeanu M. et al., 1980). Measures to prevent and combat are included in the complex organic technological culture of the vine (Lazăr Al., et al., 1980).

MATERIAL AND METHODS

Research undertaken targeted attack of the fungus resistance to *Plasmopara viticola* and *Uncinula necator* in ampelographic collection in a number of 15 table grapes: : Silvania (Figure 1) , Timpuriu de Cluj, Muscat de Hamburg, Tamina, Someşan, Splendid, Napoca, Otilia, Victoria, Prima Cl. 1022, Coarnă neagră selecţionată, Muscat de Hamburg Cl. 202, Transilvania (Figure 2), Perla de Zala (Figure 3), Moldova.

Age plantation 5 years. Planting distances 2.2 / 1.2 m.

Comparing the results of production was done with 2013 year with favorable conditions for vine growing on the sandy soils of southern Oltenia.

Figure 1. Silvania variety

Figure 2. Transilvania variety

Figure 3. Perla de Zala variety

RESULTS AND DISCUSSIONS

Agricultural year 2013 - 2014 was a year of different climatic conditions, characterized by negative minin temperatures not fallen below - 14.1˚C, relative rest period, abundant rainfall and relatively low temperatures in April, May, June and July in particular days (Table 1).

In the autumn of 2013 (September-November) recorded rainfall was 89.2 mm, under the multiannual amount for the same period (125.7 mm). December was the driest month, only 0.6 mm. The first snow was recorded in the 3rd decade of January 2014 and recorded snow thickness 30-35 cm. The average monthly temperature was between 1 ˚C in December 2013 and 23.7ºC in August 2014. The absolute minimum of - 14.1˚C, was in the last day of January 2014 and the absolute maximum of 37,6˚C, was recorded in August 2014.

Year 2014 started with normal temperature, with warmer and colder periods alternating, and in spring was minimal - 1.2 ^{0}C in the second decade of March. Accordingly's main vine buds have not suffered, so that out of the rest period was 100% viability. However, the percentage of buds, start the vegetation was lower, ranging between 63 and 93%.

During the 2014 growing season (April to September) rainfall records equaled the largest amount, 640.7 mm, compared to the multiannual monthly amount from vegetation period 1956-2014, of 313.2 mm (Table 2). The amount of rainfall was 123.8 mm in April, 111 mm in May, 92 mm in June, 125.6 mm in July, 16 mm in August and 165.9 mm in September, spread over a number great day, 17 days in April, 16 days in May, 11 days in June, 13 days in July, 4 days in August and 13 days in September. A total of 183 days that sums up the April - September rainfall were recorded in 74 days (40.4%). About half of the days, from this period were with precipitation. Also, daily dew formed, which persisted up to 11-12 hours.

Basically, during this period there were favorable conditions for the development of foliar diseases of grapevine. If at the beginning of the period (early May) were conditions for *Uncinula necator*, as the temperature climbed, from the second half of May, the attack appeared of *Plasmopara viticola*.

The first symptoms of the disease occurred in the formation of inflorescences. Attack of the two diseases, the beginning was not virulent, due to lower values of temperature overnight, then with increasing these values, the virulence of the diseases has increased.

Table 1

Characterization climate during October 2013 – September 2014

Climatic element /month	X	XI	XII	I	II	III	IV	V	VI	VII	VIII	IX	Sum
Average temperature (˚C)	11.4	8.00	1.0	1.9	2	9.9	12.6	16.6	20.7	23.1	23.7	18.3	12.4
Minimum temperature (˚C)	-1.6	-5.1	-8.6	-14.1	-12.5	-1.2	2.5	10.2	10.2	12.5	8.2	5.1	-14.1
Maximum temperature (˚C)	26.3	26.3	11.0	15.9	20.8	25.9	25.5	29.5	33.7	34.9	37.6	30.6	37.6
Rainfall (mm)	50.2	38.4	0.6	41.9	27.8	62.0	123.8	117.4	92	125.6	16	165.9	861.6
Relative hmidity of air (%)	92.2	94.4	93.1	94.2	95.4	74.9	80.3	76.9	76.9	75	72	82.32	84.2
Multiannual average temperature1956-2014	11.4	5.5	0.4	-1.3	0.7	5.6	11.8	16.8	21.8	23.1	22.3	17.7	11.3
Rainfall Multiannual average 1956-2014	39.6	40.8	49.5	32.2	33.1	35.8	45.8	60.6	68	53.3	38.2	47.3	546.8
Duration of sun brightness	138	105	37.5	50.7	72.9	197	146	248	256	305	322	184	2063

Table 2

Characterization climate during the growing season of 2014

Climatic element/ Month	IV	V	VI	VII	VIII	IX	Sum
Average temperature C^0)	12.6	16.6	20.7	23.1	23.7	18.3	19.2
Minimum temperature (C^0)	2.5	10.2	10.2	12.5	8.2	5.1	2.5
Maximum temperature (C^0)	25.5	29.5	33.7	34.9	37.6	30.6	37.6
Rainfall (mm)	123.8	117.4	92	125.6	16	165.9	640.7
Air relative humidity (%)	80.3	76.9	76.9	75	72	82.3	77.2
Multiannual average temperature 1956-2014	11.8	16.8	21.8	23.1	22.3	17.7	18.9
Rainfall Multiannual average 1956-2014	45.8	60,6	68	53.3	38.2	47.3	313.2
Total days	30	31	30	31	31	30	183
Total days with rainfall	17	16	11	13	4	13	74 (40.4%)
Total days with rainfall in May-June	-	16	11	13	-	-	40 (43.5%)
Duration of sun brightness	145.9	248.1	256.4	304.6	322.5	184.2	1461.7

The 9 phytosanitary treatments carried out have failed to fully prevent and combat major diseases of grapevine, *Plasmopara viticola* and *Uncinula necator*. All the same purpose was made in the early and leafless inflorescences. Nevertheless, the degree of attack combination product of the two diseases in some varieties was 100%. Phytosanitary treatments, the number of 9, were carried out with both the products of contact and systemic action:

1 - Ridomil plus 48 (Metalaxyl + Copper oxychloride), 0,3% + Kumulus (sulphur), 0,3%;
2 - Ridomil plus 48 (Metalaxyl + Copper oxychloride), 0,3% + Kumulus (sulphur), 0,3%;
3 - Ridomil plus 48 (Metalaxyl + Copper oxychloride), 0,3% + Shavit (triadimenol + folpet), 0,2% ;
4 - Ridomil plus 48 (Metalaxyl + Copper oxychloride), 0,3% + Shavit (triadimenol + folpet), 0,2% ;
5 – Champ (Copper hydroxide), 0,3% + Kumulus (sulphur), 0,3%;
6 – Champ (Copper hydroxide), 0,3% + Kumulus (sulphur), 0,3%;
7 - Zeamă bordeleză, 0,5% + Kumulus(sulphur), 0,3%;
8 - Zeamă bordeleză, 0,5% + Kumulus(sulphur), 0,3%;
9 - Ridomil plus 48 (Metalaxyl + Copper oxychloride), 0,3% + Kumulus(sulphur), 0,3%.

From red wine grape varieties the most sensitive variety of diseases attack both the leaves and bunches was Pinot Noir (degree of attack was 91% and 97%), (Table 3).

The degree of combined attack of the two diseases recorded on leaves, values between 5% and 90% Silvania variety to variety Transylvania and on bunches, values range between zero variety *Pearl of Zala* and 100% *Someşan* and *Transilvania* varieties (Table 3). Production of grape varieties has been compromised and *Transilvania* and *Someşan* and the other varieties ranged from 4544 kg/ha variety *Tamina* and 16056 kg/ha the variety *Perla de Zala*.

In 2013, the year in all respects favorable for vines, grape production ranged from 9091 kg/ha *Tamina* variety and 28 410 kg/ha *Transilvania* variety. Note that the *Silvania* variety most noble variety tolerant to attack the disease in 2014, grape production in 2014 (Table 3)

The degree of attack produced by main diseases (Plasmopara and Uncinula) vine varieties of grapes for table grapes in climatic conditions in 2013-2014

Variety	Degree of attack %		Grapes yield Kg/ha	
	leaves	bunches	2013 year	2014 year
Victoria	64	88	18940	5680
Silvania	5	5	6438	8452
Timpuriu de Cluj	15	24	13258	6059
Muscat de Hamburg	42	22	21212	8710
Tamina	38	27	9091	4544
Someşan	26	100	20076	0
Splendid	28	95	9849	6437
Napoca	44	96	21591	6437
Otilia	33	87	27652	7952
Prima Cl. 1022	66	72	20076	6816
Coarnă neagră selecţionată	72	76	21212	7574
Muscat de Hamburg Cl. 202	45	62	23106	7952
Transilvania	90	100	28410	0
Perla de Zala	10	-	18182	16056
Moldova	12	6	16667	12497

registered a value higher than 2013 or 6438 kg/ha in 2013 and 8452 Kg/ha in 2014. *Moldova* variety, which is a modern hybrid or resistant variety achieved a very good production in 2014 year, but lower than in 2013 year, respectively 12497 kg/ha to 16667 kg/ha.

CONCLUSIONS

Climatic conditions during the growing season in 2014, characterized by heavy rain and dew daily until 11 to 12 hours were very favorable for the emergence and foliar main attack vines, *Plasmopara viticola* and *Uncinula necator*. In such conditions, none of sorts, even resistant varieties group, showed no immune but any tolerance. The varieties which showed some tolerance were *Silvania* with a degree of attack on leaves and bunches of 5%, and modern hybrid *Perla de Zala*, with degree of attack on leaves was 10% and zero on bunches. Tolerant was the hybrid modern *Moldova*, which conducted a production of grapes 12497 Kg/ha.

Someșan and *Transylvania* varieties were among the most sensitive varieties with degree of attack was on leaves between 26% and 90% and 100% on the bunches to both varieties. The two varieties of grape production was totally compromised.

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RESEARCHES ON CHEMICAL COMPOSITION AND SENSORIAL ATRIBUTES OF NATURAL FRUIT DISTILLATES

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Keywords*: volatile compounds, fruit, distillations, natural distillates*

ABSTRACT

The purpose of this investigation was to determinate the distributions of higher alcohols (1-propanol, 1-butanol, 1-hexanol, 1-heptanoland 1-octanol), esters (ethyl acetate and isoamyl acetate) and monoterpenes (geraniol, nerol, limonene) in some distillate of apple, pear and orange.

The volatiles were determined by gas chromatography. The two most popular fruit in Romania and one from South America used in fruit brandy production, apple, pear and orange were distilled using a traditional distilling pot and fraction distillation.

The results showed that orange juice could be a good substrate for fermentation and distillation, and the sensory analysis performed revealed that the produced beverage had good acceptance by the tasters.

INTRODUCTION

Natural distilled beverages or natural spirits are spirits obtained by fermentation and distillation marcs and fruit juices but also by-products of winemaking (Pomohaci et al, 2009).

After obtaining natural spirits from different raw materials through various methods of distillation are found in terms of quality that they although meet the alcoholic strengths corresponding to each brandy in hand and the color and clarity, but the taste, odor, flavor and aroma they still no characteristics of high quality consumer demand (Stoica et al 2014).

Such quality characteristics generally depend on the quality of raw materials to manufactured method of distillation, especially those where distillate is enriches in aromatic oils ethers, and system storage, preservation and aging (Santos et al, 2013).

Fruit spirits are produced all over the world using various fruits, according to the availability in different countries and seasons. In this way, the current commercialization of known alcoholic beverages obtained from fruit could facilitate the market penetration of such spirits (González et al, 2010). Some fruits that have been used to produce distillates

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are melons (Hernández-Gómez et al, 2008), mulberries (Soufleros et al, 2004), plums and cherries (Schehl et al, 2005) and pears (García-Llobodanin et al, 2008).

During storage and conservation are some other factors, complement favorable qualitative characteristics such as: the time it takes to preserve and aging, quality vessels for storing, quality of wood that are made, constant temperature rooms, fresh air, unpolluted operations blending, conditioning and improvement of spirits

MATERIAL AND METHODS

To obtain natural distillates were discussed a variety of issues related to the production of crude spirits of different fruit varieties. Of all these goals those considered to have a more important role in producing distillates quality are comparative analysis of the main chemical components - higher alcohols and esters - and aroma compounds distillates obtained from fruit and also analyze the sensory characteristics of distillates natural fruit. Three distillates were obtained from apples, pears and oranges and analyzed distillate middle or heart of each variant.

Fruit marc fermentation was carried out in vessels of 40 liter capacity filled with 30 L of substrate. The temperature was adjusted to 20 ° C. The substrates were inoculated with a commercial yeast (Saccharomyces cerevisiae UCLM 325) to a concentration of about 10^6 cells / ml. The process was monitored daily by measuring residual sugars and the end of fermentation was determined based on sugar consumption.

Upon completion of alcoholic fermentation, fermented marc was immediately distilled in a traditional alembic of copper 30 L filled it at 70-80% of capacity.

The major volatile compounds were analyzedof heart fraction by gas chromatography.

Sensory evaluations were conducted to select the best of the three spirits products. All evaluations were performed in a standard tasting room, using standard tasting glasses filled with 30 ml of distilled. Distillates were served at a temperature of 15 ° C. evaluations occurred in the morning 10:00 to 12:00 noon.

RESULTS AND DISCUSSIONS

The results regarding comparative analysis of the main chemical components - higher alcohols and esters and also compounds flavor of natural fruit distillates are shown in Tables 1 and 2.

Table 1

The main chemical compounds in apples, pears and oranges distillates

Compound analyzed	Distillate of apple	Distillate of pear	Distillate of orange
Alcohol,% vol.	28.0	30.0	32.5
Methyl alcohol, mg / L	236.67	1112.98	189.80
1 - Propanol, mg/ L	578.03	783.37	211.18
1 -Hexanol, mg/ L	42.39	303.72	14.36
1-Heptanol, mg/ L	2.00	33.33	1.07
1-Octanol, mg/ L	2.00	187.77	3.56
3-methyl - 1-butanol, mg / L	342.41	5730.62	653.76
Benzyl alcohol, mg/ L	29.15	0.95	0
Ethil acetate, mg/ L	35.45	8444.70	381.69
Isaomyl acetate, mg/L	5.02	51.25	0
Furfural	5.17	2560.19	2.37

As noted, the alcohol content is consistent with the sugar content of the fruit from which the distillate. Distillate with small alcohol content is the apple with an alcoholic strength of 28% vol. And orange distillate has the highest alcohol concentration of 32.5% vol.

High quantities of methanol and 2-butanol in spirits may be the dangerous to consumers' health. More than this, the methanol gives a smell of boiled cabbage at the threshold of more than 1200 mg / L. The methanol content was higher in the pear distillate and the lower in the orange distillate. However, the levels do not exceed limits for fruit spirits set by legislation (EU, 2000).

Higher alcohols are responsible for the accentuation of the complex sensory attributes of spirit drinks. Amyl alcohol contributes positively to sensory characteristics. Sensorial, they are detectable at concentrations below 15 mg / L.

1-propanol has a pleasant smell, sweet but excessive concentrations can enter notes of solvent which can mask all the positive notes distillates. The highest content of 1-propanol was recorded in distillates pears and oranges; instead, it was lower in distillate apple.

The content of 1-heptanol and 1-hexanol were very similar in all cases. 1-butanol has a penetrating heavy smell, and 2-butanol is associated with low quality raw materials.

1-hexanol and 3-methyl-1-butanol herbaceous, strong flavors share.

Benzyl alcohol is related to the amount of benzaldehyde, the latter is important because it gives a flavor of bitter almonds at levels 2-3 g / L. In this study, concentrations were far from the threshold of perception.

Acetaldehyde is 90% of the total aldehydes. More than 1.200 mg / l of ethanol is proof ethanol oxidation during alcoholic fermentation or enzymatic decarboxylation of pyruvic acid (Cantagrel et al, 1993). Its importance derives from the pungent smell and chemical reactivity (Silva et al., 2000).

Furfural may be formed as a result of oxidation of ascorbic acid. Slightly higher furfural content was observed in distillate pear.

Esters are associated with pleasant odors (Steger & Lambrechts, 2000). This is especially true in the case of ethyl acetate, which contributes to the complexity of the flavoring and has a positive impact at very low levels (50-80 mg / L). The ethyl acetate was higher in the distillate pears, followed by the orange. Ethyl lactate contributes lasting intense flavors. The content of the distillate is bound to lactic fermentation.

Ethyl butyrate negatively influences the organoleptic quality distillates.

Amyl acetate, judging by its nature, has a pleasant flavor, banana, concluded that it is more the result of a side effect (higher concentration of acetic acid precursors and isoamyl alcohol) than an actual sensory impact.

Along with the main chemical constituents of distilled spirits, higher alcohols and esters were determined and the main flavor compounds, especially specific fruit from which they originated.

After the chemical analyses, the beverage was subjected to sensory analysis to assess its acceptance among consumers.

The results obtained are shown in Table 2.

For this purpose they have been identified and quantified three flavor compounds geraniol, nerol and limonene.

It may be noted that geraniol was identified in two of the three spirits, namely the apple and the orange. To quantify the amount of orange distillate is almost double that of Apple. In Pear distillate has been identified compound.

Nerol is found in all three distilled beverages but detaches as a net amount pear distillate which also has a strong floral aroma combined with the honey. If limonene, the highest content of this compound is found in orange distillate followed by pear, but with a much reduced. The apple brandy was not identified limonene.

Table 2.

The main flavor compounds in apples, pears and oranges distillates

Compound analyzed	Distillate of apple	Distillate of pear	Distillate of orange
Geraniol, mg/ L	1.51	0.00	3.22
Nerol, mg/ L	1.12	8.22	0.77
Limonene, mg/L	0.00	4.25	12.45

Regarding sensory, all crude distillates are colorless, with typical brilliance, clear, no sediment or slurry. Following a gyratory movement of the liquid in the glass, it has tears slowly leaking showing relevant content in alcohol.

The flavor was different. Thus, the distillate apple flavor is intense, raw apple fresh fruit but not very persistent. The taste is pleasant, agreeable, easy burner, supple.

In the case of pear distillate, aroma is intense, flowers and honey, persistent. The taste is pleasant, agreeable, burner, supple, slightly sweet

In the case of orange distillate flavor is intense, flowers and orange peel, very persistent, especially drip. The taste is pleasant, very balanced, agreeable, burner, round, slightly sweet.

In Figure 1 is shown top three spirits obtained by sensory analysis.

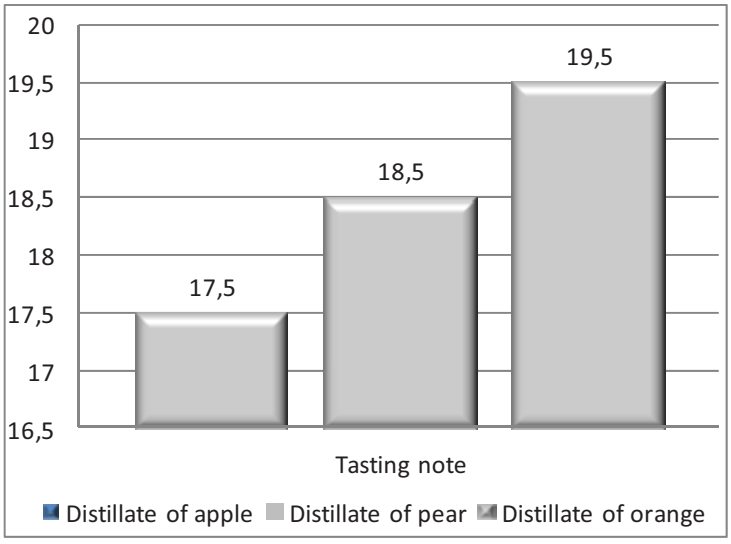

Figure 1. Ranking the three distillate during the tasting

It may be noted that sensory analysis supports the analysis of the main chemical components and aroma. Thus, the flavored alcoholic and distillate - distillate of orange tops

the podium with a score of 19.5. Second place is occupied by the distillate of pears and the third of apple brandy.

CONCLUSIONS

The study made the following conclusions:

Regarding of all the distillates analyzed organoleptic properties correspond to the standards wishes of consumers, it is of exceptional quality.

In terms of determining the composition, consisting in higher alcohols, esters and aroma main constituents of all three drinks distilled meet established requirements.

Based on the characteristics of the juice and the acceptance of the orange spirit in the sensory analysis, orange fruit showed good potential for use in the production of a distilled beverage.

Pear and orange distillates contain about the same amounts of chemical compounds like 1-propanol, 3-methyl 1-butanol, ethyl acetate, the difference is given by the aroma compound.

The distillate of pear aroma is given by nerol at the time of distillate of orange is limonene.

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A STUDY ON THE USE OF CENTRIFUGAL FANS WITH CERAMIC ELEMENTS IN DRYER COLUMN

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Keywords: *ceramic,power,fan,pressure*

ABSTRACT

The process of drying is found in various sectors of the food industry from drying fruits and cereals to drying herbs, which is in fact a booming sector of the food industry nowadays. It is known that drying is the operation whereby water from liquid or solid material is removed by the use of air. Its purposes are to bring (fully or partially) the heat needed to vaporize the moisture found in the materials and to evacuate the resultant water vapor by heating. More broadly, drying is the process of removing a liquid (not necessarily water) of a solid material, a suspension or a paste using a particular gas drying agent

INTRODUCTION

Convective drying remains the most popular and widespread process of removing moisture from the material, not only because of the simplicity of the process itself, but also for the various possibilities of getting low cost and high quality of drying product in a relatively short time.

The heat dryers calculation aims to establish the consumption of heat agent and of heat closely related to drying technology, the operating parameters and the type of installation which is to be used.

As far as the drying agent is concerned, the natural factors that influence it are: the nature of the drying agent; how to obtain it; the temperature; the humidity; the flow; the impurities and the pressure (Tisan 2007).

The mechanism of drying depends on the transportation of water (humidity) through the material which is subjected to drying, over goes through several mechanisms, such as: the way through which water is linked and the cause of the transportation. The water transport can occur by: capillary, liquid diffusion and vapor diffusion The initial existing water found on the surface of the material or the one inside it passes to the surrounding air by diffusion (Gavrilă L., 2013)

These are the reasons why the design of the fans is extremely important. The principle of their operation is known for millenniums in China reaching Europe too. A

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particularly boom in their use is given by the industrial revolution from England when John Wilkinson, the inventor of the lathe with automatic rotation of the piece, used the steam engine, invented by James Watt, to create a stream of pressurized air into a furnace increasing its spectacular efficiency.

MATERIAL AND METHODS

Nowadays, the turbochargers are being used for decades to the construction of spark ignition engines and compression ignition engines (Bâlc & Şugar I.R.2013; Burnete et al. 2001).

If we cannot bring much change when we are to talk about the operating principle of the axial and radial fans, the situation is changing when it comes to materials. Between them, after metal and plastic materials, the ceramic materials are making their way through(Chiru et al. 1999).

The use of ceramic materials can be adapted easily in a centrifugal fan (fig. 1).

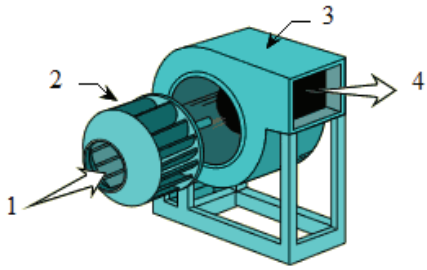

Figure 1 Function of the centrifugal fan:1-gas in;
2-fan wheel; 3-housing; gas out.

A centrifugal fan that develops a low airflow at a high pressure will have a specific speed and low efficiency because the rotor is narrow and the losses caused by friction are high. A centrifugal fan which provides high flow at low pressure will have a specific speed and efficiency relative high, because the friction losses in this case are low.

Considering that the main weakness of the ceramic material is its fragility, a stainless steel rotor hub having food ceramic crown can be used. The ceramic materials differ from metals in hardness and brittleness. Alumina was chosen as a ceramic material.

Table 1

Technical characteristics of alumina

Nr. crt	The size of the	The value of	U.M.
1	Apparent porosity	0.4	%
2	Apparent density	$3.5 \cdot 10^3$	kg/m^3
3	Tensile strength at break	$410 \cdot 10^6$	N/m^2
4	Modulus of elasticity	$220 \cdot 10^9$	N/m^2
5	The coefficient of linear expansion	$7\text{-}9 \cdot 10^{-6}$	K^{-1}
6	Specific heat	790-1050	J/kg·K
7	The thermal conductivity	10	W/m·K
8	Melting temperature	2327	K
10	Entropy	50.92	J/mol·K

Alumina ceramic (Al_2O_3) was chosen due to the following features: it meets the thermo mechanic demands; it can be obtained by sintering to near net shape; it has a relatively low price in comparison with other ceramic materials (Şugar 2007).

RESULTS AND DISCUSSIONS

Figure 2 presents the variation of flow to pressure difference. We notice the increase flow at low differential pressure.

Table 2

Variation of flow to pressure difference

Nr. crt	Q, m^3/s	Δp, mm col H_2O
1	0.6	74
2	1	70
3	1.3	64
4	1.6	52
5	1.7	50
6	1.8	42
7	2	31
8	2.2	24
9	2.4	12

Table 3

Variation of flow to power

Nr. crt	P, kW	Q, m3/s
1	0.80	0.70
2	0.9	1.00
3	1	1.20
4	1.3	1.60
5	1.35	1.70
6	1.55	2
7	1.58	2.1
8	1.78	2.4

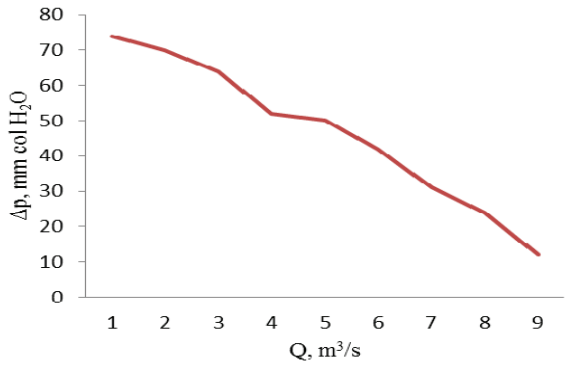

Figure 2. Variation of flow to pressure difference

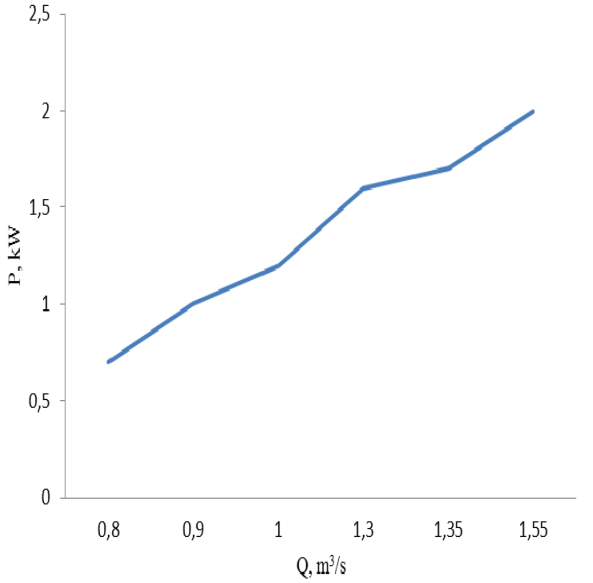

Figure 3. Variation of flow depending on power

Figure 3 presents the variation of flow depending on power We notice the increase flow at increase power.

CONCLUSIONS

The use of ceramic materials increases the efficiency of the dryers due to the lower heat losses.

Due to thermal expansion coefficient 10 times lower than the one of metals it requires no special adjustments.

The fan with ceramic elements can function at higher temperatures than plastic ones.

Given the density alumina is three times smaller than stainless steel food the power consumption of at the same rate will be lower.

Unfortunately, the main disadvantage is its relatively high price.

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COMPARATIVE STUDY BETWEEN CHEMICAL COMPOSITION OF ITALIAN RIESLING AND HYBRIDE WINE FROM NW OF ROMANIA

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Keywords: *red wines, aging, antocyanins, chromatography, color*

ABSTRACT

This paper presents two analytical methods which detect total acidity and volatile acidity of white wine, this wine comes from two types of grapes, that the Italian Riesling variety and hybrids (the name of hybrids grapes is Noah or white Fraga). The wine from Noah grapes was produced in the laboratory of the Technical University of Cluj-Napoca in University Center North Baia Mare and the other wine from Italian Riesling variety was produced in a specialized factory.

INTRODUCTION

The first determination is the titrimetrical method of total acidity. The acidity of the grapes and the stum are predominately comprises mainly of tartaric acid, malic acid, and a lower proportion of citric acid. In wine grapes are both acids, as well as those formed during the alcohol fermentation (carbonic, acetic, propionic, lactic, succinic and others), (Cebatorescu, 1996; Cotea, 1982, Macici, 1986).

In the second determination it used Saunier-Cazenave method for volatile acidity. The main component of the volatile acidity are acetic acid. In a small scale take part other acids like formic acid, propionic acid, valeric, caproic, etc. (Muntean, 2012)

MATERIAL AND METHODS

Samples: Ten samples of wine were varying concentrations of sulfur dioxide 6%. The amount of sulfur dioxide was from 0.1 to 0.10 ml and in the 11th sample was administered an amount of 0.50 ml of sulfur dioxide 6%, which is the control sample. Within the 11 samples were added two Italian Riesling wine samples of these samples the different was because the wines were from different years (Gheorghiţă, 1980).

The necessary glassware: For the first determination was used automatic burette, 200-250 ml Erlenmeyer flask, glass stick, plate glass and graduated pipette 5, 10, 25 and 50 ml. In the second one was used a special device for distillation made of glass, metal stand with mesh and metal jack, conic flask of 250 ml and a burette with stand (Gheorghiţă, 1980).

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Chemicals: distilled water, red and blue paper of litmus, red of phenol 0,02%, phenolphthalein 1%, Oxalic acid N / 10 (for determining the solution factor of NaOH N / 10), NaOH or KOH N / 10, solution of sodium chloride 15%, H2SO4 density 1.11, 1% starch solution and Iodine solution N / 50.

Solution preparation: The solution of oxalic acid n / 10. It will weigh exactly 0,304g amount of oxalic acid, pure, crystallized. The acid was dissolved in distilled water in a 1 liter flask. Make up the volume to the mark with distilled water and the temperature specified on the ball.

The solution of phenol red. Weigh 0.02 g phenol red which will dissolve in a liter of boiling distilled water to which was added 1 ml solution of NaOH N / 20 in addition to those up to the mark with distilled water.

Determination of total acidity from stum and wine.The determination of total acidity is based on titrimetrically analyzed. The stum and wine acidity is determined as follows by neutralizyng the acid, a determinated quantity of stum and wine with alkaline solution by known titre. On bazed of quantity of basic solution, are employed at titration and it calculated the total acidity of stum and wine (Giurgiulescu L. 2005).

Determination of volatile acidity through direct method- Saunier-Cazenave method. The volatile acidity from wine was determinated through direct method. This method was used, because it is quite fast and is based on the following principle: volatile acid from wine were separeted by a distillation process repeated, in speciale conditionand then determined titrimetrically in distilled solution (Gheorghiţă, 1980).

RESULTS AND DISCUSSIONS

Each sample was analysed at least at duplicates, with each series blank samples were performed. Total acidity was determined from four in four days course fermentation of the 11 samples taken in consideration. Following the analysis and obtained a series of values that were displayed in the following chart.

In this graph we can see that only the first sample value has breaches the maximum value, while the other samples are similar and falls between the two values respectively maximum and minimum value.

Table 1

Total acidity of hybrid wine during fermentation

Day	1	2	3	4	5	6	7	8
	g/L H_2SO_4							
1	0.2134	0.2134	0.2134	0.2134	0.2134	0.3104	0.3104	0.3104
2	0.0194	0.0194	0.0194	0.2134	0.2134	0.2134	0.2134	0.2134
3	0.3104	0.3104	0.3104	0.3104	0.3104	0.2134	0.2134	0.2134
4	0.3104	0.2134	0.3104	0.0194	0.0194	0.2134	0.2134	0.2134
Average	0.37072	0.18915	0.2134	0.18915	0.18915	0.23765	0.23765	0.23765
Min	0.0194	0.0194	0.0194	0.0194	0.0194	0.2134	0.2134	0.2134
Max	0.37072	0.3104	0.3104	0.3104	0.3104	0.3104	0.3104	0.3104

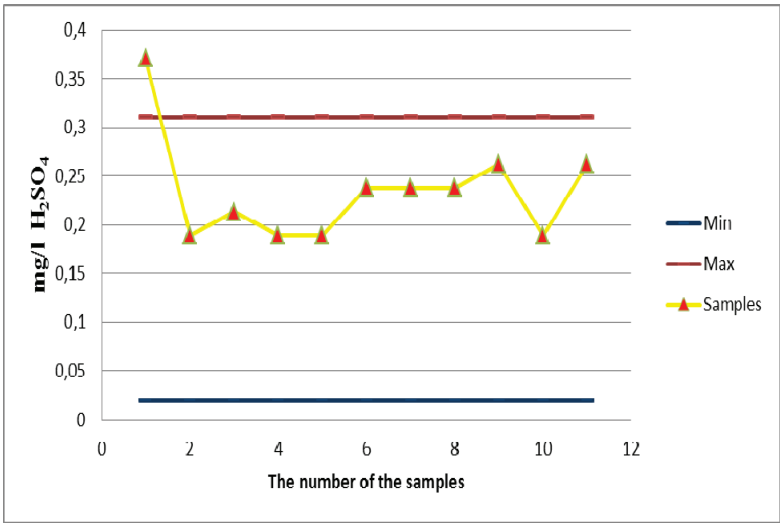

Figure 1. The evolution of tatal acidity in hybried wine course fermentation, (11 samples)

The total acidity was determined on two samples of wine Italian Riesling, remember that the two samples come from different years compared with hybrid wine. This analysis was conducted to see if total acidity of wine is affected during the storage. In Figure 2 you can see that influence sulfur dioxide, total acidity; this analysis was conducted after one month at less conditions favorable. As seen on the chart hybrid wine had the lowest value it was below the minimum.

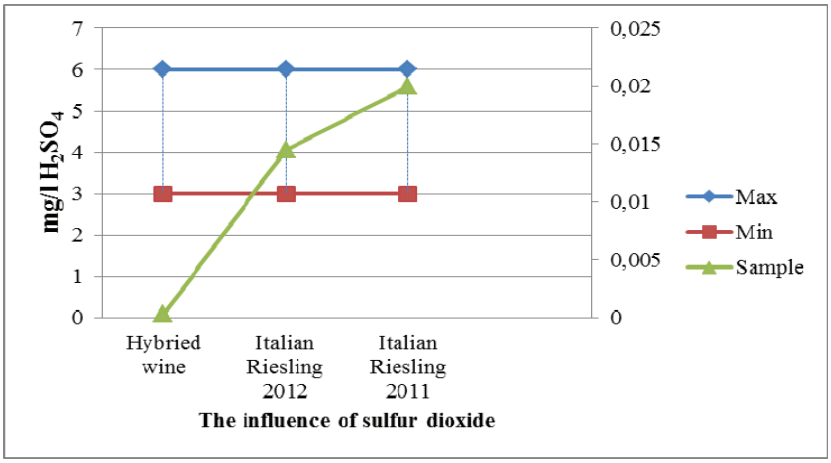

Figure 2. The evolution of total acidity during wine D.O.C. storage and comparated with hybried wine in same condition

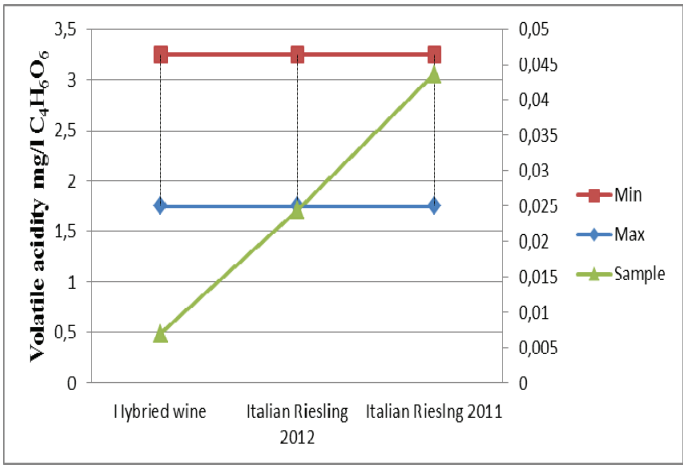

Figure 3. The values of volatile acidity.

CONCLUSIONS

Following the investigation and determination of total acidity on 11 samples which were sulfur varying quantities of the graph could clearly see that only sample one with the least amount of sulfur dioxide has been modified the acid, because the amount administered it wasn't enough to keep acidity properly. In scientific literature the total acidity of white wine values are between 3-6 g / l sulfuric acid.(Giurgiulescu, 2005)

After examining Figure 2 we can see that the value of wine hybrid is below the minimum total acidity provided in scientific literature which demonstrates that the environment in which it was kept had no influence over him, but still both DOC wines changes have been by the fact that the total acidity increased slightly after storage.

The volatile acidity of the wine hybrid was observed on the chart as the lowest value, which indicates that he has a weak and volatile acidity does not fit the other two Italian Riesling samples that have values between 1.5 to 1.75 g / l C_4 H_6 O_6. These values it was taken from the scientific literature.

These analyzes demonstrated that the environment, temperature, light and even operating mode and samples can influence their results.

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STUDY ON SOME MAIN PHYSIOLOGICAL PROCESSES APPLE VARIETIES, DEPENDING ON THE SHAPE OF CROWNS

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Keywords: *physiological elements, crown shape, apple cultivars*

ABSTRACT

In the conditions existing in the hill area of Oltenia, the highly intensive culture of apple represents a necessity both for its modernization and to meet the needs of society.

This paper's aim is to study physiologic reaction (of photosynthesis, photosynthesis rate, transpiration rate, stomatal conductivity) at apple cultivars to environmental factors (temperature, light).

Determination of intensity in physiologic processes in accordance with climate factors has been carried out by using LCapro Portable photosynthesis system.

INTRODUCTION

At the international scale, the long term analysis of climate changes and their biological effect has shown that they have impact on species' physiology, species' distribution, organisms' phenology, biocenosis' composition and dynamics (Parmesan & Yohe, 2003).

The photosynthetic activity is conducted both by seasonal and diurnal changes (light intensity fluctuations, leaf temperature, air temperature and humidity) (Kositsup et al., 2010).

At a particular light intensity, the so-called"light saturation point", the rate of CO_2 evolution levels off. Any further increase in the amount of light striking the leaf does not cause an increase in the rate of photosynthesis the amount of light is said to be 'saturating' for the photosynthetic process (Zeiger, 1990). At the light saturation point, increasing the light no longer causes an increase in photosynthesis (Marenco et al., 2009).

Plants can regulate the movements of water vapours, O_2 and CO_2 on plants are made through the leaf surface. This is accomplished by opening and closing pores, usually found on the bottom side of the leaf (stomata). Opening and closing of stomata is controlled by specialized cells called guard cells (Martin et al., 2010).

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The additive and interactive effects of the stresses and the ability of plant to resist multiple stresses simultaneously can be an important factor in plant growth and survival in stressful environments (Lichtenthaler, 1996).

Research has been made on environmental factors' effect on physiological processes and on growth and development in fruit tree species, in Romania as well (Burzo et al., 1999; Cosmulescu, 2004, 2007, 2008).

MATERIAL AND METHODS

The experiment was established in 2002 in the Research Station for Fruit Growing Valcea with apple trees, grafted on M9 rootstock. Planting was done at a distance of 3,5/1,5m (1904 plants / ha). The trial is bi-factorial of 2x8 type (variety,crown shapes), with four replications, each experimental plot comprising six trees.

Factor A - Variety: Idared, Florina.

Factor B – Crown shape: Fougeres Fusean, Vertical Axe, Solen, Valcea 1, Double Cross 1, Double Cross 2, Tatura Trellis, Tessa.

Determinations of intensity of photosynthesis, photosynthesis rate, transpiration rate, stomatal conductivity were made by using the portable LCpro is designed to carry out precise measurements of photosynthesis and transpiration, by automatically controlling the leaf chamber environment.

Physiological data were recorded in slots: 07-09 A.M; 12-2 P.M. and 4-6 P.M. The evaluation was conducted from 15 to 30 July 2010.

RESULTS AND DISCUSSIONS

Growth and fruit are influenced by mutual and complex links between multiple physiologic processes that are operating at the organs' level, and they are depending on genetic, hereditary and environment characteristics.

Photosynthesis intensity varied as follows:

Florina variety:

Between 7 to 9 A.M. photosynthesis intensity oscillated between 212 μmol/m^2/s the shape of the crown Fougeres Fusean and 1016 μmol/m^2/s at shape of the crown Tessa. Average intensity of photosynthesis depending on the 8 forms crown was 573.9 μmol/m^2/s

Between 12-02 P.M. photosynthesis intensity varied between 405.9 mol/m^2/s at shape of the crown Valcea 1 and 1282 μmol/m^2/s at Double Cross 2, with an average of the 8 forms crown at 697.4 μmol/m^2/s.

Between 04-06 P.M. photosynthesis intensity oscillated between 402 μmol/m^2/s the shape of the crown Solen and 1336 μmol/m^2/s at Double Cross 1. Average intensity of photosynthesis depending on the 8 forms crown was 879.8 μmol/m^2/s.(Figure 1)

Idared variety:

Between 7 to 9 A.M. photosynthesis intensity oscillated between 237 μmol/m^2/s the shape of the crown Vertical Axe and 963 μmol/m^2/s at shape of the crown Tatura Trellis. Average intensity of photosynthesis depending on the 8 forms crown was 519.9 μmol/m^2/s

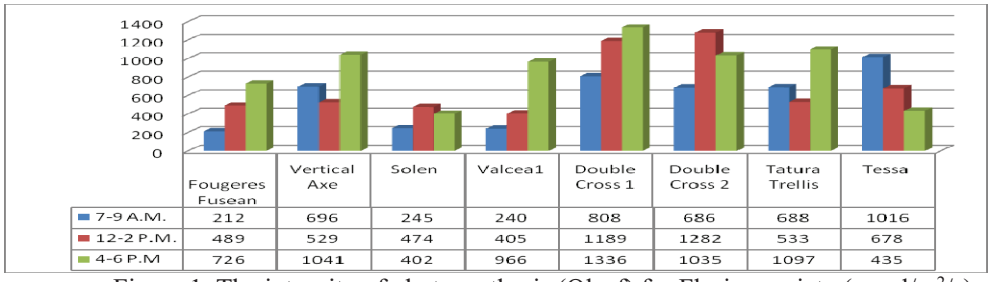
Between 12-02 P.M. photosynthesis intensity varied between 616 μmol/m^2/s (Vertical Axe) and 1303 μmol/m^2/s at Double Cross 2, with an average at 963 μmol/m^2/s.

Between 04-06 P.M. photosynthesis intensity oscillated between 419 μmol/m^2/ (Valcea 1) and 1343 μmol/m^2/s (Tessa). Average intensity of photosynthesis was 988.4 μmol/m^2/s.

The intensity of photosynthesis is very different between shape of crown, for all 3 times interval studied. In Figure 1 the differences are obvious, for both varieties, the

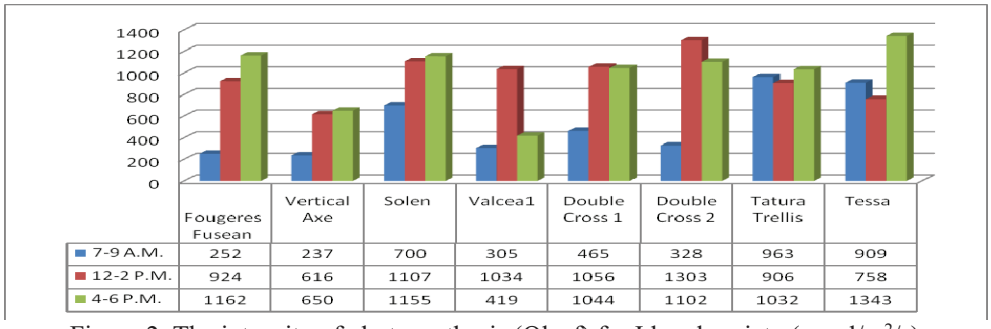
intensity of photosynthesis does not follow a linear path, but it changes very much for the same varieties from one range to another. In some cases the intensity of photosynthesis increases early in the day, intensifies in the afternoon, then grows in the last interval (Solen, Double Cross 2, at Florina variety, and Valcea 1, Double Cross 2 at Idared variety), Figure 2.

There are cases in which the intensity of photosynthesis morning less higher value, and then decreases during the day (Tessa at Florina variety). There are situations the intensity of photosynthesis has highest value in the last recorded time interval (Tatura Trellis and Vertical Axe at Florina variety and Tatura Trellis, Tessa at Idared variety).



	Fougeres Fusean	Vertical Axe	Solen	Valcea1	Double Cross 1	Double Cross 2	Tatura Trellis	Tessa
7-9 A.M.	212	696	245	240	808	686	688	1016
12-2 P.M.	489	529	474	405	1189	1282	533	678
4-6 P.M	726	1041	402	966	1336	1035	1097	435

Figure 1. The intensity of photosynthesis (Qleaf) for Florina variety (µmol/m^2/s)



	Fougeres Fusean	Vertical Axe	Solen	Valcea1	Double Cross 1	Double Cross 2	Tatura Trellis	Tessa
7-9 A.M.	252	237	700	305	465	328	963	909
12-2 P.M.	924	616	1107	1034	1056	1303	906	758
4-6 P.M.	1162	650	1155	419	1044	1102	1032	1343

Figure 2. The intensity of photosynthesis (Qleaf) for Idared variety (µmol/m^2/s)

The rate of photosynthesis was very different and varied from hour to hour, depending on the shape of the crown.

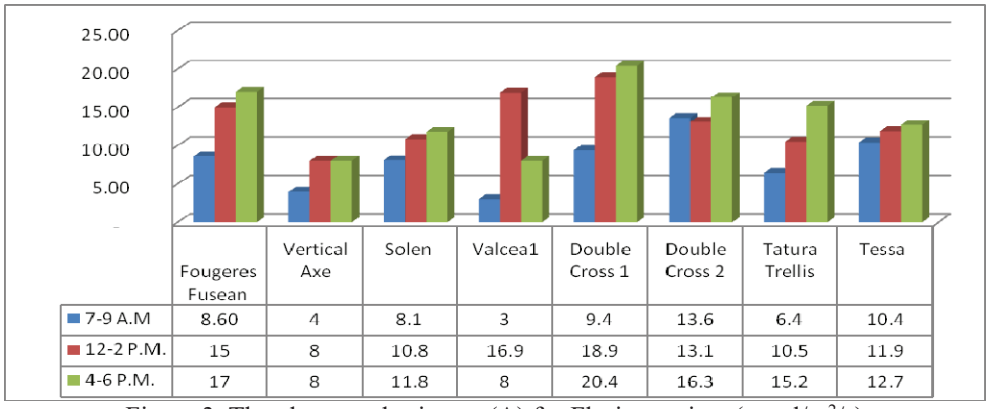
To Florina variety: Between the 07-09 A.M. the rate change between 3 µmol/m^2/s (Valcea 1) and 13.6 µmol/m^2/s (Double Cross 2).

In the time interval 12-02 P.M. the photosynthesis rate values varied from 8.0 µmol/m^2/s (Vertical Axe) and 18.9 µmol/m^2/s (Double Cross 1). In this time frame, the order of trees values has changed.

From 04-06 P.M. the photosynthesis rate values varied between 8.0 µmol/m^2/s (Vertical Axe, Valcea 1) and 20.4 µmol/m^2/s (Double Cross 1). (Figure 3)

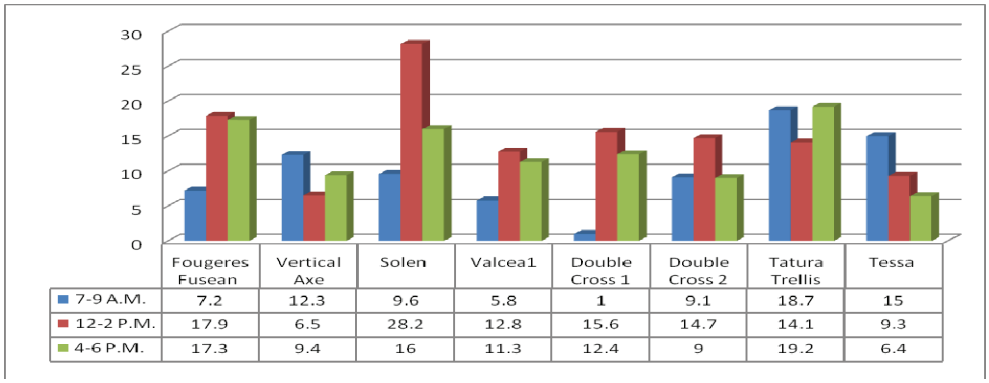
Idared variety photosynthesis rate higher values were recorded in the range 12-02 P.M. 6.5 µmol/m^2/s (Vertical Axe) and 28.2 µmol/m^2/s (Solen), Figure 4.

Transpiration rate is linked with the atmospheric temperature. The two varieties of sweat rate recorded different values following a linear path less Tatura trellis and Tessa forms crown that morning higher value, following a decrease at lunch, and the highest value is recorded one last time slot (Figure 5 and Figure 6).



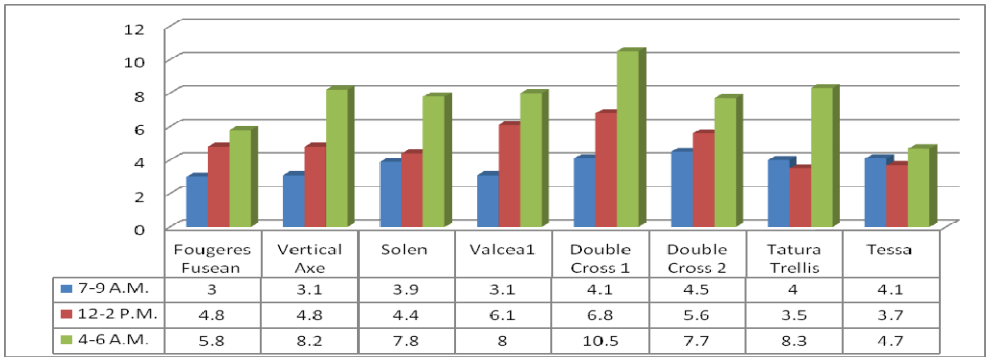
	Fougeres Fusean	Vertical Axe	Solen	Valcea1	Double Cross 1	Double Cross 2	Tatura Trellis	Tessa
7-9 A.M	8.60	4	8.1	3	9.4	13.6	6.4	10.4
12-2 P.M.	15	8	10.8	16.9	18.9	13.1	10.5	11.9
4-6 P.M.	17	8	11.8	8	20.4	16.3	15.2	12.7

Figure 3. The photosynthesis rate (A) for Florina variety (µmol/m^2/s)



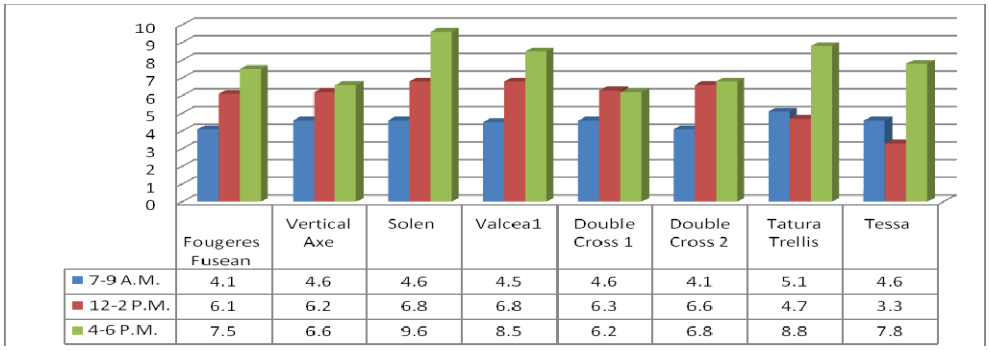
	Fougeres Fusean	Vertical Axe	Solen	Valcea1	Double Cross 1	Double Cross 2	Tatura Trellis	Tessa
7-9 A.M.	7.2	12.3	9.6	5.8	1	9.1	18.7	15
12-2 P.M.	17.9	6.5	28.2	12.8	15.6	14.7	14.1	9.3
4-6 P.M.	17.3	9.4	16	11.3	12.4	9	19.2	6.4

Figure 4 The photosynthesis rate (A) for Idaed variety (µmol/m^2/s)



	Fougeres Fusean	Vertical Axe	Solen	Valcea1	Double Cross 1	Double Cross 2	Tatura Trellis	Tessa
7-9 A.M.	3	3.1	3.9	3.1	4.1	4.5	4	4.1
12-2 P.M.	4.8	4.8	4.4	6.1	6.8	5.6	3.5	3.7
4-6 A.M.	5.8	8.2	7.8	8	10.5	7.7	8.3	4.7

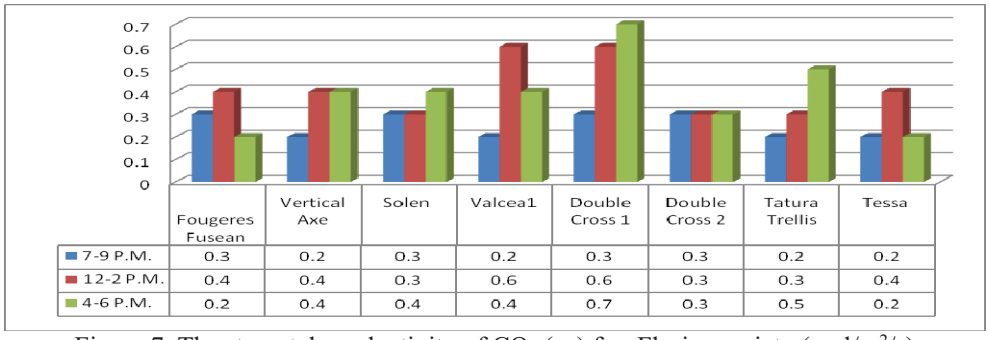
Figure 5. The transpiration rate (E) for Florina variety (mmol/m^2/s)



	Fougeres Fusean	Vertical Axe	Solen	Valcea1	Double Cross 1	Double Cross 2	Tatura Trellis	Tessa
7-9 A.M.	4.1	4.6	4.6	4.5	4.6	4.1	5.1	4.6
12-2 P.M.	6.1	6.2	6.8	6.8	6.3	6.6	4.7	3.3
4-6 P.M.	7.5	6.6	9.6	8.5	6.2	6.8	8.8	7.8

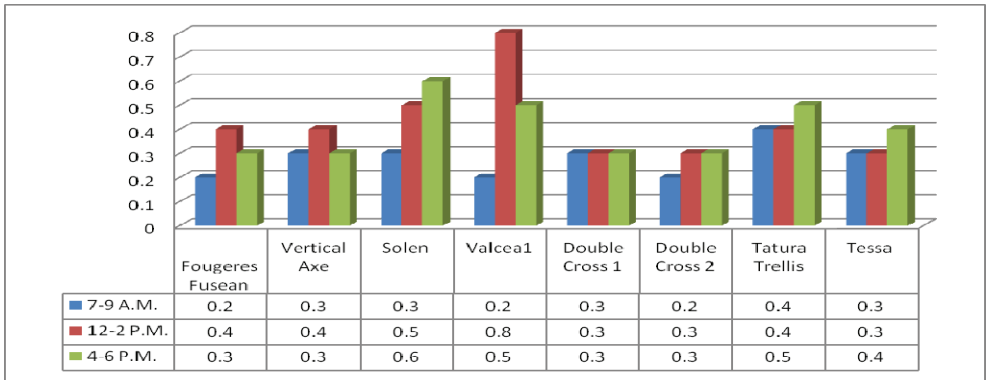
Figure 6. The transpiration rate (E) for Idared variety (mmol/m^2/s)

Another important physiological factor in plant life and dependention photosynthesis is the stomatal conductivity of CO_2. The stomatal conductivity values proved to be different in the care of apple trees. Stomatal conductivity depends on the time of day in wich observations were carried out the light and temperature. Stomatal conductivity value found to be very low, regardless of the time zone in which the observations were made hovering more then 0.1 mol/m^2/s (Figure 7 and 8).



	Fougeres Fusean	Vertical Axe	Solen	Valcea1	Double Cross 1	Double Cross 2	Tatura Trellis	Tessa
7-9 P.M.	0.3	0.2	0.3	0.2	0.3	0.3	0.2	0.2
12-2 P.M.	0.4	0.4	0.3	0.6	0.6	0.3	0.3	0.4
4-6 P.M.	0.2	0.4	0.4	0.4	0.7	0.3	0.5	0.2

Figure 7. The stomatal conductivity of CO_2 (gs) for Florina variety (mol/m^2/s)



	Fougeres Fusean	Vertical Axe	Solen	Valcea1	Double Cross 1	Double Cross 2	Tatura Trellis	Tessa
7-9 A.M.	0.2	0.3	0.3	0.2	0.3	0.2	0.4	0.3
12-2 P.M.	0.4	0.4	0.5	0.8	0.3	0.3	0.4	0.3
4-6 P.M.	0.3	0.3	0.6	0.5	0.3	0.3	0.5	0.4

Figure 8. The stomatal conductivity of CO_2 (gs) for Idared variety (mol/m^2/s)

CONCLUSIONS

Growth and fruit-setting are influenced by complex mutual links among multiple physiological processes that are developed in the organs, depending on genetic, hereditary traits and environment.

Dynamics in photosynthesis and respiration is influenced by environment factor and it varies depending on cultivar and shape of crown.

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THE EFFECT OF THE IRRIGATION REGIME ON YIELD AND THE ECONOMIC INDICATORS OF VINE PROPAGATION MATERIAL PRODUCTION

Emil Tsvetanov*[1], Daniela Dimitrova[1]

Keywords: *vine propagation material, nursery, irrigation regime, economic effect*

ABSTRACT

The results of a trial carried out in the nursery of the Institute of Viticulture and Enology – Pleven in 2011, 2012 and 2014 are presented. The rooted cuttings were of Muscat Kaylashki variety grafted to Berlandieri x Riparia CO4 rootstock. The effect of different irrigation rates on the percentage of obtained premium vine propagation material and the economic indicators of the production process was studied under the conditions of drip irrigation in combination with micro-sprinkling. Four variants of irrigation regime were tested: irrigation to 100% of the estimated irrigation rate (m), irrigation to 125% of the estimated irrigation rate (m), irrigation to 75% of the estimated irrigation rate (m), irrigation to 50% of the estimated irrigation rate (m). As the most cost-effective in terms of return on investment for irrigation was the variant of irrigation regime with optimal irrigation rate (100% m), where the rate of return was 87.3%, while the prime cost of a rooted grafted vine – 0.62 EUR.

INTRODUCTION

The irrigation regime is one of the most important units in the vine propagation material production technology (Dimitrova et al., 2007, Dimitrova et al., 2013). Micro-sprinkling as an irrigation method is the best one to meet the requirements for optimum irrigation regime in the nursery. It ensures high air humidity, which is vital for the vines, especially in the first two months after rooting. Good subsurface distribution of irrigation water in the soil is achieved. It provides the opportunity for introduction with the irrigation water of plant protection preparations, fertilizers and performance enhancers, as well as continuous operation during the hottest hours of the day, with low intensity of rainfall. As a result of our previous studies it was found that the application of micro-sprinkling combined with drip irrigation for refreshing watering is a cost-effective method for irrigation of the vine nursery (Dzhuninski, B. 1980., Tsvetanov et al., 2011, 2014, Dimitrova and Tsvetanov, 2015). Under the conditions of water deficit the issue for the choice of irrigation rate to ensure a high percentage of premium vine propagation material, increasing the economic benefits for the producer should be solved.

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The objective of the study was to determine the effects of application of different irrigation regimes for irrigation of vine nursery on productivity and economic efficiency of the production of vine propagation material.

MATERIALS AND METHODS

The trail was carried out in the nursery of the Experimental Base at the Institute of Viticulture and Enology – Pleven in the years 2011, 2012 and 2014 with Muscat Kaylashki variety grafted to Berlandieri X Riparia CO4 rootstock, (Muscat Kaylashki/ /CO4). The calculation of the irrigation rates was consistent with an already established pattern of grafted cuttings root system growth (Tsvetanov and Kumanov, 2011). Four irrigation regimes were tested, as follows:

1. irrigation to 100% of the estimated irrigation rate (m);
2. irrigation to 125% of the estimated irrigation rate (m);
3. irrigation to 75% of the estimated irrigation rate (m);
4. irrigation to 50% of the estimated irrigation rate (m).

The grafted cuttings were planted in ridges of two rows at 15 cm depth at planting distance of 7-8 cm between the cuttings and 50 cm between the rows in the ridge. The distance between the ridges was 2.0 m. Each variant had 8 replicates including 50 cuttings in each replicate.

The grafted cuttings were watered by drip irrigation system with one lateral per ridge, located between the two rows of grapevines. The laterals had built-in drop-formation units every 15 cm with flow rate of 1.0 L h^{-1}. The volume of the supplied irrigation water was controlled by means of water-meter installed at the beginning of the system. The refreshing watering was performed twice or three times per day, in the morning, at lunchtime and in the afternoon in the amount of 1-2 mm. Water Bird VI Clasic micro-sprinklers were used for that purpose with flow rate q = 156 L h^{-1} at 0.2 MPa pressure and radius of operation r = 5.0 m. The sprinkles were located in a square pattern with a distance between them a = 1.42r = 7 m, thus the irrigated area by one sprinkler was Fi = $2r^2$ = 50 m^2, and the intensity was i = q/Fi = 3.12 mm/h.

The soil moisture dynamics was monitored at intervals 7-10 days to 60 cm depth. The samples were taken in triple replicates at 10 cm and were processed by the conventional weight-thermostatic method during all years of the trail. Watering was performed after each sampling for restoring the soil moisture to LSWC. The quantity of the watering was calculated by the formula:

$$m = 10 H \alpha (\beta_{LSWC} - \beta_a), \text{ m}^3 \text{ da}^{-1} \text{ (Dzhuninski, 1980),}$$

where H is the active soil layer depth (m); calculated by the empirical formula obtained from the date on the root system depth increase as a function of time from planting the vines in the nursery;

$H = (0{,}001t^2 + 0{,}053t + 0{,}034)\sin 45° + a$, where:

H – depth of the active soil layer (cm);

t – time from transplanting the grafted cuttings in the nursery (number of days);

a – planting depth of the cuttings in soil (cm). In this case a = 15cm; sin45° - angle at which the roots were growing in the soil.

A – bulk soil density (g cm^{-3});

β_{LSWC} – limit soil water capacity (%);

β_A – actual moisture (%).

The effect of the tested irrigation regimes was evaluated by means of the yield of standard vines, %. The average data on the obtained rate of premium vines during the three

years of the trial were analyzed for eliminating the impact of the differences in the weather conditions of the year. The mathematical data processing was carried out by the method of analysis of variance at confidentiality levels of the differences (Student's criteria) p = 5.0%, p = 1.0% and p = 0.1% (Dimova and Marinkov, 1999).

The economic assessment was made on the basis of the values of the following indicators (Mihaylov et al., 2002, Bazitov and Bazitov, 2009, Radomirska and Zdravkova, 2012): average yield, pc.ha^{-1} (number of premium grafted rooted vines per unit of an area); total production, EUR.ha^{-1} (value of the quantity of obtained premium vine propagation material); production costs, EUR.ha^{-1} (the total amount of material and labor costs to grow 1 ha nursery); net income, EUR.ha^{-1} (the difference between the total production and the incurred production costs); prime cost, EUR.pc.$^{-1}$ (the production costs and the production quantity ratio); rate of profitability, % (net income and the production costs ratio).

For determining the production costs, detailed technological charts were worked out based on the estimated constructive method (Nikolov, 1997). The material investments were evaluated at the current market prices by December 2014, and the labor costs – based on rates and wages used in IVE - Pleven. The estimated value of premium grafted rooted vines production was done at the average market price of 1.17 EUR for 1 pc, according to information of the National Statistical Institute.

RESULTS AND DISCUSSIONS

Figure 1 shows the data per variants on the average for the three years of the study.

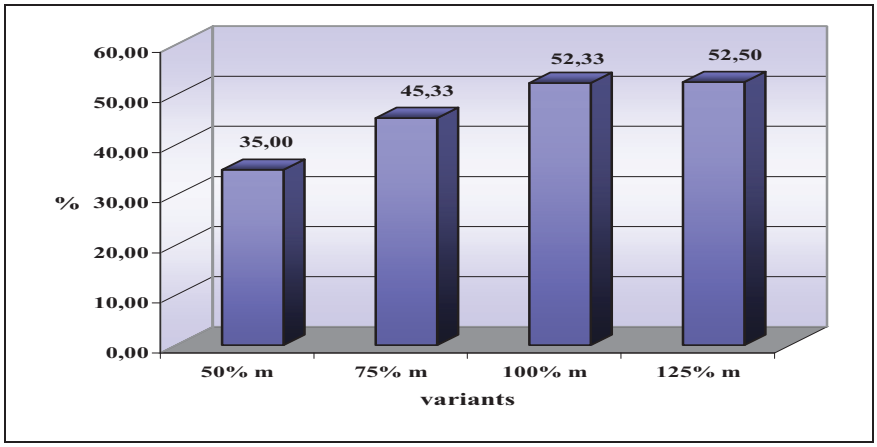

Figure 1 Obtained rate of premium grafted rooted vines per variants on the average for the three years of the trail, %

Analysis of the results revealed that there was a clear correlation between the irrigation rate reduction and the obtained rate of premium vine propagation material – the yield of grafted rooted vines dropped down proportionally to the irrigation rate decrease. However the increase of the irrigation rate above the accepted for optimal (100% m) did not have any significant effect on the rate of premium rooted vines.

To obtain a better picture of the interaction between the conditions during the years of the trail and the variants an analysis of variance was made of the average annual values of the variants per repetitions (Table 1). The results showed that the reduction of the estimated irrigation rate to 50% m, and 75% m reduced the obtained rate of premium

grafted rooted vines, respectively by 17.8% in the variant of 50% m, and 8.0% in the variant of 75% m compared to the variant accepted to be the optimal - 100% m. The correlation of the other two variants (100% m, 125% m) revealed that the increase in the irrigation rate above the calculated one did not affect the yield of grafted rooted vines.

Table 1

Proof of the differences in the obtained premium vine propagation material per variants on the average for the three years of the trail

Variants	Aver. Value	50% of "m"		75% of "m"		100% of "m"		125% of "m"	
		difference	proof	difference	proof	difference	proof	difference	proof
50% of "m"	35.00	x	x	-10.33	--	-17.33	---	-17.50	---
75% of "m"	45.33	10.33	++	x	x	-7.00	-	-7.16	-
100% of "m"	52.33	17.33	+++	7.00	+	x	x	-0.16	n.s
125% of "m"	52.50	17.50	+++	7.16	+	0.16	n.s	x	x

5% - (+) (-); 1% - (++) (--); 0.1% - (+++) (---); <5% - (n.s).

The data in table 2 illustrated the economic effect of the different irrigation rates for the irrigation of the vine nursery.

The obtained average yield for the three-year study period, as the main indicator determining the economic effect of production, was the highest in the variants of irrigation to 125% of the optimal irrigation rate and in the variant of optimal irrigation rate - 100% m.

Table 2

Economic results of applied different irrigation rates in the vine nursery

Indicators	**Variants**			
	100% m	**125% m**	**75% m**	**50% m**
Average yield, pc.ha^{-1}	62796	63000	54396	42000
Total production, EUR.ha^{-1}	73471	73710	63643	49140
Production costs, EUR.ha^{-1}	39218	39335	38908	38518
Including for irrigation:	3159	3274	3044	2929
- material	920	1035	805	690
- labour force	2045	2045	2045	2045
- depreciation	194	194	194	194
Net income, EUR.ha^{-1}	34253	34375	24735	10622
Prime cost, EUR per 1 vine	0.62	0.62	0.72	0.92
Rate of profitability, %	87.3	87.4	63.6	27.6

The lowest average yield was obtained in the variant of the nursery irrigation to 50% of the irrigation rate. The decrease was by 22.8% compared to the irrigation variant to 75% of the irrigation rate and respectively by 33.1% and 33.3% compared to the variants to 100% and 125% of the irrigation rate.

The obtained total output as an indicator in correlation with the level of the average yield was the highest in the variants of optimal irrigation regime (100% m) and 125% of the optimal irrigation rate. The excess compared to the other studied variants amounted to 9828 EUR.ha^{-1} and 10067 EUR.ha^{-1} in the variant of irrigation to 75% of the optimal irrigation rate and respectively 24331 EUR.ha^{-1} and 24570 EUR.ha^{-1} in the variant to 50% of the irrigation rate.

Ensuring the necessary irrigation regime for growing grafted vine cuttings in the nursery was related with capital investments for the acquisition of the irrigation system, and operating expenses for the annual installation and removal of the device. The investment costs amounted to 2761 EUR. The lifespan of the irrigation system was 15 years, which formed the depreciation rate of 7%. The irrigation water value was calculated based on the cost of supply by own drilling well. The difference in the total cost of irrigation per variants depended on the consumed water for the irrigations in the nursery. Its value was the highest in the variant to 125% m, exceeding by 117 EUR.ha^{-1} the total investments for the optimal irrigation rate (100% m). The amount of investments for irrigation in both of these variants – 125% m and 100% m was respectively higher by 7.6% and 3.8% of that in the variant to 75% of the irrigation rate and by 11.8% and 7.9% of the amount for the variant to 50% of the irrigation rate.

Despite the higher irrigation costs in the variants to 125% of the irrigation rate and 100% of the irrigation rate, the resulting net income (profits) in these two irrigation regimes was the highest. The increase in comparison with the values for that indicator in the other two studied variants was as followed: respectively by 223.6 % and by 222.5% compared to the variant to 50% m; respectively by 39.0% and by 38.5% compared to the variant to 75% m.

The prime cost per unit of output was the lowest - 0.62 EUR per vine in the variants with irrigation rate 100% m and 125% m. Despite the saving of resources made by reducing the optimal irrigation rate by 50%, the lowest level of the obtained average yield for the three-year study period determined the high unit cost of premium vine propagation material - 0.92 EUR.pc.$^{-1}$. The increase compared to the obtained value of the indicator in the variants of irrigation rate to 100% and 125% m amounted to 0.30 EUR.pc.$^{-1}$. The prime cost per vine in the variant of irrigation to 75% of the irrigation rate was lower than that in the preceding variant by 0.20 EUR.pc.$^{-1}$, but exceeded the level of the indicator in the other two variants (100% m and 125 m %) by 0.10 EUR.pc.$^{-1}$.

The return on investment, expressed as the rate of profitability was the highest in the variants with optimal irrigation rate and 125% of the estimated irrigation rate. The excess compared to the variant with irrigation rate to 75% m amounted to 23.7-23.8%, resulting from the higher yields in these variants. The lowest rate of profitability was realized in the variant of irrigation to 50% of the irrigation rate, as the decrease was respectively by 59.8% compared to the variants to 100% m, 125% m and 36.0% compared to the variant to 75% m.

CONCLUSIONS

The obtained results of the comparative economic assessment defined as economically inexpedient the variant of irrigation with 50% of the irrigation rate. Water savings in this case provided less quantity of premium vine propagation material per unit area, which reflected on the poorer economic results of the production activity.

The best business and economic results were realized in the variants of irrigation to 100% and 125% of the irrigation rate. The similar values of the rate of profitability and the prime cost per unit of output in the variants with optimal irrigation rate and to 125% of the irrigation rate did not justify the higher cost of water than the optimal as better economic and environmentally efficient solution. In the conditions of water deficit it is advisable to be preferred the variant of irrigation regime on the basis of the optimal irrigation rate.

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THE IMPACT OF CLIMATIC CONDITIONS ON SOME PHYSIOLOGICAL PROCESSES AT FOUR CHERRY VARAIETIES GRAFTED ON LOW VIGOR ROOTSTOCKS

Vasile N.I.[1], Dumitru Mihaela Gabriela[2], Baciu A.A.[3]

Keywords: *Cherries, acclimatization, environmental factors*

ABSTRACT

The experiment was conducted to determine the role of climate conditions on the behavior in the crops of Vâlcea of some cherry varieties on parent stock of small effect (Kordia, Summit, Regina and Simone). Were performed measurements of the physiological and assimilated parameters of cherry leaves (the rate of net photosynthesis (A = µmol/m^2/s), the rate of transpiration (E = mmol/m^2/s), stomatal conductance (gs =mmol/m^2/s), CO_2 substomatal (Ci= µmol/mol), the rate of water use (WUE = µmol/mol) in a garden with an area of 1 Ha located in Copăceni, Vâlcea County. Measurements were carried out in June before harvesting with a light intensity of 80.430 lux at lunchtime (12,30) with a mobile luxmeter for measurement of light intensity with removable sensor, model Teste 545. Following measurement are noticed Simone and Kordia varieties with values of net photosynthesis, CO_2 substomatal and water utilization, superior to that of Summit and Regina varieties, values that lead to an optimal acclimatization process in Vâlcea county area.

INTRODUCTION

Development of cherry cultivation throughout Europe and Asia is due to its growing efforts of France, Germany, Hungary, Italy, Denmark, Great Britain, Czech Republic, Romania, Estonia, Ukraine, Turkey, Japan and China. In the past decade has made the release of more than 140 varieties of cherry that helped expand the schedule to harvest the fruits of cherry and improve their quality such as size, flavor, pulp, firmness and color. Fruit cracking resistance was improved and molecular studies have helped to knowledge of genetic mechanisms of plants and fruits (Sansavini & Lugli, 2005:45).

Interest in achieving sustainable technologies for cherries crop is dominated by the possibility of locating crops in an area where change of natural climate factors (soil, climate and biota) are in close accordance with their needs.

Trees needs for the environment varies greatly in relation to species, variety and parent stock, growth phase, age etc.

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Growth and fruition of trees takes place under the influence of two categories of factors: hereditary and ecological.

Ecological factors with a direct effect on growth and exploit are grouped into several categories:

- Light, temperature, water and air;
- Edaphic factors (pedological), comprising physical and chemical properties of the soil, the extent of providing it with nutrients, water, air, and microbiological activity;
- Organic factors;
- Biotic factors.

The requirement of light is very important for trees because its presence trees photosynthesis occurs. It influences the growth rate and the formation of aerial organs of plants, breath and sweat of leaves and determines the direction of growth of shoots (Project TIP, 2006: 1).

Light is one of the most important factors in increasing production of fruit crops, respectively sunlight, which is the primary source of energy that produces assimilation of organic matter.

To determine the role of climatic conditions on the behavior of varieties of cherry on parent stock of small effect in crops in Vâlcea (Kordia, Summit, Regina and Simone) were performed measurements of the physiological and assimilated parameters of cherries in an orchard with an area of 1 ha located in the locality of Copăceni, Vâlcea County, which is part of alongside with 4 other counties (Dolj, Gorj, Mehedinţi and Olt) the South-West development region of Romania lying between the meridians 22°2’ and 24°2’ 'and the parallels of 43°3’ and 45°3’2, covering 29212 km^2, i.e. 12.25% of Romania. Copăceni locality has an area of 6317 km^2 situated at latitude 45, longitude 23.983 45º0’0’’ North, 23º58’59’’ East and altitude of 329m and is located in the middle of the temperate zone, characterized by the succession of the four seasons, belonging to this area. Continental transition climate is determined by genetic factors of climate which are: cosmic, dynamic and geographical (http://copaceni.infoprimarie.ro).

MATERIALS AND METHODS

The leaf is the organ most important in growth, development and fruiting of trees. Inside the leaf occur the most important biochemical and physiological processes and anatomical structure is extremely complex, being the bearer of specific substances (chlorophyll) important for its primary function, photosynthesis, the process in which with the help of sunlight and the presence of chlorophyll, organic substances, water, mineral salts and carbon dioxide are converted into primary organic substance (glucose), which by subsequent processing achieve the whole range of organic substances (carbohydrates, lipids, proteins) (Project TIP, 2006: 1).

Given this studying the main physiological parameters was performed on leaf samples collected from four varieties of cherry being subject to acclimatization (Kordia, Summit, Regina and Simone).

For determination of physiological parameters was used a non-destructive method (leaves of the 4 varieties subject to acclimatization were detached from plants) based on the use of LC Pro+photosynthesis system, which causes multiple physiological and environmental indicators simultaneously:

- Net photosynthetic rate (A = μmol/m^2/s), Figure 1;
- Transpiration rate (E = mmol/m^2/s), Figure 2;
- Stomatal conductance (gs =mmol/m^2/s), Figure 3;

- CO_2 substomatal (Ci= µmol/mol), Figure 4;
- The rate of water usage (WUE = µmol/mol), Figure 5 (*User Manual of BioScientific LCpro+ System*).

Measurements were carried out in June before harvesting at a light intensity of 80.430 lux at lunchtime (12.30) with a mobile luxmeter measuring light intensity, with removable sensor model Teste 545.

RESULTS AND DISCUSSIONS

Following the determination of net photosynthesis on cherry plants were found the following average values: Simone variety had a value of 15.6 µmol m-2s-1, Kordia variety 13,9 µmol $m^{-2}s^{-1}$, Summit variety 11 µmol $m^{-2}s^{-1}$ and Regina variety 10,5 µmol $m^{-2}s^{-1}$, Figure 1.

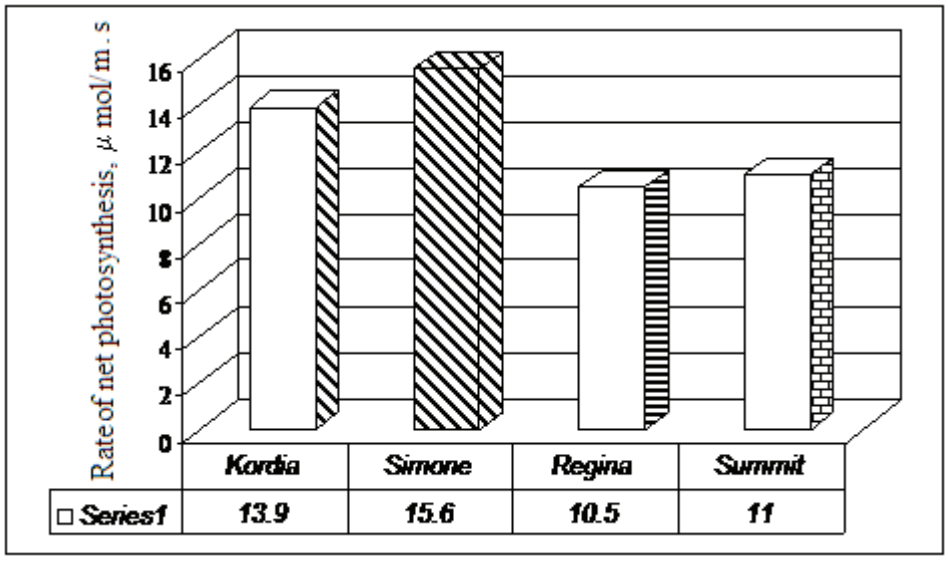

Figure 1. The rate of net photosynthesis in cherry plants

Simone and Kordia varieties are noted with high values of photosynthesis process. An increase in the photosynthesis process ensures obtaining on plants cultivated of what is considered full biological crop (assimilates of all plant organs) and agricultural crop (assimilates used as agricultural products).

Transpiration is the process of removing water from plants in the form of vapor, only on terrestrial plants, through all plant organs, except the roots. Deficiency of saturation of water vapor in the atmosphere causes the sweat.

Removing water from plants is absolutely necessary because it ensures:

- raw sap rise through the xylem;
- avoid water saturation of cells;
- avoid overheating of plants.

The positive effects of this process are found in plant life, being able to nominate them as follows: cooling effect of foliar system, water absorption and effect of maitaining cell turgor and effect on the absorption of mineral salts.

Following the measurement on cherry plants, Simone variety shows an average rate of transpiration of 3.2 mmol $m^{-2}s^{-1}$, Kordia variety 3. 3,8 mmol $m^{-2}s^{-1}$, Summit variety de 4,5 mmol $m^{-2}s^{-1}$ and Regina variety 5,6 mmol $m^{-2}s^{-1}$. Simone and Kordia varieties are noted with the lowest amount of transpiration rate, Figure 2.

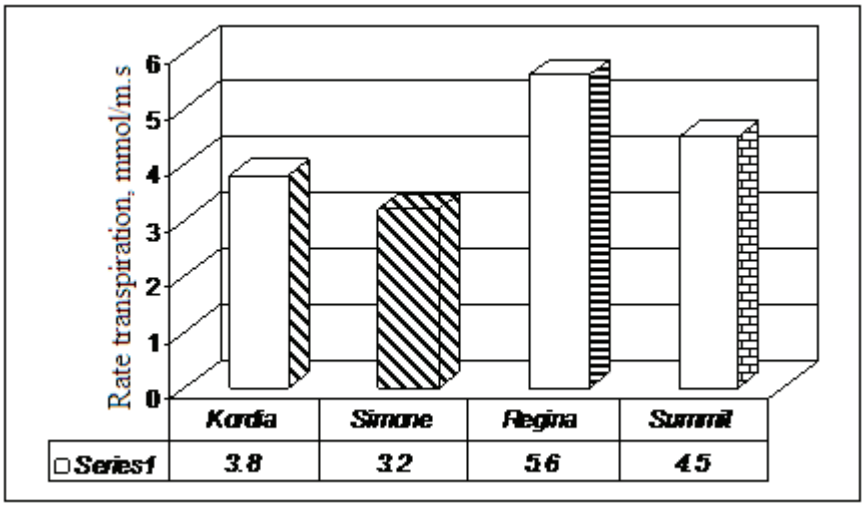

Figure 2. Cherry plants transpiration rate

Stomatal conductance, gs is directly related to the transpiration process. Its increase leads to an increase in the leaf transpiration. The stomata is a specialized structure located in the epidermis and plays a role in gas exchange between the plant and the external environment, and releases water vapor (transpiration). They are nothing but the external epidermal elements of aerifer tissues. With their help also occurs penetration of carbon dioxide into the plant required for assimilation and oxygen necessary for respiration, and the removal of plant body of various gaseous substances (oxygen and carbon dioxide) formed during different processes.

In Figure 3 the average values determined on cherry varieties under study are shown. Thus, Regina variety has stomatal conductance of 425 mmol/m^2s, Sumit variety 401 mmol/m^2s, Kordia 326 mmol/m^2s and Simone 287 mmol/m^2s.

For terrestrial plants CO2 concentration is one of the three limiting factors highlighted by F.Blackman.

Photosynthesis occurs by CO_2 penetration through ostiole stomata into substomatic room, where diffuses through the intracellular space to the hydrated cell walls. At this level CO_2 is dissolved. It crosses the cell membrane by simple diffusion and reaches the chloroplast where it is fixed. In the process of photosynthesis, O_2 formed makes the reverse path, being released into the atmosphere. The resulting organic substances are transported from cell to cell to the vessels, from which they are spread throughout the plant body.

Substomatal CO_2 measurements led to averages values of 278 mmol mol^{-1} for Simone variety of cherry, 265.7 mmol mol^{-1} for Kordia variety, 220 mmol mol^{-1} for Summit variety and 195 mmol mol^{-1} for Regina variety, Figure 4.

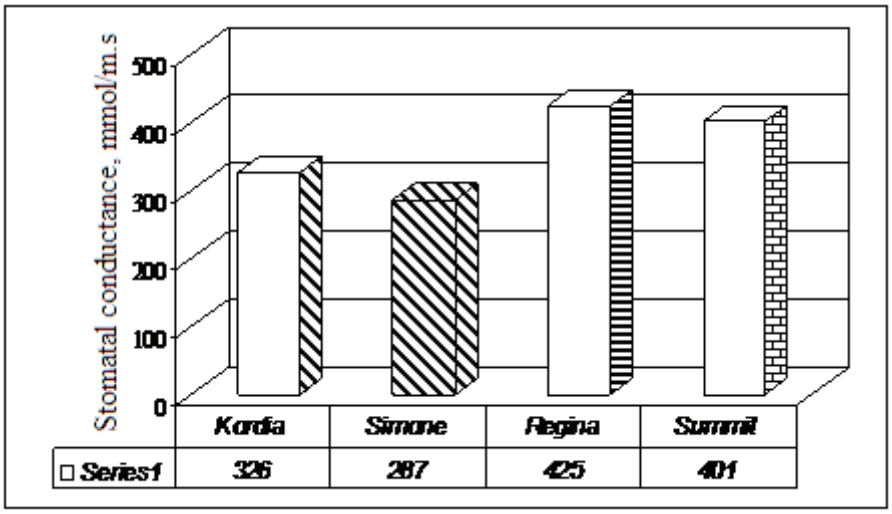

Figure 3. Stomatal conductance on cherry plants, CO_2 substomatal Ci concetration

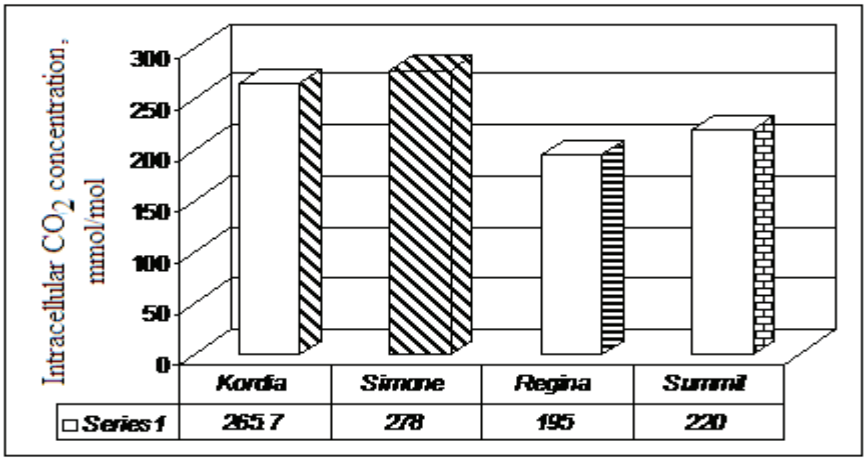

Figure 4. Intracellular CO2 concentration of cherry plants

The rate of water use in plants presents an important parameter in identifying the variety adaptable to water stress (Orlovic et al., 2014: 381; Ehleringers 1993: 155). It reflects the ability of plants to minimize water losses during drought. Plants can to obtain an utilization rate of water through reduced transpiration or by higher net photosynthesis, or both (Orlovic et al., 2014: 381, Rouhi et al., 2007: 117).

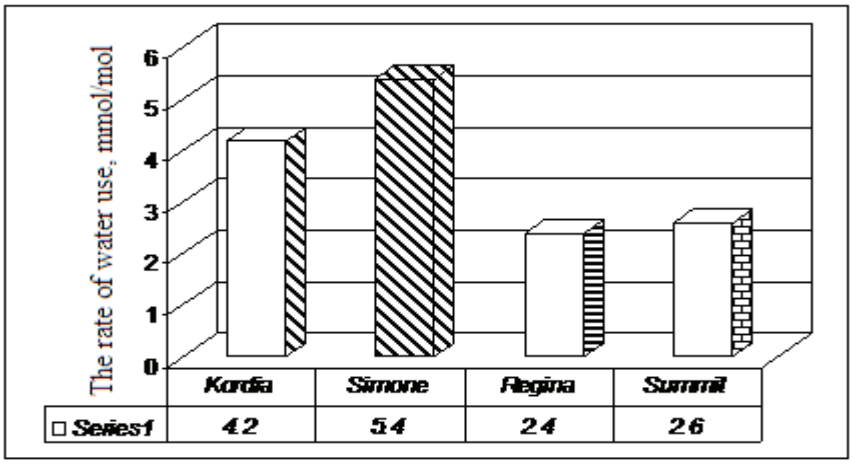

Figure 5. The rate of water use on cherry plants

Maintaining a high level of plant utilization in water has a specific water saving strategy that allows plants to avoid high water losses and moderating its absorption as an important advantage in periods of prolonged drought.

Following the measurements made Simone variety presents the highest average rate of water use 5.4 mmol/mol followed by Kordia (4.2 mmol/mol), Summit (2.6 mmol/mol) and Regina (2.4 mmol/mol), Figure 5.

CONCLUSIONS

Corroboration of experimental data obtained from measurements of key physiological parameters during the growing season of the four varieties of cherry in conjunction with environmental factors surrounding Vâlcea area highlight Simone and Kordia varieties. The two varieties have average value of net photosynthesis, CO_2 substomatal and rate of water use higher than those of Summit and Regina varieties, values that lead to an optimal acclimatization process in Vâlcea county area.

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*** http://copaceni.infoprimarie.ro

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STRUCTURE, DYNAMICS AND ABUNDANCE OF COLLECTED BEETLES IN CORN CULTURES

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Keywords: *Coleoptera, soil traps type Barber, corn cultures.*

ABSTRACT

Collecting the material was made during 2013 in corn culture from a company with private capital in Botosani.

The material was harvested in ground traps type Barber of corn batches with four different prior plants, namely: Lot 1- corn after wheat, Lot 2- corn after sunflower, Lot 3 - corn after soybeans, Lot 4- corn after corn.

The species collected were: Pseudophonus griseus, Pseudophonus rufipes, Pterostichus cupreus, Dermestes laniarius, Coccinella 7 punctatta, Epicometis hirta, Opatrum sabulosum, Dorcadion pedestre, Brachynus crepitans etc .

INTRODUCTION

Coleoptera are the most numerous species, more than 300,000, not only of insects, but throughout the world creatures. All are characterized by converting previous wings sheath that covers very well the rest abdomen and defend it. They are spread all terrestrial, aquatic and cave adopted in part to supply all regions. A large number are predatory entomophagous very useful to man, the vast majority are phytophagous, so harmful. Some have adapted to parasitism.

There are also species of predatory beetles that can populate ecosystems such as tree species of beetles Calosoma, Pterostichus, Brachynus etc. Ideally, some species (predatory and harmful) to find a balance so harmful species to cause damage (Sin et al. 2002, Safavi 1968). The present study is a comparative study of beetles found in four corn lots with four different types of plants preceding.

MATERIAL AND METHODS

The research was conducted in 2013 in a corn crop belonging to a private company in Botosani. Collecting the material was done with soil traps type Barber (Panin 1951, Rogojanu & Perju 1979, Talmaciu et al. 2007). Setting traps was made in mid-May, they functioned until the end of August, every six traps for each lot.

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For objective reasons (torrential rain, thunderstorms, strong winds) was possible only take three harvests of the following material: Harvest I- 20.05.2013; Harvest II- 03.06.2013; Harvest III -02.08.2013.

At each of the three crops selected for trap material which ever is the species collected and replaced or supplemented as appropriate formalin solution. Throughout the period in 2013 were harvested materials of 28 traps per harvest, the situation is as follows: Harvest. I- Lot 1 with 6 traps and Lot 2 with 3 traps; Harvest II - Lot 1 with 5 traps, Lot 2 with 6 traps; Lot 3 with 6 traps; Lot 4 with 4 traps; Harvest III -Lot 2 with 6 traps and Lot 4 with 3 traps. In total were harvested 39 traps. In other case were no other crops species of beetles, or traps were full of earth, plant debris or were not at all. The collected material selected from the coleopteran species were then determined**.**

RESULTS AND DISCUSSIONS

In 2013 the 4 groups were made a number of different collections:

- In lot 1 were performed a total of two harvests;
- In lot 2 were completed in a total of three harvests;
- In lot 3 was carried out one harvesting;
- In lot 4 were carried out two crops.

The fauna of beetles collected in 2013, the trapping and harvesting is as follows:

-of maize belonging No.1 experimental group (Table 1) were collected:

a. Take harvest was collected a total of 1694 samples of beetles after centralization of the six traps. The traps no. 1 were collected from 26 of the 312 samples belonging to species. The traps no. 2 were collected 348 samples belonging to 12 species. The traps no. 3 were harvested in 300 samples belonging to a number of 13 species of beetles. Trapped 4, in total number of samples collected was 285, which belong to 20 species. 234 samples was collected from trap number 5 belonging to 14 species of beetles. In the sixth trap was collected a total of 19 species with a total of 215 samples of beetles centralized.

b. harvesting II were collected a total of 10 samples belonging to several species of beetles, the largest number of samples (7) were collected in trap number three, then followed traps number 1, 2 and 6 with a single samples. For other traps it was not collected any samples.

c. harvesting III were not collected samples of the beetles species.

Table 1

The situation regarding the species and number of specimens collected from the corn lot number 1 in 2013

Traps / Traps 1		Harvest I 20.05.2013	Harvest II 03.06.2013	Harvest III 02.08.2013	Total
1.	*Epicometis hirta*	210	0	0	210
2.	*Dorcadion fulvum*	1	0	0	1
3.	*Dorcadion pedestre*	11	1	0	11
4.	*Dermestes laniarius*	12	0	0	12
5.	*Bothynoderes punctiventris*	1	0	0	1
6.	*Harpalus distinguendus*	6	0	0	6
7.	*Pterostichus cupreus*	6	0	0	6
8.	*Silpha obscura*	8	0	0	8
9.	*Cassida nobilis*	6	0	0	6
10.	*Tanymecus dilaticollis*	2	0	0	2
11.	*Agriotes lineatus*	4	0	0	4

12.	*Necrophorus vespillo*	1	0	0	1
13.	*Opatrum sabulosum*	3	0	0	3
14.	*Tanymecus palliatus F.*	1	0	0	1
15.	*Longitarsus anchusae*	2	0	0	2
16.	*Anthicus antherimus*	9	0	0	9
17.	*Bembidion meridianus*	1	0	0	1
18.	*Rhizophagus parvulus*	2	0	0	2
19.	*Phyllotreta vitulla*	5	0	0	5
20.	*Ceuthorryncus rapae*	1	0	0	1
21.	*Anthicus gracilis*	3	0	0	3
22.	*Anthicus floralis*	2	0	0	2
23.	*Metabletus truncatellus*	3	0	0	3
24.	*Formicomus pedestris Rossi*	8	0	0	8
25.	*Acupalpus meridianus*	3	0	0	3
26.	*Ophonus puncticollis*	1	0	0	1
Total trap 1		***312***	***1***	***0***	***313***
Trap 2:					
1.	*Epicometis hirta*	300	0	0	300
2.	*Dorcadion fulvum*	1	0	0	1
3.	*Dorcadion pedestre*	4	0	0	4
4.	*Carabus scabriusculus*	1	0	0	1
5.	*Dermestes laniarius*	15	0	0	15
6.	*Pterostichus cupreus*	3	0	0	3
7.	*Harpalus distinguendus*	5	0	0	5
8.	*Silpha obscura*	10	0	0	10
9.	*Opatrum sabulosum*	3	0	0	3
10.	*Bothynoderes punctiventris*	2	0	0	2
11.	*Phylotreta vitulla*	3	0	0	3
12.	*Formicomus pedestris Rossi*	1	0	0	1
13.	*Longitarsus anchusae*	0	1	0	1
Total trap 2		***348***	***1***	***0***	***349***
Trap 3:					
1.	*Epicometis hirta*	245	3	0	248
2.	*Dorcadion pedestre*	3	0	0	3
3.	*Carabus scabriusculus*	1	0	0	1
4.	*Silpha obscura*	1	0	0	1
5.	*Opatrum sabulosum*	5	0	0	5
6.	*Harpalus distinguendus*	5	1	0	6
7.	*Dermestes laniarius*	15	0	0	15
8.	*Harpalus aeneus*	1	0	0	1
9.	*Anthicus antherimus*	6	0	0	6
10.	*Longitarsus anchusae*	5	2	0	7
11.	*Anthicus antherimus*	9	0	0	9
12.	*Phyllotreta vittula*	3	0	0	3
13.	*Leucosomus pedestris*	1	0	0	1
14.	*Tanymechus palliatus*	0	1	0	1
Total trap 3		***300***	***7***	***0***	***307***
Trap 4:					
1.	*Epicometis hirta*	219	0	0	219
2.	*Cetonia aurata*	1	0	0	1
3.	*Dorcadion pedestre*	6	0	0	6
4.	*Dorcadion fulvum*	2	0	0	2
5.	*Silpha obscura*	6	0	0	6
6.	*Tanymecus palliatus*	3	0	0	3

7.	*Dermestes laniarius*	7	0	0	7
8.	*Anisodactylus binotatus*	1	0	0	1
9.	*Anisodactylus signatus*	1	0	0	1
10.	*Pseudophonus rufipes*	2	0	0	2
11.	*Tanymecus dilaticollis*	3	0	0	3
12.	*Agriotes lineatus*	2	0	0	2
13.	*Harpalus distinguendus*	4	0	0	4
14.	*Formicomus pedestris Rossi*	8	0	0	8
15.	*Anthicus antherimus*	4	0	0	4
16.	*Phylotreta vitulla*	3	0	0	3
17.	*Longitarsus anchusae*	5	0	0	5
18.	*Cassida nobilis*	2	0	0	2
19.	*Rhizophagus parvulus*	5	0	0	5
20.	*Typhaea stercorea L.*	1	0	0	1
Total traps 4		***285***	***0***	***0***	***285***
Traps 5:					
1.	*Epicometis hirta*	183	0	0	183
2.	*Dorcadion pedestre*	1	0	0	1
3.	*Dorcadion fulvum*	4	0	0	4
4.	*Dermestes laniarius*	7	0	0	7
5.	*Opatrum sabulosum*	4	0	0	4
6.	*Chromaderus fasciatus*	1	0	0	1
7.	*Pseudocleanus cinereus*	7	0	0	7
8.	*Cassida nobilis*	1	0	0	1
9.	*Anthicus antherimus*	12	0	0	12
10.	*Formicomus pedestris Rossi*	5	0	0	5
11.	*Phylotreta vitulla*	4	0	0	4
12.	*Longitarsus anchusae*	2	0	0	2
13.	*Bembidion lampros*	2	0	0	2
14.	*Anthicus floralis*	1	0	0	1
Total traps 5		***234***	***0***	***0***	***234***
Traps 6					
1.	*Epicometis hirta*	154	1	0	155
2.	*Dorcadion pedestre*	5	0	0	5
3.	*Dorcadion fulvum*	2	0	0	2
4.	*Silpha obscura*	2	0	0	2
5.	*Opatrum sabulosum*	5	0	0	5
6.	*Dermestes laniarius*	7	0	0	7
7.	*Pseudocleanus cinereus*	6	0	0	6
8.	*Agriotes lineatus*	2	0	0	2
9.	*Xantholinus lentus Grav.*	1	0	0	1
10.	*Lixus ascanii*	1	0	0	1
11.	*Tanymecus dilaticollis*	2	0	0	2
12.	*Anisodactylus signatus Panz*	1	0	0	1
13.	*Ophonus punctulatus*	1	0	0	1
14.	*Baris artemisiae Herbst.*	1	0	0	1
15.	*Cantharis obscura*	1	0	0	1
16.	*Phylotreta vitulla*	8	0	0	8
17.	*Formicomus pedestris Rossi*	5	0	0	5
18.	*Hiraphilus elongatus*	6	0	0	6
19.	*Longitarsus anchusae*	5	0	0	5
Total traps 6		***215***	***1***	***0***	***216***
TOTAL HARVESTED		***1694***	***10***	***0***	***1704***

II. of maize belonging no.2 experimental group (Table 2):

a. Take harvest was collected a total of 1540 samples of beetles from all six traps. The traps no. 1 were collected 316 samples belonging to a total of 18 species. In traps no 2 were harvested 264 samples belonging to 20 species. In the traps no. 3 were harvested in 225 samples belonging to a number of 18 species of beetles. Trapped 4 in total number of samples collected was 286, which belong to 21 species. 234 samples was collected from trap number 5 which belong to 20 species of beetles. In the sixth trap was collected a total of 23 species with a total of 215 samples of beetles centralized.

b. harvesting II were collected in total 215 specimens belonging to several species of beetles, the largest number of samples (62) were collected in trap number three, then came trap number one with a number of 47 samples to trap number 6 were collected a total of 38 samples of beetles, then the trap number 5 all samples was 31 samples, 19 samples were collected using trap number 2, and the lowest number of samples (18) was collected in trap number four.

c. harvesting III were collected 65 samples of beetles. In traps no. 1 were collected 16 samples belonging to a number of three species. In traps no. 2 were collected 12 samples belonging to three species. In traps no. 3 were harvested a total of 12 samples belonging to a number of 3 species of beetles. Trapped 4 total number of samples collected was 7, which belong to the two species. A total of 12 samples was collected from trap number 5 which belong to the two species of beetles. In the sixth trap it was collected only seven samples beetle species.

Table 2

The situation regarding the species and number of samples collected from corn lot no. 2 in 2013

Traps		**Harvest I 20.05.2013**	**Harvest II 03.06.2013**	**Harvest III 02.08.2013**	**Total**
1.	*Epicometis hirta*	259	3	0	262
2.	*Pterostichus cupreus*	31	25	8	64
3.	*Dorcadion pedestre*	6	0	0	6
4.	*Dorcadion fulvum*	2	0	0	2
5.	*Pseudocleanus cinereus*	1	0	0	1
6.	*Opatrum sabulosum*	5	0	0	5
7.	*Leptinotarsa decemlineata*	1	0	0	1
8.	*Dermestes laniarius*	2	5	0	7
9.	*Agriotes lineatus*	1	0	0	1
10	*Pterostichus nigrita*	2	0	0	2
11	*Brachynus enp*	2	0	0	2
12	*Melbe proscarabaeus*	1	0	0	1
13	*Slischrochilus quadripuntulatus*	3	0	0	3
14	*Anthicus antherimus*	0	6	0	6
15	*Longitarsus anchusae*	0	3	0	3
16	*Phyllotreta undulata*	0	5	0	5
17	*Pseudophonus griseus*	0	0	2	2
18	*Pseudophonus rufipes*	0	0	6	6
Tolal trap1		***316***	***47***	***16***	***379***
Trap 2:					
1.	*Epicometis hirta*	179	4	0	183
2.	*Pterostichus cupreus*	29	0	6	35

3.	*Dorcadion pedestre*	6	0	0	6
4.	*Dorcadion fulvum*	4	0	0	4
5.	*Agriotes lineatus*	2	0	0	2
6.	*Dermestes laniarius*	6	1	0	7
7.	*Opatrum sabulosum*	8	0	0	8
8.	*Pseudocleanus cinereus*	2	0	0	2
9.	*Brachynus enp*	3	0	0	3
10	*Harpalus distinguendus*	5	1		6
11	*Carabus calceatus*	2	0	0	2
12	*Anthicus antherimus*	6	0	0	6
13	*Anthicus floralis*	4	0	0	4
14	*Formicomus pedestris*	5	0	0	5
15	*Metabletus truncatelus*	2	0	0	2
16	*Pseudocleanus cinereus*	1	0	0	1
17	*Ophonus sigmaticornis*	0	1	0	1
18	*Phylotreta vitulla*	0	12	0	12
19	*Pseudophonus rufipes*	0	0	3	3
20	*Dermestes laniarius*	0	0	2	2
Total trap 2		***264***	***19***	***11***	***294***
Trap 3:					
1.	*Epicometis hirta*	133	2	0	135
2.	*Pterostichus cupreus*	31	45	6	82
3.	*Opatrum sabulosum*	5	0	0	5
4.	*Harpalus distinguendus*	13	0	0	13
5.	*Dermestes laniarius*	3	5	3	11
6.	*Dorcadion pedestre*	2	2	0	4
7.	*Airaphilus elongatus*	4	0	0	4
8.	*Anthicus antherimus*	16	0	0	16
9.	*Phyllotreta vittula*	3	3	0	6
10	*Longitarsus anchusae*	4	0	0	4
11	*Meligethes aeneus*	2	0	0	2
12	*Metabletus truncatelus*	3	0	0	3
13	*Brachynus crepitans*	3	0	0	3
14	*Xantholinus lentus*	3	0	0	3
15	*Ceuthorrhyncus rapae*	0	1	0	1
16	*Tanymecus palleatus*	0	3	0	3
17	*Rhisophagus parvulus*	0	1	0	1
18	*Pseudophonus rufipes*	0	0	3	3
Total trap 3		***225***	***62***	***12***	***299***
Trap 4:					
1.	*Epicometis hirta*	219	7	0	226
2.	*Cetonia aurata*	1	0	0	1
3.	*Dorcadion pedestre*	6	0	0	6
4.	*Dorcadion fulvum*	2	0	0	2
5.	*Silpha obscura*	6	0	0	6
6.	*Tanymecus palliatus*	3	0	0	3
7.	*Dermestes laniarius*	7	1	0	8
8.	*Anisodactylus binotatus*	1	0	0	1
9.	*Anisodactylus signatus*	1	0	0	1
10	*Pseudophonus rufipes*	2	0	2	4
11	*Tanymecus dilaticollis*	3	0	0	3

12	*Agriotes lineatus*	2	0	0	2
13	*Harpalus distinguendus*	4	0	0	4
14	*Formicomus pedestris*	8	0	0	8
15	*Anthicus antherimus*	4	0	0	4
16	*Phylotreta vitulla*	3	0	0	3
17	*Longitarsus anchusae*	5	0	0	5
18	*Cassida nobilis*	2	0	0	2
19	*Rhizophagus parvulus*	5	0	0	5
20	*Typhaea stercorea L.*	1	10	0	11
21	*Pterostichus cupreus*	1	0	5	6
Total trap 4		***286***	***18***	***7***	***311***
Trap 5:					
1.	*Epicometis hirta*	183	12	0	195
2.	*Dorcadion pedestre*	1	1	0	2
3.	*Dorcadion fulvum*	4	1	0	5
4.	*Dermestes laniarius*	7	0	0	7
5.	*Opatrum sabulosum*	4	0	0	4
6.	*Chromaderus fasciatus*	1	0	0	1
7.	*Pseudocleanus cinereus*	7	0	0	7
8.	*Cassida nobilis*	1	0	0	1
9.	*Anthicus antherimus*	12	2	0	14
10	*Formicomus pedestris*	5	0	0	5
11	*Phylotreta vitulla*	4	5	0	9
12	*Longitarsus anchusae*	2	0	0	2
13	*Bembidion lampros*	2	0	0	2
14	*Anthicus floralis*	1	0	0	1
15	*Harpalus distinguendus*	0	3	0	3
16	*Meligetes aeneus*	0	4	0	4
17	*Aphodus finetarius*	0	2	0	2
18	*Staphyllinus sp.*	0	1	0	1
19	*Pterostichus cupreus*	0	0	11	11
20	*Coccinella 7 punctata*	0	0	1	1
Total trap 5		***234***	***31***	***12***	***277***
Trap 6					
1.	*Epicometis hirta*	154	17	0	171
2.	*Dorcadion pedestre*	5	0	0	5
3.	*Dorcadion fulvum*	2	0	0	2
4.	*Silpha obscura*	2	0	0	2
5.	*Opatrum sabulosum*	5	0	0	5
6.	*Dermestes laniarius*	7	5	0	12
7.	*Pseudocleanus cinereus*	6	0	0	6
8.	*Agriotes lineatus*	2	0	0	2
9.	*Xantholinus lentus*	1	0	0	1
10	*Lixus ascanii*	1	0	0	1
11	*Tanymecus dilaticollis*	2	0	0	2
12	*Anisodactylus signatus*	1	0	0	1
13	*Ophonus punctulatus*	1	0	0	1
14	*Baris artemisiae Herbst.*	1	0	0	1
15	*Cantharis obscura*	1	0	0	1
16	*Phylotreta vitulla*	8	5	0	13
17	*Formicomus pedestris*	5	0	0	5

18	*Hiraphilus elongatus*	6	0	0	6
19	*Longitarsus anchusae*	5	2	0	7
20	*Pterostichus cupreus*	0	5	7	12
21	*Harpalus distinguendus*	0	1	0	1
22	*Aphodus finetarius*	0	2	0	2
23	*Meligetes aeneus*	0	1	0	1
Total trap 6		***215***	***38***	***7***	***260***
TOTAL harvested		**1540**	**215**	**65**	**1820**

III. of maize belonging to the experimental group no. 3 (Table 3):

a. harvesting I was not collected any samples of beetle.

b. harvesting II were collected in total 88 samples belonging to several species of beetles, the largest number of samples (31) were collected in trap number six, then came trap number 2 numbers 28 samples to trap number 1 were collected a total of 22 samples of beetles, then the trap number 5 all samples were 3 samples and 2 each samples were collected in the trap number 3 and trap number 4 .

c. harvesting III were not recorded species belonging to the order Coleoptera.

Table 3

The situation regarding the species and number of samples collected from corn lot no. 3 in 2013

Traps	**Harvest I 20.05.2013**	**Harvest II 03.06.2013**	**Harvest III 02.08.2013**	**Total**
1. *Epicometis hirta*	0	18	0	18
2. *Opatrum sabulosum*	0	3	0	3
3. *Tanymecus dilaticolis*	0	1	0	1
Total traps 1	***0***	***22***	***0***	***22***
Traps 2:				
1. *Epicometis hirta*	0	25	0	25
2. *Opatrum sabulosum*	0	3	0	3
Total traps 2	***0***	***28***	***0***	***28***
Traps 3:				
1. *Epicometis hirta*	0	1	0	1
2. *Harpalus distinguendus*	0	1	0	1
Total traps 3	***0***	***2***	***0***	***2***
Traps 4:				
1. *Epicometis hirta*	0	1	0	1
2. *Opatrum sabulosum*	0	1	0	1
Total traps 4	***0***	***2***	***0***	***2***
Traps 5:				
1. *Epicometis hirta*	0	3	0	3
Total traps 5	***0***	***3***	***0***	***3***
Traps 6				
1. *Epicometis hirta*	0	25	0	25
2. *Opatrum sabulosum*	0	2	0	2
3. *Dermestes laniarius*	0	3	0	3
4. *Harpalus distinguendus*	0	1	0	1
Total traps 6	***0***	***31***	***0***	***31***
Total harvested	***0***	***88***	***0***	***88***

IV. of maize belonging to the experimental group no. 4 (Table 4):

a. At the first harvesting has not been collected any samples belonging to the Coleoptera order.

b. harvesting II were collected in total 22 samples belonging to several species of beetles, the largest number of samples (13) were collected in trap number six, then came trap number 5 numbers with 4 samples, traps 3 and 4 were collected by two samples of beetles, then there was a trap number one single and the trap 2 have recorded species of beetles.

c. harvesting III were collected in total 38 samples largest number of samples (35) were collected in trap number five, then followed trap no. 4 with a total of 3 samples, and the other traps there were samples of the species of beetles.

Table 4

The situation regarding the species and number of samples collected from corn lot no. 4 in 2013

Traps		**Harvest I 20.05.2013**	**Harvest II 03.06.2013**	**Harvest III 02.08.2013**	**Total**
Trap 1:					
1.	*Tanymecus dilaticolis*	0	1	0	1
Total trap 1		***0***	***1***	***0***	***1***
Trap 2:					**0**
Trap 3:					**0**
1.	*Epicometis hirta*	0	2	0	2
Total trap 3		***0***	***2***	***0***	***2***
Trap 4:					
1.	*Epicometis hirta*	0	2	0	2
2.	*Pseudophonus rufipes*	0	0	1	1
3.	*Dermestes laniarius*	0	0	2	2
Total trap 4		***0***	***2***	***3***	***5***
Trap 5:					
1.	*Epicometis hirta*	0	2	0	2
2.	*Opatrum sabulosum*	0	1	0	1
3.	*Dermestes laniarius*	0	1	0	1
4.	*Pseudophonus rufipes*	0	0	4	4
5.	*Pteroistichus cupreus*	0	0	3	3
6.	*Necrodes litoralis*	0	0	17	17
7.	*Necrophorus vespillo*	0	0	7	7
8.	*Hister cadaverinus*	0	0	3	3
9.	*Xantholinus lentus*	0	0	1	1
Total trap 5		***0***	***4***	***35***	***39***
Trap 6					
1.	*Epicometis hirta*	0	6	0	6
2.	*Aphodus finetarius*	0	2	0	2
3.	*Opatrum sabulosum*	0	5	0	5
Total trap 6		***0***	***13***	***0***	***13***
Total harvested		***0***	***22***	***38***	***60***

CONCLUSIONS

In the company, in the 4 slots with corn were applied three harvests and during the research were collected in 39 insects traps.

The largest number of copies belongs to the order *Coleoptera*, followed by invertebrates in order *Hymenoptera*, *Arachnida*, and those that belong to the order *Orthoptera*, *Homoptera*, *Gastropoda* and *Isoptera*.

The species collected were: *Pseudophonus griseus*, *Pseudophonus rufipes*, *Pterostichus cupreus*, *Dermestes laniarius*, *Coccinella 7 punctatta*, *Epicometis hirta, Opatrum sabulosum*, *Dorcadion pedestre*, *Brachynus crepitans* etc.

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ASPECTS TO KNOWLEDGE OF EXISTING INVERTEBRATES FAUNA IN CORN CULTURES

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Keywords: *Coleoptera, Hymenoptera, soil traps type Barber.*

ABSTRACT

During of 2013 in corn crops was studied the invertebrates entomofauna into a company with private capital in Botosani, in four plots of corn with the previous plant different way: Lot 1- corn after wheat; Lot 2- corn after sunflower; Lot 3- corn after soybeans; Lot 4- corn after corn.

The collection of material was performed using soil traps type Barber.

The species more frequently collected were: Pseudophonus griseus, Pseudophonus rufipes, Gryllus campestre, Anthicus anterimus, Anthicus floralis, Harpalus distinguendus, Bothynoderes punctiventri, etc.

INTRODUCTION

Regardless of the agricultural production potential agricultural losses caused by diseases, insects, nematodes and weeds are less than 30% in countries with developed agriculture (average loss of 35% is considered) (Perju 1980). If crops or in a forest, great damage is caused by a wide range of pests, which often are not specific to a single plant or plant families, and species that are found particularly in an ecosystem, which actually produce great damage. We must also remember that a number of pests, consider hunger, even if not all species of farm attacks, are common and cause damage of economic importance to a large number of crops.

MATERIAL AND METHODS

The researches were performed in corn culture of a private equity firm in Botosani County in 2013, making it the collection of soil traps type Barber.

The method used to collect harmful and useful epigenous fauna in corn culture.

The traps were placed between rows of plants to not prevent or not to be affected by applied technological execution.

Each trap was used formalin solution diluted with water in a proportion of 20%. There were performed a total of three crops throughout the growing season at data 20.05, 03.06 and 02.08. At each harvest the biological material from traps was placed in containers of alcohol, label, and labels including: stationary, harvest date and number of lots. The material thus collected was brought into the lab for determinations (Manole et al. 2009).

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RESULTS AND DISCUSSIONS

In total, in 2013, in corn culture from Botosani county were identified 280 samples, belonging to a number of 27 species (Table 1).

On harvesting, the situation was presented as follows:

Take the first harvesting, dated 20.05.2013, they were collected a total of 2631 samples belonging to 50 species of beetles and other species of the orders *Hymenoptera*, *Orthoptera*, *Diptera*, *Arachnida*, *Heteroptera* and *Homoptera*. Most, of many species and taxa were *Epicometis hirta* (1882) *Pterostichus cupreus* (90), *Anthicus antherimus* (87), *Heteroptera* (85) and *Dermestes laniarius* (74).

Take the second harvesting, dated 03.06.2013, 355 samples were collected useful and harmful insects, falling in the following systematic order: *Coleoptera Diptera*, *Arachnida*, *Heteroptera*, *Hymenoptera* and *Orthoptera*. Among the most abundant species include: *Epicometis hirta* (129), *Pterostichus cupreus* (60), *Heteroptera* (22), *Phyllotreta vitulla* (20) and *Hymenoptera* (*Apis*) (16).

At harvest III, dated 02.08.2013, were collected in total, 146 samples, 103 samples beloning to 9 species of beetles, and the others belong to the order *Hymenoptera*, *Orthoptera*, *Cicadinia*, *Isopoda* and *Arachnida*. Among the species collected are: *Pseudophonus rufipes* (44), *Orthoptera* (21), *Pterostichus cupreus* (30) and *Necrodes litoralis* (17).

Table 1

The situation regarding the species and number of specimens collected from the corn culture in 2013

Order	No.	Name of species	Harvest / harvested data		
			I	II	III
Coleoptera	1.	*Epicometis hirta*	1882	129	0
	2.	*Dorcadion fulvum*	16	1	0
	3.	*Dorcadion pedestre*	45	4	0
	4.	*Dermestes laniarius*	74	15	7
	5.	*Bothynoderes punctiventris*	3	0	0
	6.	*Harpalus distinguendus*	38	8	0
	7.	*Pterostichus cupreus*	90	60	44
	8.	*Silpha obscura*	27	0	0
	9.	*Cassida nobilis*	9	0	0
	10.	*Tanymecus dilaticollis*	7	4	0
	11.	*Agriotes lineatus*	11	0	0
	12.	*Necrophorus vespillo*	1	0	7
	13.	*Opatrum sabulosum*	38	12	0
	14.	*Tanymecus palliatus F.*	4	1	0
	15.	*Longitarsus anchusae*	23	6	0
	16.	*Anthicus antherimus*	61	2	0
	17.	*Bembidion meridianus*	1	0	0
	18.	*Rhizophagus parvulus*	12	1	0
	19.	*Phyllotreta vitulla*	29	20	0
	20.	*Ceuthorryncus rapae*	1	0	0
	21.	*Anthicus gracilis*	3	0	0
	22.	*Anthicus floralis*	7	0	0
	23.	*Metabletus truncatellus*	8	0	0
	24.	*Formicomus pedestris Rossi*	32	0	0
	25.	*Acupalpus meridianus*	3	0	0
	26.	*Ophonus puncticollis*	2	0	0

Coleoptera	27.	*Carabus scabriusculus*	1	0	0
	28.	*Carabus calceatus*	2	0	0
	29.	*Harpalus aeneus*	1	0	0
	30.	*Leucosomus pedestris*	1	0	0
	31.	*Cetonia aurata*	1	0	0
	32.	*Anisodactylus binotatus*	1	0	0
	33.	*Anisodactylus signatus*	2	0	0
	34.	*Pseudophonus rufipes*	2	0	21
	35.	*Chromaderus fasciatus*	1	0	0
	36.	*Pseudocleanus cinereus*	17	0	0
	37.	*Bembidion lampros*	2	0	0
	38.	*Xantholinus lentus*	3	0	1
	39.	*Lixus ascanii*	1	0	0
	40.	*Baris artemisiae*	1	0	0
	41.	*Chantaris obscura*	1	0	0
	42.	*Hiraphilus elongatus*	6	0	0
	43.	*Typhaea stercorea*	1	0	0
	44.	*Leptinotarsa decemlineata*	1	0	0
	45.	*Pterostichus nigrita*	2	0	0
	46.	*Brachynus crepitans*	8	0	0
	47.	*Melbe proscarabaeus*	1	0	0
	48.	*Slischrochilus quadripuntulatus*	3	0	0
	49.	*Airaphilus elongatus*	4	0	0
	50.	*Meligethes aeneus*	2	5	0
	51.	*Phyllotreta undulata*	0	10	0
	52.	*Ophonus sigmaticornis*	0	1	0
	53.	*Ceuthorrhynculus rapae*	0	1	0
	54.	*Tanymecus dilaticolis*	0	1	0
	55.	*Aphodus finetarius*	0	5	0
	56.	*Staphyllinus sp.*	0	1	0
	57.	*Pseudophonus griseus*	0	0	2
	58.	*Coccinella 7 punctata*	0	0	1
	59.	*Necrodes litoralis*	0	0	17
	60.	*Hister cadaverinus*	0	0	3
Hymenoptera	1.	Apis	10	16	0
Hymenoptera	2.	Wasps	16	14	5
Orthoptera			1	6	30
Diptera			10	7	0
Arachnida			15	3	6
Heteroptera			85	22	0
Homoptera			2	0	0
Cicadinia			0	0	2
Isopoda			0	0	3

Concerning the total number of samples collected by the soil traps type Barber method the situation is as follows: In Botosani stationary (Table 3) were collected at six harvests a number of 3132 samples of insects belonging to eight systematic order. With the largest number of registered *Coleoptera* insects collected (Chatened du Gaetan 1990, Panin 1951, Rogojanu & Perju 1979) with a tolal of 2882 samples, of which 2942 samples collected in the first harvest, 287 samples collected from the second harvest, and 103 samples from the last harvest.

Table 3

Dynamics and number of samples of collected beetles in Botosani stationary

No	Method of research	Order	Data harvesting and number of harvested samples			Total samples
			I -06.06	II- 23.06	III -03.07	
1.	Soil traps type Barber	Coleoptera	2492	287	103	2882
2.		Hymenoptera	26	30	5	61
3.		Orthoptera	1	6	30	37
4.		Diptera	10	7	0	17
5.		Arachnida	15	3	6	24
6.		Heteroptera	85	22	0	107
7.		Homoptera	2		0	2
8.		Cicadinia	0	0	2	2
Total samples			**2631**	**355**	**146**	**3132**

Order *Heteroptera* totaled a number of 107 samples, of which 85 samples the first harvest, and the other 22 samples were collected from the second harvest, what was the third harvest have not collected any copy. Insects belonging to the order *Hymenoptera* belonging to the two groups identified, bees and wasps, and totaled 61 samples. Total of samples that belong to the group *Orthoptera* was 37 at the first harvest we recorded a single in the second harvest have totaled six samples, and at the third collection total was 30 samples. *Arachnida* totaled 24 samples, 15 samples of the first harvest, 3 samples to the second harvest and 6 samples from the last harvest. The collected insects belonging to the order *Diptera* were a total of 17 samples, 10 of which were collected in the first collection and the remaining 7 samples from the second harvesting. *Homoptera* and *Cicadinia* orders were recorded with two samples each. (Constantineanu & Pisică 1977).

CONCLUSIONS

In 2013, the corn culture belonging Botosani stationary were collected by using soil traps type Barber, 2882 samples of beetles belonging to 60 species, the largest number of copies being recorded species: *Epicometis hirta*, *Pterostichus cupreus*, *Anthicus antherimus*, *Phyllotreta vitulla*. The other orders totaled systematic copies of useful and harmful insects as follows: *Heteroptera* 107 samples, 61 samples *Hymenoptera*, *Orthoptera* 37samples, *Arachnida* 24 samples, 17 samples *Diptera*, *Homoptera* and *Cicadinia* with two copies in 2013 corn culture mentioned were performed a total of three sampling by the method traps type Barber, between May and September.

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CONTRIBUTION TO THE STUDY OF THE SPATIAL DISTRIBUTION OF OPILIONES (ARACHNIDA) FROM BUCOVĂȚ FOREST (SW ROMANIA)

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Keywords: *Opiliones, spatial distribution, Bucovăț Forest*

ABSTRACT

In the present study we analyze the spatial pattern of four harvestmen species (Arachnida, Opiliones) - Rilaena triangularis (Herbst, 1799), Phalangium opilio Linnaeus 1761, Zacheus crista (Brullé, 1832), Egaenus convexus (C. L. Koch, 1835) in Bucovăț Forest. The study has been conducted in three plots with different vegetation, humidity, geographical exposure and age; the statistical analysis has been done by using Taylor's law as well as Fischer's, Green's and Morisita indexes.

INTRODUCTION

The spatial distribution of the individuals of a population is a parameter with a valuable ecological significance, showing the way in which the population occupies, exploits and transforms the biotope (Stugren 1982).

The type of spatial distribution results from the correlated intervention of numerous factors of which some of them can play a major role: complexity of inter- and intraspecific relations, species biology, preference for a certain biotope, environment factor. In general, the individuals of natural populations are distributed in space either uniformly (regular spatial distribution), accidently (random spatial distribution) or in groups (contagious spatial distribution). As a result of some particular individual behaviors, the spatial structure of a population can take extreme and opposite shapes – aggregation and territoriality.

Broadly speaking, most opilionids are inhabitants of humid and dark sites like caves and forests. Opilionids are common arthropods in forested habitats where they use a variety of microhabitats: leaf litter, leafs of low vegetation, fallen trunks, rotting logs, tree trunks, spaces beneath rocks. Opilionids' activity pattern during the cyrcadian rhythm (movement, foraging, avoiding enemies), the feeding type (omnivorous, necrophagous, predator, polyphagous, opportunisstic), the reproductive behavior (mating, oviposition, parental care....) as well as the inter- and intraspecific relationships influence the habitat

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(microhabitat) use, reflected in the pattern of the spatial distribution. For opilionids of various types of habitats (natural, protected, impacted by human activity) in temperate and tropical regions, the arachnological literature reports all types of spatial distribution for which the determining factors are hypothesized or established. The most common types of spatial distribution, i.e. regular, random or contagious were reported by Drummond et al. 2010, Mitov 1997 and included references, Šajna et al. 2011, Sechterová 1989.

Harvestmen aggregation does not appear to be a rare phenomenon. Aggregations of unrelated individuals of a single species as well as multi-species-aggregations have been reported in tropical/subtropical and temperate habitats (Cockerill 1988 and included references, Coddington et al. 1990, Chelini & Willemart 2011, Chelini et al. 2012, Grether et al. 2014, Holmberg et al. 1984, Machado & Vasconcelos 1998, Machado et al. 2000, Machado et al. 2002, Machado & Ordóñez 2007a, Martens 1978, Teng et al. 2012, Wade et al. 2011, Willemart & Gnaspini 2004 and included references, Wijnhoven et al. 2007).

MATERIAL AND METHODS

The study was conducted between 4.04 and 25.07. 2002 in Bucovăț Forest (Dolj County), approximately 5 km away from Craiova, inside the perimeter of Bucovăț commune, in the vicinity of Jiu River. Bucovăț Forest belongs to the nemoral area, spreading over the limit between the southern forest steppe and the nemoral area.

From a phytocenological point of view, the forest vegetation in Bucovăț Forest fits the vegetal association Quercetea pubescenti-petreae (Oberd. 1948) JaKucs 1960 which characterizes the xerothermic forests in the Eastern and Central Europe, Quercetum frainetto-cerris sub-association (Georg. et Const. 1945 in Paşc. et Leandru 1958), (Popescu 1988). Popescu mentions the presence of *Carpinus orientalis* on the sunny slopes, surfaces that can be framed into the *Carpinetosum orientalis* sub-association and which show the influence of the continental climate in this area (Popescu 1988). As a result of the proximity of Jiu River, on the outskirts of the forest, groups of Salix species can be found. The forest vegetation has suffered mutations due to the anthropic factor – forest exploitation, Populus species afforestation, planting of species such as *Pinus nigra*, Taxodium sp.

The July and August climate conditions in the forest steppe of the S-W part of Romania are characterized by severe and prolonged drought with more than 7-10 consecutive scorching hot and dry days.

The study was carried out at the level of three plots, each of 378 square meters, different from the point of view of vegetation, humidity, exposure and age. Differences are shown in Table 1.

In each plot 30 Barber pitfall traps were set, buried with their opening at the level of ground and filled with 10% formalin. The traps were all emptied on the same day, firstly in a week's time and then in two weeks' time. The necessary number of traps was established based on the preliminary investigations conducted in the same woods the previous year, by using the following formula:

$$\varepsilon = \frac{1}{\bar{x}}\sqrt{\frac{S^2}{n}}$$

Where: ε=estimation error, $\overline{x}$= mean number of sample individuals, S^2= variance, n = number of samples.

An average error of 20% was considered acceptable. For this value we analyzed the spatial distribution of *Rilaena triangularis*, *Zacheus crista*, *Egaenus convexus* and *Phalangium opilio*. The total number of collected individuals rose to 1204.

For some opilionid species whose emergence frequency in samples was very low and which registered a small mean number of individuals – *Nemastoma bidentatum sparsum*, Trogulus species, in order to achieve an acceptable error we calculated a necessary high number of traps – 500.

The statistical analysis has been done by using Taylor's law, Fischer's (IF), Green's (IG) and Morisita's IM) indexes (Botnariuc & Vădineanu 1982, Rîşnoveanu & Vădineanu 2000).

RESULTS AND DISCUSSIONS

1. Species composition, frequency, abundance

The composition of species at the level of the three plots, the ranges of frequencies and of relative numerical abundances for each species are shown in Table 2.

2. The spatial distribution

The calculated indexes and the regression lines for the four species - *Rilaena triangularis*, *Zacheus crista*, *Egaenus convexus* and *Phalangium opilio* as well as the intervals for collection at the level of the 3 plots are shown in Table 3, Fig.1 and Fig. 2.

The analysis of both the three indexes and the regression coefficient shows that the spatial pattern of the species populations has the following characteristics:

1. All species show a random distribution with a tendency towards the grouping of individuals of analyzed populations.

Rilaena triangularis was present only in the Salix plot (S). In most of the periods, *Rilaena triangularis* shows a random distribution with a more obvious tendency towards grouping in the period corresponding to the emergence in nature of adults.

Egaenus convexus points out a random spatial distribution in Quercus (Q) and Fraxinus + Quercus (F+Q) biotopes. The population points out a slight tendency towards grouping in the period corresponding to the maximum number of adult individuals in the Salix plot. It can be noticed the absence from the traps of the individuals in Q and F+Q plots, starting with the month of May and June throughout the whole period corresponding to the maximum number of adults but their presence in Salix plot.

The populations of *Zacheus crista* points out on the one hand, a tendency towards grouping in both the juvenile and adult stage at the level of the Salix plot and on the other hand, a tendency for grouping in the juvenile stage at the level of F+Q biotope. The highest and constant tendency towards grouping is in the F+Q plot. It can be noticed the absence from the traps of the individuals in the period corresponding to the maximum number of adults (June - VI) in Q and F+Q plots and their presence in the Salix plot.

Phalangium opilio is only accidental in the Q plot. *Phalangium opilio* points out an overall higher and similar tendency towards grouping (throughout the whole period) for the Salix and F+Q plots, but less constant at the level of the Salix biotope. It can be noticed the absence from the traps of the individuals in the month of July (VII – period corresponding to the maximum number of adults at the level of the Bucovăț forest) at the level of the F+Q plot, but their presence in the Salix plot.

2. No aggregation has been observed for our study, neither mono-species, nor multi-species aggregations.

3. Discussions

Three main interacting factors incriminated in determining the spatial patterns of harvestmen are discussed: 1) the species (morphology – body size and leg length; feeding

biology and reproductive biology); 2) the habitat structure; 3) the geographic exposure and climatic factors.

Arachnological literature points out the importance (influence) of habitat structure over various parameters of harvestmen ecology - frequency, activity pattern, distribution, population dynamics (e.g. Bragagnolo et al. 2007, Jennings et al. 1984, Proud et al. 2012, Šajna et al. 2011, Williams 1962). The relationship between opilionid morphology (leg length and body size) and habitat use also has been mentioned (Adams 1984, Curtis & Machado 2007). According to Adams (1984), "the critical factor influencing opilionid ecology" (distribution and frequency) "appears to be the habitat structure and density, influencing diet, life history pattern and morphology" in forested habitats (Adams 1984). The analysis of species frequencies in Table 2 indicates a correlation between the species morphology, the type of habitat and the ecological profile of the four harvestmen species, offering an image on how the populations occupy the habitat. Referring to forested habitats, Adams (1984) described that longer legged species are more frequent in more simple and open structure types of habitats. Due to their long legs, *Rilaena triangularis* and *Phalangium opilio* should be more frequent in open structure habitats like Q/F+Q habitats. *Phalangium opilio* indeed shows the highest frequency in the habitats with a more open structure (96% frequency in F+Q); a less frequency is shown in the more humid Salix habitat with tall herbaceous field (46% frequency in Salix plot). *Phalangium opilio* avoids the Q plot with E exposure although provides an open-structure habitat. *Rilaena triangulari*s, instead, despite it long legs, is present only in sites with dense, tall herbage showing a clear preference for sites with high humidity and N-W exposure. Thus, our study suggests that for *Phalangium opilio* the structure habitat overrules to a limit the physiological need for humidity in determining the spatial distribution, showing a high ecological plasticity for this species. For *Rilaena triangularis* the decisive factor in occupying the space is the physiological need for humidity.

Zacheus crista and *Egaenus convexus* are very similar in their habitus: they have robust, large bodies and shorter legs and both species inhabit the leaf litter strata. While *Zacheus crista* shows a clear preference for habitats with litter strata (83% in Q and F+Q), *Egaenus convexus* appears to be indifferent to the litter strata depth (similar frequencies intervals in habitats with different litter depth - Salix and F+Q), showing a clear preference for E exposure (60% in Q).

The ecological meaning, namely the critical organizing factor of the observed spatial pattern for the populations of the four species is difficult to establish at the level of this study, all the more so as some aspects of the feeding and reproductive biology of analyzed species are insufficiently known. The authors are not aware so far of references on feeding biology for *Egaenus convexus* and *Zacheus crista*. As regarding *Rilaena triangularis* and *Phalangium opilio* they are reported to be carnivorous polyphagous (Acosta & Machado 2007), yet it is unknown whether the two species are strictly predators or opportunistic in natural conditions. Another parameter that can influence the spatial pattern of a species population is the way and sites of oviposition. In respect with this parameter, no information is available so far for *Zacheus crista* and *Egaenus convexus*; it is reasonable to assume that both species oviposit in leaf litter spaces, yet nothing is known whether the eggs are oviposited or not in clusters (batches). *Rilaena triangularis* oviposites clusters of eggs (batches of 78 eggs/batch) in cavities in the soil and under rocks and *Phalangium opilio* oviposites 32-200 eggs/batch inder rocks, in cavities in the soil and trunks or undersurfaces of leaves (Machado & Ordóñez 2007b and included references).

Until more detailed and comprehensive studies we can only assume the underlying reasons for the shown spatial patterns of the harvestmen populations in Bucovăț Forest.

Table 1

Characterization of the three plots

Plot	Dominant trees	Humidity	Exposure	Age	The leaf litter	The herbaceous field
1	Salix-100%	High	N-W	25 years	Reduced to absent	Tall, dense herbage
2	Fraxinus-70% Quercus-30%	Reduced	N-W	45 years	5-10 cm	reduced
3	Quercus-100%	Reduced	E	130 years	5-10 cm	reduced

Table 2

Species composition, range frequencies and range of the relative numerical abundances of the four species in the three plots

Plot – dominant tree species	Harvestmen species	Range of frequencies (%)	Range of the relative numerical abundances (%)
Salix	***Rilaena triangularis***	3,33-42	0,07-5,5
	Nemastoma bidentatum sparsum	3-6,67	0,07-0,5
	Egaenus convexus	3,33-19,22	0,12-0,79
	Zacheus crista	7,14-26,32	0,60-1,58
	Phalangium opilio	6,67-46,43	0,24-2,95
	Trogulus nepaeformis	3,33-6,66	0,12-0,33
Fraxinus + Quercus	***Egaenus convexus***	3,33-23,33	0,07-0,96
	Zacheus crista	20-83	0,71-15,73
	Phalangium opilio	16,67-96,67	0,61-10
	Trogulus tricarinatus	3,33	0,10-0,20
	Trogulus nepaeformis	3,33	0,11-0,19
Quercus	***Egaenus convexus***	22,22-60	2,35-10,28
	Zacheus crista	3,57-83,33	0,27-12,14
	Phalangium opilio	3,33-6,67	0,11-0,68
	Trogulus tricarinatus	3,33	0,11

The random spatial pattern for *Rilaena triangularis* might be the result of its high mobility and thus, a high ability to explore resources. The high mobility and the high ecological plasticity could be the underlying reasons for the random pattern of *Phalangium opilio*. The highest degree of randomness for *Egaenus convexus*, species inhabiting the leaf litter, may be associated with the abundance of food and a polyphagous/omnivorous feeding type and/or a low population density (Mitov 1997).

The tendency towards grouping in the juvenile stage as observed for *Zacheus crista* might be associated either with early stages of development when eggs are deposited in groups and „the young move only gradually away from the hatching site" (Edgar, 1971) and with a low mobility of the juveniles (Sechterová 1989). The tendency towards grouping in the juvenile stage which was not observed for the other species might be thus associated

Table 3

Fischer's, Green's and Morisita's index values calculated for the 4 species of opilionids and the periods for collection at the level of the 3 plots

Plot	Salix					Quercus+Fraxinus				Quercus			
Sp.	Period	Nr. ind	IF	IG	IM	Nr. ind	IF	IG	IM	Nr. ind	IF	IG	IM
Rilaena triangularis	8.04-15.04	11	1.02	0.00	1.05	0				**0**			
	15.04-22.04	13	1.31	0.03	1.46	0				**0**			
	22.04-28.04	6	1.17	0.03	2.00	0				**0**			
	29.04-5.05	11	1.41	0.04	2.18	0				**0**			
	6.05-12.05	3	1.62	0.31	10	0				**0**			
	13.05-19.05	2	0.97	-0.03	0.00	0				**0**			
	20.05-26.05	1	1	-	-	0				0			
	26.05-9.06	4	0.89	-0.04	0	0				0			
Zacheus crista	8.04-15.04	0				15	1.05	0.00	1.10	1	1	-	-
	15.04-22.04	5	0.78	-0.06	0.00	77	4.00	0.04	2.14	4	1.41	0.14	5.00
	22.04-28.04	5	1.28	0.07	3.00	113	5.10	0.04	2.06	1	1	-	-
	29-04-5.05	6	1.17	0.03	2.00	156	2.50	0.01	1.28	17	1.12	0.01	1.19
	6.05-12.05	5	1.28	0.07	3.00	63	1.65	0.01	1.31	63	1.65	0.01	1.31
	13.05-19.05	7	2.85	0.31	9.67	14	1.28	0.02	1.59	15	0.79	-0.01	0.57
	20.05-26.05	9	1.41	0.05	2.50	7	1.09	0.01	1.43	0			
	26.05-9.06	15	2.00	-0.07	2.93	0				0			
	12.06-26.06	11	2.53	0.15	5.27	0				0			
Eggenus convexus	8.04-15.04	0				7	1.08	0.01	1.40	11	0.82	-0.02	0.51
	15.04-22.04	0				7	1.08	0.01	1.38	15	2.17	0.08	3.43
	22.04-28.04	1	1.00	-	-	7	0.79	-0,03	0.00	11	2.13	0.11	3.93
	29.04-5.05	1	1.00	-	-	3	0.93	-0.03	0.00	11	0.99	0.00	0.98
	6.05-12.05	1	1.00	-	-	1	1.00	-	-	41	1.34	0.01	1.24
	13.05-19.05	5	0.86	-0.03	0.00	2	0.96	-0.04	0.00	21	1.49	0.02	1.71
	20.05-26.05	3	1.62	0.31	10.00	0				0			
	26.05-9.06	11	1.95	0.09	3.56	0				0			
	12.06-26.06	9	1.63	0.08	3.22	0				0			
	26.06-11.07	6	1.15	0.03	1.73	0				0			

Phalangium opilio	29.04-5.05	0				23	1.32	0.01	1.42				
	6.05-12.05	2	0.97	-0.03	0.00	150	3.20	0.01	1.43				
	13.05-19.05	12	1.67	0.06	2.82	47	2.09	0.02	1.66				
	20.05-26.05	16	1.65	0.04	2.25	6	1.17	0.03	2.00				
	26.05-9.06	41	1.69	0.02	1.47	0							
	12.06-26.06	32	1.90	0.03	1.81	0							
	26.06-11.07	25	4.28	0.14	4.42	0							
	11.07-25.07	16	2.33	0.09	3.13	0							

with a high mobility of the juveniles. The low mobility of the exuviating specimens is another influencing parameter (Sechterová 1989). The tendency towards grouping in the adult stage as observed for all species may be associated with mating. The tendency towards grouping for carnivorous species may also follow the spatial pattern of prey as concluded by Allard & Yeargan for *Phalangium opilio* (Allard & Yeargan 2005).

The traps' poor collection of the individuals of *Phalangium opilio*, *Zacheus crista* and *Egaenus convexus* species in drier, more arid and more exposed to light habitats in the periods corresponding to the maximum for adults, can be explained either by the "impoverishment-exhaustion" phenomenon of the population in the respective plots as a result of having kept the traps in the same spot, either by the migration phenomenon of the populations' individuals or either both. Migration is associated with long or short-distance population displacements to regions with more suitable conditions and/or more available resources, (Chelini et al. 2011 and included references). The presence of the immature individuals of *Phalangium opilio*, *Egaenus convexus* and *Zacheus crista* species in dry and arid habitats correlated with the absence of adult individuals in these habitats, but the presence of the adults in more humid, darker and cooler habitats (north-western exposure) like the Salix plot pleads for the migration phenomenon. Migration on short distances may have different grounds for opilionids of this study:

a) avoidance of desiccation, harvestmen being very susceptible to desiccation (Edgar 1971, Santos 2007). In severe droughty conditions which are characteristic for the Bucovăț Forest, migration in more humid sites seems very probable even for species with a high survival resistance to shortage or lack of water such as *Phalangium opilio* (Edgar 1971);

b) the choice of more suitable conditions: more humid, shady, darker and cooler sites, near to the optima of temperature, humidity and light according to their ecological profile;

c) behaviors such as seasonal translocation and hygrotaxis associated with the seasonal rhythmicity of some ecological factors (Cârdeiu 1946, Weiss 1980, 1984).

CONCLUSIONS

All species showed a random spatial distribution of the individuals of populations and presented a tendency towards grouping in the adult stage which is associated with mating. The ecological meaning of randomness is difficult to be established for the investigated biotope.

Our study suggests that to a certain extent for some species the opilionid physiological need for humidity overrules the habitat structure in determining the spatial distribution. A certain distinction should be done between the terms "spatial distribution"

(in what way the harvestmen occupy the space) and "spatial pattern" (the degree of randomness or contagiousness).

A certain distinction also has to be done between the use of a habitat and a micro-habitat by harvestmen populations.

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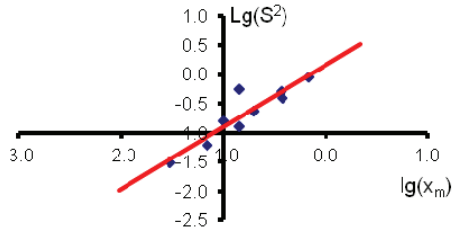
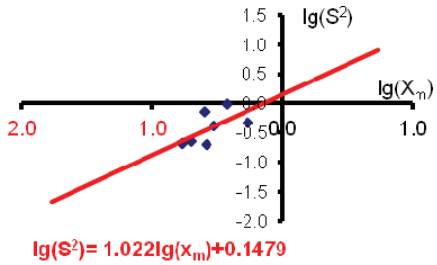
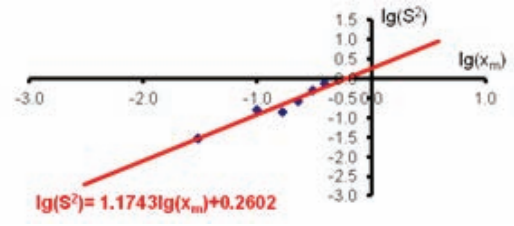


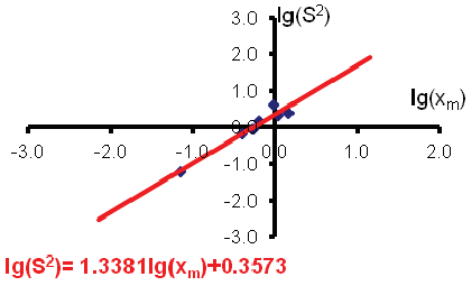
1. Rilaena triangularis - Salix



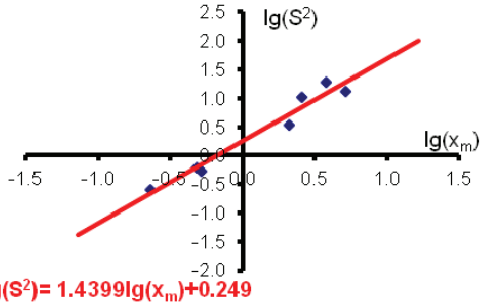
2. *Zacheus crista* - *Salix*



3. *Egaenus convexus* - *Salix*

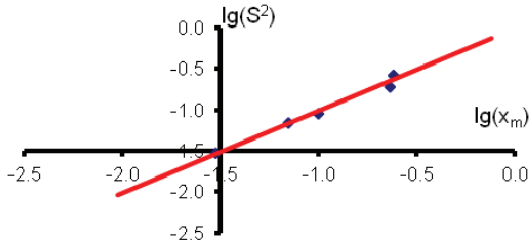


4. *Phalangium opilio* - *Salix*

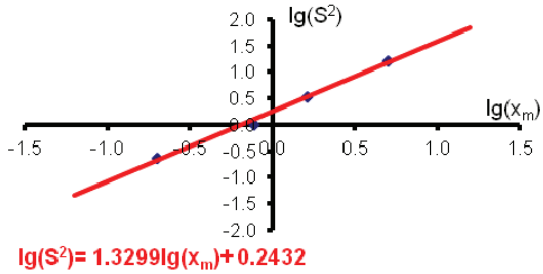


5. *Zacheus crista* - Fraxinus – Quercus

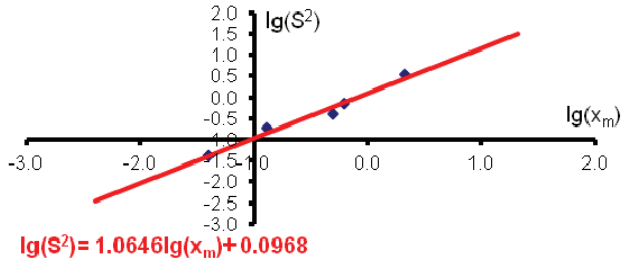
Figure 1. The linear regression lines and equations of logarithmic values of variance and mean number of individuals for Salix plot and F+Q plot (*Zacheus crista*)



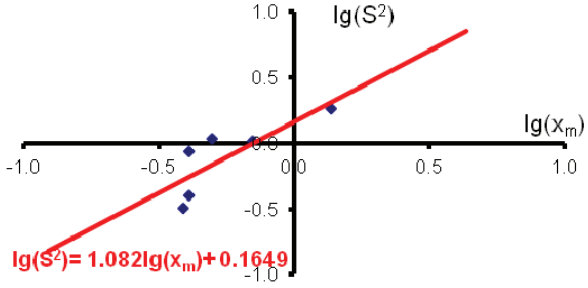
6. *Egaenus convexus* - Fraxinus – Quercus



7. *Phalangium opilio* – Quercus



8. *Zacheus crista* - Quercus



9. *Egaenus convexus* – Quercus

Figure 2. The linear regression lines and equations of logarithmic values of variance and mean number of individuals for F+Q and Q plots

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ORNITHOLOGICAL OBSERVATIONS WITHIN THE PROTECTED AREA PREAJBA-FĂCĂI LACUSTRINE COMPLEX AND ITS SURROUNDINGS (DOLJ COUNTY)

Bălescu Carmen Daniela[1]

Keywords*: birds, diversity, habitat, nesting species*

ABSTRACT

The present paper provides data (biological, ecological and ethological) about the avifauna diversity from the protected area Preajba-Făcăi Lacustrine Complex and its surroundings (Dolj County). During the investigation conducted between March 2014 and September 2015, there were also recorded species of European conservation interest included in different protectionist lists, of which 18 species appear in Annex 1 of the Birds Directive 147 / EC, species that require enhanced conservation measures: Aythya nyroca, Microcarbo pygmeus, Ixobrychus minutus, Nycticorax nycticorax, Ardeola ralloides, Egretta garzetta, Ardea alba, Ardea purpurea, Ciconia ciconia, Circus aeruginosus, Himantopus himantopus, Chlidonias hybrida, Sterna hirundo, Alcedo atthis, Coracias garrulus, Dendrocopos syriacus, Lanius colurio, L. minor.

INTRODUCTION

Preajba-Făcăi Lacustrine Complex, with an area of about 28 ha, is located in the central-eastern part of Dolj County. From the administrative point of view, it belongs to Craiova municipality, respectively Malu Mare settlement. It is located northern of Preajba village, in the proximity of the national road DN 55, 6 km from Craiova municipality and it has the following geographical coordinates: 44°16′17″N, 23°49′32″E (https://ro.wikipedia.org/wiki/Complexul_lacustru_Preajba - Făcăi). Preajba - Făcăi complex of reservoirs was declared natural protected area of national interest according to Law no. 5/6.03.2000 (code 2394).

The chain of small reservoirs was built by damming the Preajba River (9.6 km long) and the Valea Bătrâna (6.8 km long), a tributary of the Preajba River, and they are supplied by about 50 springs (Cioboiu, 2002). The reservoirs, with anthropogenic character, are separated by dams and they are eutrophic.

The studied area is located within Romanați Plain (a component unit of Oltenia Plain), at 83-122 m altitude. The climate is temperate continental with sub-Mediterranean influences. The average annual temperature is 10.8^0 C. The precipitation amount registers an annual average of about 597.4 mm (Vlăduţ et al., 2013).

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The vegetation and fauna of the studied habitats is very diverse. There also develops a rich aquatic vegetation represented by microphytes (phytoplankton and phytobenthos) and numerous macrophytes (natant, emersed, submersed and paludous) among which reed and bulrush are dominant for all the reservoirs. A significant part of the surface of the reservoirs is covered by compact reed beds. The woody vegetation is represented by clumps of trees and shrubs bordering (in some parts) the paths along the reservoirs: poplars species (*Populus canadensis, P. nigra*), willow species (*Salix alba, S. fragilis*), common hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), dog-rose (*Rosa canina*), blackberry (*Rubus fruticosus*), etc. In the structure of mesophilous grasslands (located in the immediate proximity of the reservoirs) and xerophilous grasslands, there can be found a variety of species of herbaceous plants.

The first pieces of information about Preajba-Făcăi Lacustrine Complex (implicitly about birds) are the result of a research program started in 1996 regarding the structures and functions of a basinal system from the plain area, performed by PhD Cioboiu (2002, 2014).

From 1996 until now, the ecosystems underwent modifications. They were influenced by both natural (temperature variations, increased or low precipitation amounts, etc.) and anthropogenic factors (cutting of trees, fishing and grazing, discharge of pollutants into the reservoirs, etc.). Vegetation modified and certain animals are no longer present while other species appeared.

The lack of a synthesis scientific study regarding the present avifauna of Preajba village (which also includes the natural protected area) represents the main reason for the present paper and the research will continue in the next years as well. The field investigations aimed at: inventory of species, phenological statute of the identified species, seasonal dynamics and frequency, numerical evaluation of specimens for each species, distribution of species in different habitats, highlighting some behavioural aspects.

MATERIAL AND METHODS

The study of the avifauna of the Lacustrine Complex was achieved along nine reservoirs (Fig. 1). In order to facilitate the research, the numbering of the reservoirs was achieved from downstream (west) to upstream (east).

The avifauna observations were also made in the settlements located in the immediate proximity of the protected area. For species monitoring, it was used the classical methodology. The field trips were made monthly from March 2014 until September 2015, most in the first part of the day, between 7.30 a.m. and 3 p.m. The main instruments used for bird observation, photographing, filming and identifying were: binocular (Norconia 10x50), photo camera Canon Sx40HS, video camera Panasonic SDR-H20-EP-S, bird guides (Peterson et al., 1989 and Bruun et al., 1999). The geographical coordinates were obtained by the GPS Garmin eTrex 30x. Information processing was based on own observations, field survey and data from specialized literature: Munteanu (2005, 2012), Radu (1984), Tălpeanu (1969). The classification of the species from the taxonomic point of view was based on the "Atlas of bird species of community interest from Romania" (2015).

RESULTS AND DISCUSSIONS

The ornithological research performed in the period March 2014 - September 2015 led to the identification of 84 bird species included in 17 orders and 35 families (Table 1). From the phenological point of view, the inventoried species were classified in the

following bird phenological groups. Sedentary species – 20 species, constantly observed in all the months of the observation years, in a greater or smaller number of specimens.

Figure 1. Map of Preajba-Făcăi Lacustrine Complex (processed after https://www.google.ro/maps/). Location of the area within the country and the county (https://ro.wikipedia.org/wiki/ Complexul_ lacustru_Preajba-Facai).

Partially migratory species - 5 species (e.g.: *Sturnus vulgaris, Emberiza calandra, Turdus merula*, etc.). Summer visitor – 34 species; this is the most important subgroup of migratory birds, both in terms of number and biological and ecological significance. We included the species that come for the wintering places and remain for nesting in the area, non-nesting species that station here in the summer months to feed and rest or are in transit flying over the area in search of food. Species of passage - 14 species, observed only during the spring and/or autumn migration. Winter visitor species, which remained in the region for wintering or just transited the area in search for food during the cold season –11 species (e.g.: *Troglodytes troglodytes, Erithacus rubecula, Parus caeruleus*, *Alcedo atthis, Turdus pilaris, Emberiza citrinella*, etc). Generally, many of the species identified in the studied area present another phenological status than the one recorded for our country. This situation is also induced by the aspect of habitats, which is influenced by the climatic factors. A part of the birds acquired a double status. It is about those species that remained here to nest in one year, while in the other year, were noticed only in passage, but also about non-nesting species (grey heron, cormorant, gulls) noticed during all the seasons no matter the number of signalled specimens.

During the 6 ecological seasons of a year (prevernal, vernal, aestival, serotinal, autumnal, hiemal) we remarked a vast dynamics of the avifauna with the development of the main biological cycles characteristic to bird life (breeding, migration, wintering). The lowest number of species was registered during the hiemal season (45 species). By the end of 2014 and in January 2015, as it snowed and the temperature decreased below 0°C, the surface of the reservoirs remained frozen until the end of February. Most of the emphasized

species belong to sedentary birds. We also remarked 15 aquatic species, such as *Cygnus olor* (8 specimens), *Anas platyrhynchos* (+75 specimens), *Anas crecca* (3-8 specimens), *Phalacrocorax carbo* (5 specimens), *Microcarbo pygmeus* (12 specimens), *Ardea alba* (2-4 specimens), *Ardea cinerea* (1-4 specimens), *Gallinula chloropus* (+20 specimens), *Fulica atra* (+40 specimens), *Larus cachinnans* (2-6 specimens), *Chroicocephalus ridibundus* (+4 specimens), *Alcedo atthis* (2 specimens), etc. The species that remain during this season are usually adult birds, resistant to cold and with a mixed and atypical feeding regime.

The most numerous species (64 species) were registered during the serotinal season (July 15 – September 15), the season that also coincides with the beginning of the autumn migration (among other activities of birds).

As the chain of reservoirs is surrounded by agricultural plots (located in the north and east) and the anthropogenic habitat (houses and gardens - in the south), there is a close interdependency among the present ecosystems (terrestrial, aquatic, anthropogenic). Referring to the distribution of birds within different biotopes, it can be noticed that the number and density of species is induced by their characteristics. Many bird species are found in many categories of habitats in order to be able to satisfy their food, rest and reproduction requirements. For example: *Hirundo rustica* (it builds nests in the anthropogenic habitat at the coping of buildings and flies over the aquatic habitat and agricultural lands to catch insects). *Sturnus vulgaris* (it nests in hollows, cracks of walls, under the tiles of roofs; it feeds in fruit trees or agricultural fields; it also finds shelter in reed beds, etc.). The same situation is registered in case of other species: *Cuculus canorus, Motacilla alba, Passer montanus, P. domesticus*, *Corvus frugilegus, C. monedula* and the list may be continued.

Taking into account the preferred biotope that better ensures the reproduction and feeding needs, within the studied area, terrestrial species (53 species) predominate.

The forest species are also well represented (as number); they populate the clumps of trees and shrubs and build nests in shrubs (thorn bushes), in hollows or on tree branches (poplars, willows, fruit trees). We mention species of Falconidae, Columbidae, Picidae, Upupidae, Coraciidae, many Paseriformes, etc.

At the same time, the birds that nest and feed within open habitats (arable lands, pasture lands, meadows with more or less high herbaceous plants, thorn bushes or isolated bushes, etc.) are represented by Galliformes (*Phasianus colchicus, Perdix perdix*) and certain Passeriformes (*Alauda arvensis, Galerida cristata, Carduelis carduelis, Emberiza calandra*, etc.). Many species are found in open lands searching for food, such as: Columbidae, Corvidae (noticed in a great number of specimens especially over the cultivated fields in autumn), Passeridae, diurnal predators. Falcons and common buzzards were seen flying over these areas in search of prey (rodents, birds, reptiles, various insects, etc.).

Among anthropophilous birds that build their nests in buildings and local people's gardens (with tree and shrub vegetation) or in the trees along streets, we mention: *Athene noctua, Streptopelia decaocto, Dendrocopos syriacus, Parus major, Oriolus oriolus*, *Corvus monedula*, *Sturnus vulgaris*, *Carduelis chloris*, etc.

The species that populate the semiaquatic and aquatic habitats (reed beds, wetlands, lakes, rivers, etc.) do not dominate in terms of number within the studied area. There were identified 31 aquatic and semiaquatic species distributed in 10 orders and 13 families.

In terms of the habitat used for nesting, most of the aquatic species preferred the reed tickets: *Aythya nyroca* (3-4 pairs), *A. ferina* (1-2 pairs), *Anas platyrhynchos* (+15 pairs), *Cygnus olor* – one pair nested every year and, in 2014, the pair had 8 chicks

(reservoirs IX) while, in 2015, only one chick (reservoirs III), *Ixobrychus minutus* (+8 pairs), *Fulica atra* (+12 pairs), *Gallinula chloropus* (+8 pairs), *Acrocephalus arundinaceus*, etc. Certain species built floating nests with the vegetation found at the surface of the water: *Podiceps cristatus* (2-3 pairs), *Chlidonias hybrida* (6 pairs in 2014 and 9 pairs in 2015, with 2 and 3 chicken). In the willows near reservoir II, there nested *Nycticorax nycticorax* (2 pairs), etc. After reproduction, we remarked a dispersion of the species in search for food and, consequently, there were not noticed massive concentrations of birds.

In the studied area, the breeding and possible breeding avifauna included 51 species, which from the phenological point of view is distributed in 26 summer visitors and 25 sedentary and partially migratory species. However, not all these species nested in both years. For example: *Himantopus himantopus* nested in 2014 (one pair) in the proximity of reservoir V (44°16′249″N, 23°50′210″E), which is rich in paludous vegetation. The species no longer nested in 2015 in the area, as there was built a sheepfold on the meadow near the reservoir. At the time, *Sterna hirundo* nested in 2014 – 2 pairs at reservoir VI, *Lanius minor* in 2015, etc. It is also characteristic to the area the nesting of the species of the order Coraciiformes: *Merops apiaster* breeding in small colonies (+ 9 pairs) at north-east of reservoir IX (44°15′893″N, 23°51′830″E); *Coracias garrulus* - 2 pairs, in the tree hollows near reservoirs II and IV. It is also important to mention the nesting of two falcon species in solitary pairs: *Falco tinnunculus* (2 pairs in 2014, 3 pairs in 2015) and *Falco subbuteo* (2 pairs in 2014, a pair in 2015). They used abandoned crow (*Corvus frugilegus*) and common wood pigeon nests. The nests were built in poplars, at a height of about 9-12 m. In July, we remarked 2-3 chicks of *Falco subbuteo*. We shall further develop the issue of bird nesting in the area in another paper.

The obtained data, although preliminary, show the diversity of avifauna and the role habitats play in the conservation of birds in the studied area.

CONCLUSIONS

The diversity of habitats from Preajba-Făcăi Lacustrine Complex and its proximity (springs, streams, reservoirs, wetlands, reed beds, clumps of trees and shrubs, arable plots, meadows and pasture lands, etc.) motivates the presence of a high number of both terrestrial (forest, meadow and agroecosystem, anthropophilous species) and aquatic and semiaquatic species in the area. The 84 species observed in the period March 2014 – September 2015 are distributed in 17 orders and 35 families.

From the phenological point of view, the most numerous group is represented by migratory birds, 59 species, of which 34 summer visitors (most breeding), 14 species of passage, 11 winter visitors. Sedentary and partially sedentary species count 25 species. Many bird species have a double status conditioned by the dynamics of seasons and ecological needs and this is why this phenological classification might modify anytime.

Within the investigated area, we emphasized the presence of 49 nesting species and 2 potentially nesting species. Among the aquatic and semiaquatic species that found adequate conditions for breeding in the investigated area we mention: *Podiceps cristatus*, *Cygnus olor, Anas platyrhynchos, Aythya nyroca*, *Aythya ferina, Ixobrychus minutus, Nycticorax nycticorax, Gallinula chloropus, Fulica atra, Himantopus himantopus, Sterna hirundo, Chlidonias hybrida, Acrocephalus arundinaceus*.

During the period of research (March 2014 – September 2015), climatic and anthropogenic factors are the ones that induced the variation of the number of species and specimens, as well as the variation of the signalled nesting pairs (both annually and seasonally).

Of the total number of birds identified within Preajba-Făcăi Lacustrine Complex, 10 species appear in the Red Book of Vertebrates from Romania (Munteanu, 2005) as having a certain degree of vulnerability; vulnerable species: *Aythya nyroca, Microcarbo pygmeus, Nycticorax nycticorax, Ardeola ralloides, Ciconia ciconia, Upupa epops,* and endangered species *Egretta garzetta, Ardea alba, Himantopus himantopus*, also declared Nature Monuments, and *Ardea purpurea*.

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Table 1

Systematic list of bird species observed within Preajba-Făcăi Lacustrine Complex and its surroundings (Dolj) in the period March 2014 – September 2015.

No	Taxonomy	Observation periods (months)	Phenology Preajba	Breeding (B)	Ecologic type	Number of specimens	Some observations
	1. Order Anseriformes Family Anatidae						
1.	*Cygnus olor*	I – XII	S	B	Aqu.	2 – 10	Constant; adults, chicks, juveniles
2.	*Anas crecca*	XII, I, II	WV	–	Aqu.	3 – 8	Small number of specimens
3.	*Anas platyrhynchos*	1 – XII	S	B	Aqu.	4 – 100	Common; adults, chicks, juveniles
4.	*Anas querquedula*	III	P	–	Aqu.	4 – 6	Rare; reservoir III and IV
5.	*Anas clypeata*	III	P	–	Aqu.	7	Rare, reservoir III and IV
6.	*Aythya ferina*	IV, VI, VIII, IX, X, XI	SV	2014	Aqu.	2 – 8	Rare; discrete presence, hidden in the reed beds
7.	*Aythya nyroca*	III, V, VII, VIII, IX, X, XI	SV	B	Aqu,	2 – 10	Frequent; in a reduced number of specimens
	2. Order Galliformes Family Phasianidae						
8.	*Perdix perdix*	I, II, III, IV, V, VII, VIII, IX, X, XI, XII	S	–	Terr.	3 – 5	Rare; arable land, meadows
9.	*Coturnix coturnix*	V, VII, VIII	SV, P	–	Terr.		Rare; sound identification; agricultural field;
10	*Phasianus colchicus*	I,II, III, IV, V, VII, XIII, IX, X, XI, XII	S	B	Terr.	+8	Common; on open land with shrubs and dense thorn bushes; cultivated plots; reed beds
	3. Order Podicipediformes Family Podicipedidae						
11.	*Tachybaptus ruficollis*	IX, X	P	–	Aqu.	2 – 5	Rare
12.	*Podiceps cristatus*	III – X	SV	B	Aqu.	4 – 12	Frequent; adults, chicks, juveniles
	4. Order Suliformes Family Phalacrocoracidae						
13.	*Phalacrocorax carbo*	II, III, IX, V, VI, VII, IX, X, XII	SV, WV	–	Aqu.	2 – 17	Frequent, for food and rest; all reservoirs

14.	*Microcarbo pygmeus*	II, III, IV, V, VII, VIII, IX, X, XII	SV, WV	–	Aqu.	3 – 25	Frequent, for food and rest, all reservoirs
	5. Order Pelecaniformes Family Ardeidae						
15.	*Ixobrychus minutus*	V – IX	SV	B	Aqu.	+27	Constant; adults, juveniles; reed beds
16.	*Nycticorax nycticorax*	IV – X	SV	2015	Aqu.	4 – 10	Frequent; adults, juveniles
17.	*Ardeola ralloides*	V	P	–	Aqu.	2	Rare; noticed at the edge of the reed beds, reservoir II
18.	*Egretta garzetta*	IV,V, VII,VIII, IX, X	SV	B?	Aqu.	3 – 15	Frequent
19.	*Ardea alba*	XI – II	WV	–	Aqu.	2 – 4	For rest and food; wintering
20.	*Ardea cinerea*	I, III, V, VI, VII, VIII, IX, X, XI, XII	SV, WV	–	Aqu.	1 – 5	Rare; solitary activity, observed at the edge of the reeds, on the agricultural lands; wintering
21.	*Ardea purpurea*	VII – IX	SV	–	Aqu.	2 – 4	For feeding and resting
	6. Order Ciconiiformes Family Ciconiidae						
22.	*Ciconia ciconia*	VIII	P	–	Aqu.	2	Accidental appearance; noticed in flight above the studied area
	7. Order Accipitriformes Family Accipitridae						
23.	*Buteo buteo*	II, IV, V, VII, VIII, IX, X, XI	SV, P	–	Terr.	1 – 2	Flying over the area in search for food above the agricultural lands and reservoirs
24.	*Circus aeruginosus*	III, V	P	–	Aqu.	1	Rare; flying over the reed beds
	8. Order Falconiformes Family Falconidae						
25.	*Falco tinnunculus*	III – XI	SV	B	Terr.	2 – 12	Constant
26.	*Falco subbuteo*	IV – IX	SV	B	Terr.	2 – 9	Constant; adults, chicks, juveniles
	9. Order Gruiformes Family Rallidae						
27.	*Gallinula chloropus*	I – XII	S	B	Aqu.	8 – 50	Common; adults, chicks, juveniles
28.	*Fulica atra*	I – XII	S	B	Aqu.	15 – 100	Common; adults, chicks, juveniles
	10. Order Charadriiformes Family Recurvirostridae						

29.	*Himantopus himantopus*	IV, V, VI, VII, VIII, IX	SV, P	2014	Aqu.	4 – 6	Rare; the paludous vegetation;
	Family Laridae						
30.	*Larus cachinnans*	I, II, IV, V,VII,VIII, IX, X, XI, XII	SV, WV	–	Aqu.	4 – 15	Modest presence; come for feeding and resting
31.	*Chroicocephalus ridibundus*	I, II, III, VII, VIII, IX, X, XII	SV, WV	–	Aqu.	2 – 8	Modest presence; come for feeding and resting
	Family Sternidae						
32.	*Sterna hirundo*	V, VI, VII, VIII	SV	2014	Aqu.	2 – 10	Rare; adults, juveniles
33	*Chlidonias hybrida*	V – IX	SV	B	Aqu.	6 – 30	Constant; nesting in small colonies; adults, chicks, juveniles
	11. Order Columbiformes Family Columbidae						
34.	*Columba livia domestica*	I – XII	S	B	Terr.	tens	Common; anthropophilous species
35.	*Columba palumbus*	III – X	SV	B	Terr.	tens	Constant; anthropogenic habitat, trees in the vicinity of reservoirs
36.	*Streptopelia decaocto*	I – XII	S	B	Terr.	tens	Common; settlements
	12. Order Cuculiformes Family Cuculidae						
37.	*Cuculus canorus*	IV – VIII	SV	B	Terr.	4 – 8	Frequent
	13. Order Strigiformes Family Strigidae						
38.	*Athene noctua*	I – XII	S	B	Terr	1 – 2	In anthropogenic habitat
	14. Order Coraciiformes Family Coraciidae						
39.	*Coracias garrulus*	V – IX	SV	B	Terr.	2 – 4	Frequent; small number of specimens
	Family Meropidae						
40.	*Merops apiaster*	V – IX	SV	B	Terr.	+50	Frequent; adults, juveniles
	Family Alcedinidae						
41.	*Alcedo atthis*	IX, XII, I	P, WV	–	Aqu.	1 – 2	In passage, during winter in search for food
	15. Order Bucerotiformes Family Upupidae						
42.	*Upupa epops*	IV – IX	SV	B	Terr.	2 – 3	Frequent; small number of specimens
	16. Order Piciformes						

	Family Picidae						
43.	*Picus viridis*	I, II, III, IV, V, VII, VIII, IX, X, XI, XII	S	B	Terr.	1 – 3	Frequent; small number of specimens adults and juveniles
44.	*Dendrocopos major*	I – XII	S	B	Terr.	3 – 4	Frequent; small number of specimens adults and juveniles
45.	*Dendrocopos syriacus*	I – XII	S	B	Terr.	2 – 6	Frequent; small number of specimens adults and juveniles
	17. Order Passeriformes Family Alaudidae						
46.	*Alauda arvensis*	IV, V, VI, VIII, IX	SV	B	Terr.	+10	Species of agroecosystem
47.	*Galerida cristata*	I, II, III, V, VIII, IX, X, XI, XII	S	B	Terr.	3 – 7	Rare presence; more numerous autumn and winter
	Family Hirundinidae						
48.	*Hirundo rustica*	III – IX	SV	B	Terr.	tens	Common; anthropophilous; noticed in the entire studied area
	Family Motacillidae						
49	*Anthus trivialis*	VIII, IX	P	–	Terr.	+6	Highlighted on the open land with shrubs and herbaceous vegetation
50.	*Motacilla flava*	VIII, IX	P	–	Terr.	7 – 12	Rare; noticed on agricultural lands, grasslands
51.	*Motacilla alba*	IV – IX	SV	B	Terr.	+20	Constant; observed in the entire studied area
	Family Troglodytidae						
52.	*Troglodytes troglodytes*	X – III	WV	–	Terr.	4 – 9	Noticed in the reed beds, bushes
	Family Muscicapidae						
53.	*Muscicapa striata*	V – IX	SV	B	Terr.	+15	Frequent
54.	*Erithacus rubecula*	XI – III	WV	–	Terr.	3 – 8	Rare; small number of specimens
55.	*Luscinia megarhynchos*	III, IV, V	P	–	Terr.	+7	Frequent in passage
56.	*Phoenicurus ochruros*	III, IV	P	–	Terr.	2 – 6	Frequent, in anthropogenic habitat
	Family Turdidae						
57.	*Turdus merula*	I, II, III, IV, V, VII, VIII, IX, X, XI	PM	B	Terr.	3 – 8	Rare presence
58.	*Turdus pilaris*	I	WV	–	Terr.	+50	In passage; accidental occurrence
	Family Sylviidae						

59.	*Acrocephalus scirpaceus*	V, VI, VII, VIII	SV	B?	Aqu.		Unevaluated effectives; reed species
60.	*Acrocephalus arundinaceus*	IV – IX	SV	B	Aqu.	+20	Frequent; noticed in reed beds
61.	*Sylvia curruca*	IV,V, VIII, IX	P		Terr.	+5	Frequent in passage
62.	*Sylvia borin*	IV, V	P		Terr.		Unevaluated effectives
63.	*Sylvia communis*	III, IV, V, VII, VIII, IX	SV	B	Terr.	3 – 10	Frequent
64.	*Phylloscopus collybita*	III, IV, IX, X	P	–	Terr.		Frequent; unevaluated effectives; tree and shrub clumps
65.	*Phylloscopus trochilus*	III, IV, IX, X	P	–	Terr.		Frequent; unevaluated effectives; tree and shrub clumps
	Family Paridae						
66.	*Parus major*	I – XII	S	B	Terr.	+75	Frequent; numerous during winter
67.	*Parus caeruleus*	XI – III	WV	–	Terr.	+30	Observed in trees and shrubs; reed beds, gardens
	Family Oriolidae						-
68.	*Oriolus oriolus*	V – IX	SV	B	Terr.	3 – 8	Constant; noticed in tree and shrub clumps; gardens
	Family Laniidae						
69.	*Lanius collurio*	V – X	SV	B	Terr.	tens	Common; adults and juveniles,
70.	*Lanius minor*	V, VI, VII, VIII, IX	SV, P	2015	Terr.	2 – 4	Small number of specimens; trees and bushes
	Family Corvidae						
71.	*Pica pica*	I – XII	S	B	Terr.	6 – 27	Common; present in the entire area
72.	*Corvus frugilegus*	I – XII	S	B		tens/ hundreds	Common; omnipresent
73.	*Corvus cornix*	I – XII	S	B	Terr.	tens	Frequent; number in increases autumn and winter
74.	*Corvus monedula*	I – XII	S	B	Terr.	tens/ hundreds	Common; omnipresent
	Family Sturnidae						
75.	*Sturnus vulgaris*	II, III, IV, V, VI, VII, VIII, IX, X, XI, XII	PM	B	Terr.	tens/ hundred	Constant; noticed in the entire studied area
	Family Passeridae						
76.	*Passer domesticus*	I – XII	S	B	Terr.	tens/ hundreds	Common; all area

77.	*Passer montanus*	I – XII	S	B	Terr.	tens/ hundreds	Common; all area
	Family Fringillidae						
78.	*Fringilla coelebs*	XI – III	WV	–	Terr.	10 – 50	Frequently observed during winter time
79.	*Coccothraustes coccothraustes*	XI – IV	WV	–	Terr.	+75	Noticed in trees and bushes, in anthropogenic habitat
80.	*Carduelis carduelis*	I, II ,III, VI, VII, VIII, X, IX, XI, XII	PM	B	Terr.	5 – 12	Frequent; noticed on open land with herbaceous vegetation and shrubs
81.	*Carduelis chloris*	I, II, IV, V, VII, VIII, IX, XI, XII	PM	2014	Terr.	3 – 7	Rare
	Family Emberizidae						
82.	*Emberiza calandra*	II, III, IV, V, VII, VIII, IX, X, XI	PM	B	Terr.	tens	Frequent; in agricultural land, open land with herbaceous vegetation and shrubs
83.	*Emberiza citrinella*	I, II	WV	–	Terr.	7 – 12	Noticed in bushes and trees, at the edge of the agricultural lands
84.	*Emberiza schoeniclus*	XII – II	WV	–	Aqu.	2 – 4	Hidden in reed areas

Legend

Months of the year: I – January, II – February, III – March, IV – April, V – May, VI – June, VII– July, VIII– August, IX– September, X– October, XI– November, XII – December; Phenological type: S – sedentary species; PM – partially migratory species, P – passage species; SV – summer visitors, WV – winter visitors. Breeding (B): B? – possible breeding (uncertain nesting) Ecological type: Aqu. – aquatic species, Terr. – terrestrial species.

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THE ECOLOGICAL BRAND – INSTRUMENT FOR THE PROMOTION OF ECOLOGICAL PRODUCTS AND MEANS OF REDUCING THE NEGATIVE ENVIRONMENT IMPACT

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Keywords: *ecological brand, eco-label, promotion, environment*

ABSTRACT

Currently constant interest legislative authorities, both national and international are to assess the environmental impact of the use of consumer products and services and the integration of waste resulting from consumption. The concerns of mitigating the negative impact on the environment are highlighted by introducing a system of eco-labeling. A first step was made by EEC Regulation no. 880 of 1992. Eco-label is a tool to promote products and services distinguished by ecological features contributing to the protection of life, health and the environment, positively influencing the buying decision of consumers and increasing the interest of organizations for design and execution of a more diverse offer of "green and services products - Environment friendly".

INTRODUCTION

Currently, the constant interest of the legislative authorities, both national and international is to assess the environmental impact that it has the use of consumer products and services and the integration of waste resulting from consumption. The concerns of mitigating the negative impact on the environment are highlighted by introducing a system of eco-labeling. A first step was made by the EEC Regulation no. 880 from 1992. It aims to establish a voluntary Community eco-labeling to promote products with a reduced environmental impact during their entire life cycle and to provide consumers with precise and accurate, scientifically based, on their impact on environment (Nicoară M., 2009). They also established the first group of products (***, Regulamentul CEE nr. 880/1992).

The European Union Eco-label, European Flower - flower with petals in the shape of stars (figure 1), is a distinct and optional scheme of certification to help consumers to distinguish green products and services, environmentally friendly, conceived to encourage businesses, to market goods and services with a reduced impact on the environment and for European consumers, including public and private purchasers, to easily identify them (***, Regulamentul CEE nr. 1980/2000).

In EU Member States, each State shall establish its own measures to ensure the application of the Regulation on the EU Eco-label (Ciobotaru Virginia et al., 2011). In

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Romania, the competent authority which grants the right to use the EU Eco-label is the Ministry of Environment and to implement Eco-label scheme was established the National Commission for eco-label, consultative body involved in making decisions on the awarding (***, Hotărâre de Guvern nr. 236 din 07/03/2007).

Figure1. European flower - the symbol of the Community Eco-label

The Eco-label is a graphic symbol and / or descriptive text on the product or packaging, in a brochure or other document accompanying the product and provides the necessary information on the environmental criteria of products offered on the market. The eco-label is certifying that the product or service meets standards set at EU level. To receive this qualification must be met mandatory criteria, which relate to water and energy saving, waste reduction and environmental protection. The purpose of the eco-label is to promote products that have a reduced environmental impact, eco-labeling being a voluntary action. The validity of the ecological criteria is a period between 3 and 5 years, the revision is to be performed depending on the technical progress of the products.

The European Eco-label has the following objectives:

- Encouraging industry to design and produce products that have a minimal environmental impact during the production phase, distribution, consumption and use, even during disposal after use;

- To provide consumers with the best information on the environmental impact of products / services. (Paraschivescu Viorica, 2009)

The EU Eco-label aims 24 product groups from different sectors and two service activities, such as: cleaning products, paper products, products for home, gardening products, electrical products and home appliances, footwear, textiles, services, heat pumps, lubricants.

The scheme is open to all products / services except:

a) substances or preparations classified as very toxic, toxic, harmful to the environment, carcinogenic, mutagenic or toxic to reproduction, and goods manufactured by processes harmful to humans or the environment and which may harm consumers in normal use;

b) food, beverages, pharmaceuticals;

c) medical devices intended for professional use or to be prescribed or used by medical professionals under current legislation.

The advantages of eco-labeling include: credibility - based on scientific studies, reliability - awarded by the Ministry of Environment, visibility - covering a wide range of products, contributing to the purchaser's choice by its symbol applied to them. European Eco-label advantages for operators are: increases customer confidence, strengthens the company image and improve brand image (Morar Avia, 2013). Also Eco-label scheme is part of a European strategy that promotes sustainable production and consumption

(Dumitru Claudia, 2004). Promoting eco-labeled products contribute to the efficient use of resources and a high level of environmental protection (Danciu V., 2006).

MATERIAL AND METHODS

Recently, we are witnessing in all fields of activity to certain changes, taking into account environmental issues and those associated with it. These issues related to rural, which evaluates the environmental impact of the product, unifies the effects exerted by the product throughout its life cycle. Product life cycle analysis constitutes an extremely useful tool, both for comparing products taking into account their environmental impact and to launch on the market products that respect the needs of environmental protection. Thus, companies that meet tough environmental standards on life cycle analysis are rewarded for their products or services with the European Eco-label. This paper is based on a bibliographic documentation of documents produced by other authors, on theoretical issues relating to the European Eco-label, a documentary analysis of empirical data on the number of eco-label licenses given to countries and the structure of eco-label on products / services.

RESULTS AND DISCUSSIONS

Eco-label becomes a tool to promote products and services that are distinguished by ecological features contributing to the protection of life, health and the environment, influencing positively the purchase decision of consumers and increasing the interest of organizations to design and construct an offer of more diversified "environmental goods and services - Environment friendly".

The concerns about the environment can be transformed into an asset for organizations, for specific products and services, for which they attach particular importance to the adoption of different eco-labels. Globally speaking, business, public and governments concerns have increased and led the appearance of Eco-label (Morar Avia, 2013).

In March 2015, the EU Eco-label, which was launched in 1992 by the European Commission in light of developing a Europe-wide voluntary environmental labelling scheme that consumers could trust, now has 44,051 products and services comprised by 2010 licenses (Figure 2).

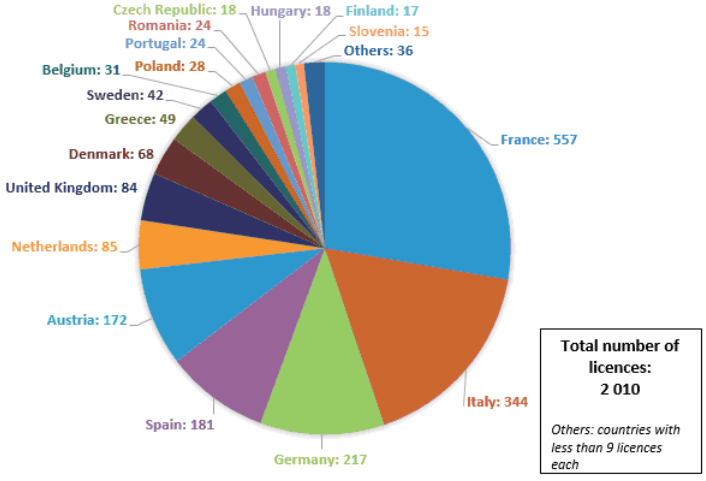

Figure 2. Total EU eco-label licenses per country (2015)
Source: http://ec.europa.eu/environment/ecolabel/facts-and-figures.html

The largest number of EU Eco-label licenses was awarded in France (28%), Italy (17%), and Germany (11%). Romania has 24 eco-labels in year 2015 (figure 2). Note that in the European Union, 44.8% of the eco-label licenses are held by France (557) and Italy (344), out of the 2010 environmental licenses.

Out of the total licenses in the March 2015 reporting period, the majority of products/services comprised within this total are from Italy (44%), France (12%), and Spain (6%) (figure 3).

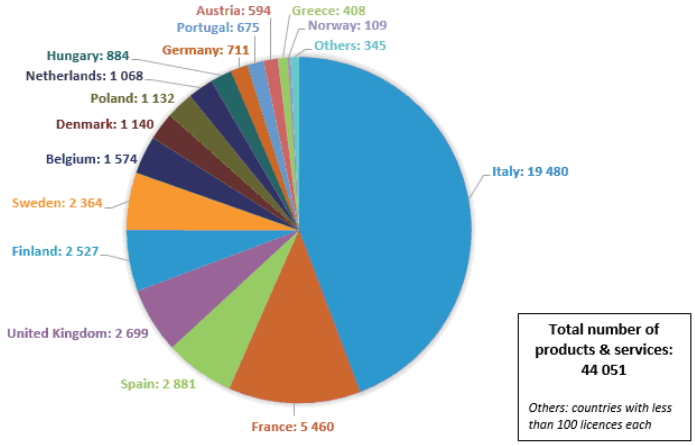

Figure 3. Total EU eco-label products &services per country (2015)
Source: http://ec.europa.eu/environment/ecolabel/facts-and-figures.html

Tourist accommodation services represent 31.5% of the total number of licenses, followed by cleaning products (13%) and exterior and interior paints (8%), figure 4.

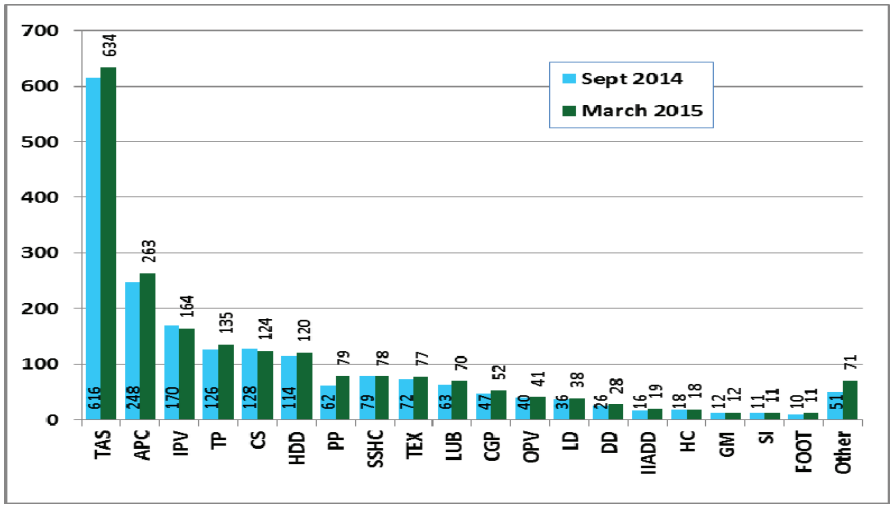

Figure 4. Total EU Ecolabel licenses per product or service group, total sept. 2014 – 1924, total march 2015 - 2010
Source: http://ec.europa.eu/environment/ecolabel/facts-and-figures.html

Where:
TAS: Tourist accommodation services; APC: All-purpose cleaners and cleaners for sanitary facilities; IPV: Indoor paints and varnishes; TP: Tissue Paper; CS: Campsite services; HDD: Hand dishwashing detergents; PP: Printed paper; SSHC: Soaps, shampoos, and hair conditioners; TEX: Textiles; LUB: Lubricants; CGP: Copy and Graphic paper; OPV: Outdoor paints and varnishes; LD: Laundry detergents; DD: Detergents for dishwashers; IIADD: Industrial and institutional automatic dishwasher detergents; HC: Hard coverings; GM Growing media; SI: Soil improvers; FOOT: Footwear; Other - Product groups with less than 9 licenses each.

Marking products eco joins the measures adopted at the United Nations Conference on Environment and Development in 1992, measures taken to reduce and eliminate unsustainable production methods, resizing growth, increasing the quality of human life and preservation of consumers health and safety (***, Development durable et environnement 1992; Adamov Tabita Cornelia et al. 2010; Stanciu 2008).

CONCLUSIONS

Currently, we are witnessing to competition between private companies that offer "green", "ecological", "natural", "biodegradable" (for packaging) products. Eco-label is a voluntary option, designed to assist consumers in identifying and choosing products and services that are "friendly" to the environment compared to similar products on the market. The eco-label helps consumers to use their purchasing power to procure products / services from "green" companies that respect the environment.

Eco-labeling procedure is regulated at European level and in Romania. The right to use the eco-label is conferred by a national committee designated by each of the EU countries, which sets environmental criteria, specific to various product categories.

The "Flower" is only valid eco-label within the European Union Member States and Iceland, Liechtenstein, Norway, granted for a fixed period, between 3 and 5 years. Currently, the European Eco-label aims 24 product groups from various sectors and two service activities.

Promoting eco-labeled products contribute to the efficient use of resources and a high level of environmental protection, but also to provide consumers with accurate information, deceptive and scientifically based, about these products.

In conclusion, the EU Eco-label has become a European symbol for products / services, but also a competitive advantage for companies that promotes the design, production, marketing and use, of products with low impact on the environment.

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***, Hotărâre de Guvern nr. 236 din 07/03/2007 privind stabilirea unor măsuri pentru asigurarea aplicării Regulamentului Parlamentului European şi al Consiliului nr. 1980/2000/CE din 17 iulie 2000 privind sistemul revizuit de acordare a etichetei ecologice comunitare

***, http://ec.europa.eu/environment/ecolabel/facts-and-figures.html

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ANALYSIS OF THE COMMUNICATION MESSAGES FROM THE GREENWASHING PERSPECTIVE

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Keywords*: greenwashing, environment, advertisements.*

ABSTRACT

Nowadays, when climate change legislation concerns about foreign oil dependence and mandatory curbside recycling are becoming the "new normal," companies across a variety of sectors are seeing the benefit of promoting their "greenness" in advertisements. Many lay vague and dubious claims to environmental stewardship. Others are more specific but still raise questions about what their claims really mean. The term for ads and labels that promise more environmental benefit than they deliver is "greenwashing." Today, some critics are asking whether the impact of greenwashing can go beyond a breach of marketing ethics - can greenwashing actually harm health? Greenwashing is not a recent phenomenon; since the mid-1980s the term has gained broad recognition and acceptance to describe the practice of making unwarranted or overblown claims of sustainability or environmental friendliness in an attempt to gain market share.

INTRODUCTION

Seems like anything and everything has "gone green" these days: airlines, car companies, retailers, restaurants, even networks and stadiums. Thankfully, more often than not, that's a good thing. It's only bad if it's greenwashing - that's bad for the environment, consumers, and, ultimately, for the very businesses doing the greenwashing - whether they mean to or not.

At its very worst, greenwashing is bad for the environment because it can encourage consumers en masse to do the opposite of what's good for the environment. At its most benign, greenwashing makes claims that are neither good nor bad for the environment - it's just making green claims to sell more stuff.

Regarding consumers: we've all heard of lemon laws and bait-and-switch. Nobody likes to be taken advantage of, especially when it comes to money. So, the next time you see an environmental claim, ask yourself about "the truth, the whole truth, and nothing but the truth" before you buy. The last thing you want to do is spend money on a product or service you believe is doing right by the environment, but in reality is not - or not as much as the ad might lead you to believe.

Smart businesses are finding out that doing right by the environment actually does increase profitability in many cases. With so many easy ways for businesses to reduce their

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environmental impact or improve their products and processes, it's just sad when they don't. It's even worse when they don't make changes and claim to be a green company just to push their agenda. When properly trained, consumers see right through this "green screen." Then greenwashing backfires, hurting the company's reputation and, ultimately, their sales (***http://www.greenwashingindex.com/about-greenwashing).

MATERIAL AND METHODS

This paper is based on bibliographical materials belonging to other authors that help to present a documentary analysis on theoretical and practical issues relating to greenwashing: a brief history of greenwashing, three negative examples, and a model of good practice regarding the use of this concept in ads.

While there's a new wave of greenwashing in the media these days, it is by no means a new phenomenon. Many corporations have a long track record of riding green consumer interest and staving off criticism with advertising campaigns and front groups, distracting attention with green PR, denying the impacts of their activities or products and working behind the scenes against environmental regulations.

Although greenwashing has been around for many years, its use has escalated sharply in recent years as companies have strived to meet escalating consumer demand for greener products and services, according to advertising consultancy TerraChoice Environmental Marketing. TerraChoice issued its report on the subject in 2009, identifying 2,219 products making green claims - an increase of 79% over the company's first report two years earlier. TerraChoice also concluded that 98% of those products were guilty of greenwashing. Furthermore, according to TerraChoice vice president Scot Case, the problem is escalating. TerraChoice also measured green advertising in major magazines and found that between 2006 and 2009, the number mushroomed from about 3.5% of all ads to just over 10%; today, Case says, the number is probably higher still and he predicts the number of products making dubious green claims will double.

Organizations and individuals are making attempts to reduce the impact of greenwashing by exposing it to the public. The Greenwashing Index, created by the University of Oregon in partnership with EnviroMedia Social Marketing, allows examples of greenwashing to be uploaded and rated by the public (***http://www.greenwashingindex.com/). The British Code of Advertising, Sales Promotion and Direct Marketing has a specific section (section 49) targeting environmental claims.

According to some organizations opposing greenwashing, there has been a significant increase in its use by companies over the last decade. Additionally, it has begun to manifest itself in new varied ways. Within the non-residential building products market in the United States, some companies are beginning to claim that their environmentally minded policy changes will allow them to earn points through the U.S. Green Building Council's Leadership in Energy and Environmental Design rating program. This point system has been held up as an example of the "gateway effect" that the drive to market products as environmentally friendly is having on company policies. Jim Nicolow, AIA, LEED Fellow, leader of architecture and planning firm Lord, Aeck & Sargent's sustainable design initiative has claimed that the greenwashing trend may be enough to eventually effect a genuine reduction in environmentally damaging practices. According to the Home and Family Edition, 95% consumer products claiming to be green were discovered to commit at least one of the "Sins of greenwashing".

The seven sins of greenwashing are as follows (figure 1):

1. Sin of the hidden trade-off: committed by suggesting a product is “green” based on an unreasonably narrow set of attributes without attention to other important environmental issues (e.g., paper produced from a sustainable harvested forest may still yield significant energy and pollution costs).

2. Sin of no proof: committed by an environmental claim that cannot be substantiated by easily accessible supporting information or by a reliable third-party certification (e.g., paper products that claim various percentages of postconsumer recycled content without providing any evidence).

3. Sin of vagueness: committed by every claim that is so poorly defined or broad that its real meaning is likely to be misunderstood by the consumer (e.g., “all-natural”).

4. Sin of irrelevance: committed by making an environmental claim that may be truthful but is unimportant or unhelpful for consumers seeking environmentally preferable products (e.g., “CFC-free” is meaningless given that chlorofluorocarbons are already banned by law).

5. Sin of lesser of two evils: committed by claims that may be true within the product category, but that risk distracting the consumer from the greater health or environmental impacts of the category as a whole (e.g., organic cigarettes).

6. Sin of fibbing: committed by making environmental claims that are simply false (e.g., products falsely claiming to be Energy Star certified).

7. Sin of false labels: committed by exploiting consumers’ demand for third-party certification with fake labels or claims of third- party endorsement (e.g., certification-like images with green jargon such as “eco-preferred”) (*** http://sinsofgreenwashing.com/findings/greenwashing-report-2009/).

In 2008, Ed Gillespie identified "ten signs of greenwashing" (Gillespie 2008), which are similar to the seven sins listed above, but with three additional indicators:

8. Suggestive pictures - Images that imply a baseless green impact, such as flowers issuing from the exhaust pipe of a vehicle.

9. Just not credible - A claim that touts the environmentally friendly attributes of a dangerous product, such as cigarettes.

10. Gobbledygook - The use of jargon and/or information that the average person can not readily understand or be able to verify.

Companies may pursue environmental certification to avoid greenwashing through independent verification of their green claims. For example, the Carbon Trust Standard launched in 2007 with the stated aim "to end 'greenwashing' and highlight firms that are genuine about their commitment to the environment".

RESULTS AND DISCUSSIONS

Greenwashing took root in the 1970s when the growth of the environmental movement brought awareness of ecological damage to the general public. The practice was honed and perfected by professional public relations companies. Since then, the intensity and frequency of greenwashing waxes and wanes with the public and political mood of the times. This latest phase is no different then earlier cycles except that the stakes are higher as global warming looms.

The first Earth Day was held on April 22, 1970. This encouraged many industries to advertise themselves as being friendly to the environment. Public utilities spent 300 million dollars advertising themselves as clean green companies. This was eight times more than the money they spent on pollution reduction research.

In 1985, the Chevron Corporation launched one of the most famous greenwashing ad campaigns in history. Chevron's "People Do" advertisements were aimed at a "hostile

audience" of "societally conscious" people. Two years after the launch of the campaign, surveys found people in California trusted Chevron more than other oil companies to protect the environment. In the late 1980s The American Chemistry Council started a program called Responsible Care, which shone light on the environmental performances and precautions of the group's members. The loose guidelines of responsible care caused industries to adopt self - regulation over government regulation (***http://thegreenlifeonline.org/greenwash101/,***http://www.corpwatch.org/article.php?id=242).

Greenpeace has been working to bring attention to the problem since the early 1990s. In 1992, they published the Greenpeace Book of Greenwash, highlighting the most egregious examples of corporate greenwashing at the time. Many of the same companies are still up to their old tricks (http://stopgreenwash.org/history).

In 1991, a study published in the Journal of Public Policy and Marketing (American Marketing Association) found that 58% of environmental ads had at least one deceptive claim. Another study found that 77% of people said the environmental reputation of company affected whether they would buy their products. One fourth of all household products marketed around Earth Day advertised themselves as being green and environmentally friendly. In 1998 the Federal Trade Commission created the "Green Guidelines", which defined terms used in environmental marketing. The following year the FTC found that the Nuclear Energy Institute claims of being environmentally clean were not true. The FTC did nothing about the ads because they were out of their jurisdiction. This caused the FTC to realize they needed new clear enforceable standards. In 1999, according to environmental activist organizations, the word "greenwashing" was added to the Oxford English Dictionary.

In 2002, during the World Summit on Sustainable Development in Johannesburg, the Greenwashing Academy hosted the Greenwash Academy Awards. The ceremony awarded companies like BP, ExxonMobil, and even the US Government for their elaborate greenwashing ads and support for greenwashing.

More recently, social scientists have been investigating claims of and the impact of greenwashing. In 2005, Ramus and Monteil conducted secondary data analysis of two databases to uncover corporate commitment to implementation of environmental policies as opposed to greenwashing. They found that while companies in the oil and gas are more likely to implement environmental policies than service industry companies, they are less likely to commit to fossil fuel reduction (Ramus & Monteil 2005).

In 2010 a study was done showing that 4.5% of products tested were found to be truly green as opposed to 2% in 2009. In 2009 - 2,739 products claimed to be green while in 2010 the number rose to 4,744. The same study in 2010 found that 95% percent of the consumer products claiming to be green were not green at all (*** http://sinsofgreenwashing.com/media-room/media-coverage/print-archive/).

Bellow are presented some advertising messages used by retailers which are falling under the greenwashing (***http://awsassets.panda.org/downloads/retailer_scorecard_2013_final_1.pdf):

- this product supports the environment,
- this store supports environment,
- discover all healthy price offers,
- we invest in projects in order to reduce carbon emissions,
- hundreds of offers for a healthy lifestyle,
- absolute freshness of fruits and vegetables,

-closed shop windows are saving energy. We protect nature, we protect the environment,

- our stores use 25% green energy,
- 70% of articles present in our product range are produced in Romania,
- goodies from Romania,
- we support the Romanian producers of vegetables and fruits,
- our Romanian fruits and vegetables are coming from the most known Romanian farmers.

Figure 1. Greenwashing specific advertising messages

In what follows are presented and analyzed three negative examples regarding greenwashing:

1. Shell: Don't throw anything away, there is no away. In 2007, an advertisement of the Shell Company has been banned in Britain and the Netherlands on the grounds that made environmental statements which mislead the public.

Figure 2. Shell advertisement

The ad (figure 2) was depicting a Shell refinery and from its blast furnaces were coming out flowers. The text ad said: "We use waste carbon to grow flowers and waste sulfur to make concrete. Real solutions for real world". An oil refinery that grows flowers? Here's a pretty good example of creativity, which is based on some truth yet. Shell claimed it uses waste carbon dioxide to grow flowers and waste sulfur to produce concrete. The problem is one of proportion: that Shell may indeed use waste carbon dioxide to grow flowers, but it is a very small part of the total produced by the company. In addition, the company did not stop gas burnings in the Niger Delta, although they promised to end this practice.

2. Renault: Economical, Ecological. In March 2008, the ASA (Advertising Standards Authority) asked Renault to withdraw from the United Kingdom an advertisement, saying that "the car's environmental benefits are exaggerated."

Figure 3. Renault advertisement

The ad (figure 3) shows green leaves coming out of the tailpipe of Renault Twingo. In addition, the advertisement contained ECO2 logo used by companies that have a policy of reducing carbon emissions. ASA has decided that the use of the logo was not justified and that it transmits incorrect information about the environmental quality of the product. The ad presents the car on a green background and talk about carbon emissions levels. In fact, the car is neither economical nor efficient. It is in C efficiency class and is not included in the top 10 cars with low carbon emission, conducted by the UK Department of Transport. Consequently, they asked the company to withdraw the advertisement.

Although they show imagination by replacing emissions with flowers or leaves, these two campaigns are clear examples of greenwashing. In addition, there are other ways, far better to involve consumers in matters related to sustainable development.

3. Ford Motor: It isn't easy being green. When pointing to greenwashing, one of the most cited examples is Ford Motor Company's "It Isn't Easy Being Green" campaign for the hybrid Escape SUV. While touting itself as being environmentally friendly, Ford's cars were considered the worst carbon emitters and had the worst fuel efficiency trend of any major automaker according to Union of Concerned Scientists (Friedman & Mackenzie, 2004). Since it's early and much - criticized entry into the hybrid market, Ford has backed away from promoting itself as the green car choice.

A model of good practice in terms of greenwashing is represented by Patagonia Company: The footprint chronicles. Patagonia, an American company producing shoes and clothing, admitted less pleasant aspects related to its supply chain, and also reaffirming its overall objectives. A remarkable initiative of the company regarding sustainable development was The Footprint Chronicles. It's a website that informs consumers about the

environmental impact that the 10 representative products of the company have, from the design stage up to the delivery. The site contains graphic and relevant explanations. It even has a blog that seems to communicate honestly and transparently and there were no flowers or leaves.

Figure 4. Patagonia site

In an era in which consumers frequently use the Internet to learn the truth about the companies, it is more important what they do than what a company really communicates. But it seems we have forgotten that actions speak louder than words.

CONCLUSIONS

Greenwashing is a form of spin in which green PR or green marketing is deceptively used to promote the perception that an organization's products, aims or policies are environmentally friendly (Kahle & Gurel-Atay 2014). Evidence that an organization is greenwashing often comes from pointing out the spending differences: when significantly more money or time has been spent advertising being "green" (that is, operating with consideration for the environment), than is actually spent on environmentally sound practices. Greenwashing efforts can range from changing the name or label of a product to evoke the natural environment on a product that contains harmful chemicals to multimillion dollar advertising campaigns portraying highly polluting energy companies as eco-friendly.

While greenwashing is not new, its use has increased over recent years to meet consumer demand for environmentally friendly goods and services. The problem is compounded by lax enforcement by regulatory agencies such as the Federal Trade Commission in the United States, the Competition Bureau in Canada, and the Committee of Advertising Practice and the Broadcast Committee of Advertising Practice in the United Kingdom. Critics of the practice suggest that the rise of greenwashing, paired with ineffective regulation, contributes to consumer skepticism of all green claims, and diminishes the power of the consumer in driving companies toward greener solutions for manufacturing processes and business operations. Many corporate structures use greenwashing as a way to repair public perception of their brand. The structuring of corporate disclosure is often set up so as to maximize perceptions of legitimacy. However, there is a growing body of social and environmental accounting research finds corporate posturing and deception in the absence of external monitoring and verification.

Most greenwashing messages are generated by lack of rigor or knowledge in the field, rather than bad intentions. Therefore, with the help of a consultant with environmental expertise or through thorough information, communication agencies and companies can easily avoid greenwashing. At the same time, ensuring that environmental

messages are backed by concrete actions on the company's strategic and sustainability side, companies can avoid risks arising from greenwashing practices.

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MECHATRONIC SYSTEM TO DETERMINE THE CONCENTRATION OF CAROTENOIDS

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Keywords*: Biophotonic scanner, Carotenoids, Antioxidants, Free radicals, Slowing aging*

ABSTRACT

Civilization besides its major advantages (undisputed) brought us some unhealthy habits which unfortunately have managed to penetrate deeply within several generations on the current planetary populations producing great damages to its health. Perhaps it would be the right time to more people learns to live healthy, to feed ourselves healthy, let's try to break the chain of evil which we grind all already several generations. It has been shown that residual free radicals in the body are responsible for aging. The role to annihilate them is fulfilled by the antioxidants. Antioxidants are a group of compounds produced by the organism or that occur naturally in many foods. Antioxidants work together in the human body to maintain health and vigor, especially during the last decades of life. Antioxidants network offers the advantage of avoiding premature death caused by these deficiencies and sometimes even cure those diseases.

INTRODUCTION

Civilization and progress have brought us many benefits. Today we do not live in the field, in forests or in the caves. We have houses specially designed with air conditioning in summer and winter heating. We have transport quickly by any direction and wireless communications. We can't yet devise spaceships high speed and autonomy and satellites to locate us with great precision habitable planets. I mean that today, we (considered to be a civilization top) can only ask for a Galactic expansion of humanity. We don't have real possibilities to accomplish although current technologies would allow it. When we have opened "Pandora's box" we have overflowed the humanity by the good and by the all evil, leaving them to tumbling out. Unfortunately we haven't today political capacity to solve all essential issues of humanity. However many of them have begun to be taken into account. How do we want to have more money for the research concerned eradicate major diseases and for the extension of life, when now we have multiplied too much and the planet on which we are now all closed, can only lead us all.

A major medical problem is that of free radicals present in the human body. They are formed in the human cells and have the role to destroy certain pathogenic bacteria.

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Their presence is permanent and required in the human body. But when they multiply too much might get out of control and can be very toxic to human body. So as long as they are check of the cells and the immune system radicals fulfill only the role good and are friendly. Serious problems produce them only when they are free to cell or body. It has been shown that free radicals in the body can be put under control by antioxidants present themselves in the human body.

Free Radicals adversely affecting the DNA cells; are adversely affected mainly heart cells, brain cells and some immune system; it can be altered the genetic material of a cell; as a result changes occur in the structure of a protein, and after the immune system considers the cell a foreign substance and are trying to destroy it. Free Radicals can damage and protective membrane of cells, causing their death in this way. Any cell receives approximately ten thousands of attacks on day from the free radicals. A free radical is an atom or group of atoms containing a lone electron non-compensated; it can live only one fraction of a second.

The oxygen is necessary to human metabolism and to convert nutrients into energy; the most known free radicals are oxygen derivatives, such as superoxide, hydroxyl, hydrogen peroxide, nitric oxide, etc. Free radicals are formed by a number of different metabolic processes such as breaking down the fat molecules stored for their use as an energy source, by exposure to sunlight or X-ray, or in the presence of harmful chemicals (from cigarette smoke, from the exhaust gases, from polluted atmosphere).

But immune system produces and the radical free useful, to destroy viruses and bacteria. When the production of free radicals in the body is too high there is a defect of cells and a multiplication of free radicals above normal level (that can be controlled by the body). If free radicals activity is more intense than the work of neutralization of the antioxidants, result in an imbalance called "oxidative stress", which can cause major chronic degenerative diseases, such as: cardiovascular disease, cancer, mental disease, body aging. Today a large majority of the population of advanced countries from the point of view industrial-technological suffers because of diseases caused by deficiencies of the network of antioxidants. The network of antioxidants offers the advantage to avoid premature death caused by these deficiencies and sometimes even cure of the disease concerned. Network components of antioxidants are vitamin C, vitamin E, as well as nutrients needed to produce body following antioxidants: lipoic acid, coenzyme Q10 (Co Q10) and glutathione (Packer 1999, 2002). It is considered that the most important antioxidants that the body can produce usually are: superoxide dismutase (SOD), glutathione peroxidase, catalase and methionine reductase.

MATERIAL AND METHODS

The relation between network status of antioxidants cells of human body and the concentration of carotenoids from skin. Carotenoid molecules degrade in the process of neutralizing free radicals.

A recent study led by Arne Svilaas (2004) concluded that these carotenoids are an accurate indicator of the level of antioxidants. Svilaas evaluated the content of antioxidants in the diet of more than 2670 adults and measured the serum levels of antioxidants more than 61 patients for 7 consecutive days; found that is greater the ability of carotenoids to predict the other antioxidants level than predictive ability of alpha, beta and gamma-tocopherols (vitamin E), as well as that of glutathione; this result is explained by the fact that network of antioxidants protects (more efficient) the body cells from free radical attacks, and therefore carotenoids molecules degrade less in the process of neutralizing free

radicals; such molecules content of carotenoids in the skin increases, because they are neutralized to a lesser extent by free radicals; Raman method is effective that direct measurement of carotenoids in the skin, without the inconvenience of blood or urine samples.

Clinical studies have revealed that there is a direct correlation between antioxidant levels and general health and immunity of the human body with a relevance factor of 84%.

Measurement of carotenoids concentration from the skin. Biophotonic scanner applies a noninvasive method of measuring the level of antioxidants; measures the level of carotenoid antioxidants, safely, using Raman spectroscopy.

Biophotonic scanner emits a laser light with a wavelength of 473 nm; if the laser light meets a carotenoid molecule, it generates a green light with a wavelength of 510 nm; this is captured by an ultra light detector connected to a computer, which analyzes the amount of green light indicates the concentration of carotenoids in the skin, called skin carotenoid score (SCS). 10,000 units correspond to a carotenoid concentration of 0.04 mmol / ml of blood.

A carotenoid score of less than 20 000 units reflects a very small pool of health, high risk of disease due to a wrong diet; carotenoid score greater than 20 000 and less than 30 000 units reflect a reserve of low health; carotenoid score greater than 30 000 and less than 40 000 units reflects a satisfactory health reserve, between 40 000 and 50 000 better, and more than 50 000 health reserve is considered very good and the risk of diseases listed above is very small (Bojovic 2005).

High values in the level of carotenoids dramatic increase chances for the fight with a cancer which may threaten life to everyone at a certain point in time. For example low carotenoids level may be caused by an increased consumption of pastry products.

The use of Raman spectroscopy for the determination of carotenoids in the skin has been validated by independent studies carried out and the teams led by Gellermann 2002, Bernstein 2002 a-b, Ermakov 2001, Hata 2000.

The new S3 scanner will dramatically improve the user experience, being smaller, faster, battery-powered, and integrated with iOS wireless capability.

By measuring the stable level of carotenoid antioxidants in your skin and generating your Skin Carotenoid Score, the Scanner provides a more accurate and reliable biomarker of your overall antioxidant health status than other methods of measuring antioxidants. Getting your Skin Carotenoid Score makes you aware of the antioxidant levels in your body-and gives you the push you need to improve your overall antioxidant health.

Quality control of fruit and vegetables with portable Raman spectrometers. Portable Raman systems achieved rapid identification of substances and determine their concentration in the analyzed material.

Raman technique advantages are: Measurement technology is non-destructive; give very specific information at the molecular level; wavelength for the excitation of molecules can be chosen optimal depending on the nutrient, antioxidant, which is analyzed; optical fibers can be used for illumination or detection; samples analyzed may have small size, on the order of millimeters; radiation can pass through thin glass or plastic transparent or translucent, if this requirement is imposed on the method for determining the concentration of the nutrient in question; samples preparation is easy to perform and can be automated; Raman measurement systems are safe, easy to use, compact, robust and portable; quantitative analysis with statistical evaluation "Teach / Match" can use the spectra libraries specific to each area of use. For example, Xantus-Mini Raman spectrometer with 1064 nm wavelength has an i-phone interface.

Determination of carotenoids from fruits and vegetables. First, the action mechatronics profitable to determine the content of antioxidants in fruits and vegetables, we address the determination of ascorbic acid in fruit and vegetables. Several methods are known for the determination of ascorbic acid, such as: a - Methods based on reducing properties of vitamin C, such as iodometric method. b - For the evaluation of total antioxidant capacity of commercial fruit juices by the spectrophotometric method was used redox couple DPPH (2,2-diphenyl-1-picrylhydrazyl) / DPPH (2,2-diphenyl picryl hydrazine 1); Followed DPPH absorbance decrease (Pisoschi 2009). c - Determination of ascorbic acid by voltammetry carried out with carbon electrodes (Pisoschi 2011). d - One method used to determine fast and simple ascorbic acid in pharmaceutical products, fruit juices, soft drinks and serum is chemiluminescent reaction in alkaline solution of lucigenin with photo-oxidation products of ascorbic acid toluidine blue sensitized (Pérez-Ruíz 1995).

These methods require costly preparation of samples that can be a source of errors. Therefore it would be useful to investigate feasibility of determining the concentration of vitamin C in foods with Raman spectrometers (Wellburn 1994).

Food safety risk minimization. Management System in food safety SQF (SMSA) is designed to give organizations a rigorous food safety risk management system; as a result, the market offering safe products and offers customers a recognized food safety certification. SQF Code contains requirements for integrated processes that work together to control and minimize food safety risks. Mission of nutrient control laboratories is to provide leadership and promote international cooperation in the development of databases of nutrients; State authority requires methods to acquire, assess, implement and disseminate data on the composition of foods available in the market. Control devices should be purchased and used by the state authority of each country.

RESULTS AND DISCUSSIONS

Support systems for group decision on minimize food safety risk. To minimize the risk of malnutrition, it is useful to adopt rational decisions with group decision support systems; these systems can be integrated into CLOUD COMPUTING, for that segment of the market to be as high as possible and statistical evaluations to be more precise. An essential criterion of decision recommended is "internal rate of return" which must be large enough to allow the remuneration of capital is greater than if the capital were placed in a bank (see the relationship 1).

$$V_o = \sum_{i=1}^{n} \frac{Fi}{(1+r)^i} + \frac{V_r}{(1+r)^n} \qquad (1)$$

Where: n is life of the instruments used to determine the antioxidant network, in order to reduce the risk of malnutrition; (1 + r) - internal rate of return of financial resources; Vo- initial cost of the investment; Vr - residual value of the instruments for the determination of antioxidant network; Fi - profit and depreciation for the year of operation of instruments for determining the antioxidant network. For that the profit is as high as possible is required intensive use of instruments. For this must that initially the price to be low enough to attract users. One can call on companies already performing Raman spectrometry control services.

Carotenoids. Carotene Def. DEX Pigment red, orange found in foods of plant and animal foods. Carotenoids are pigments that give color of egg yolk, tomatoes, all fruit and flowers. They are found in shellfish, some species of fish, bird feathers and insects. Carotenoids play a role of antioxidants acting against free radicals against premature aging

and counter of the spots on the skin. Carotenoids facilitate communication of cells and can be converted into vitamin A when necessary (especially beta-carotene). The daily requirement is 2-4 mg.

Carotenoids needed of human body are: beta-carotene, lutein, zeaxanthin, lycopene. Beta-carotene is found in dark yellow - orange fruits and vegetables such as carrots, apricot (Marx 2000).

Beta-carotene is one of over 600 carotenoids that are found in nature. Beta-carotene is converted to vitamin A and is the most important source of provitamin A from food. Acts as an antioxidant with vitamins E and C and can reduce the risk of chronic diseases. Beta-carotene also plays important role in protecting your skin from the harmful effects of ultraviolet radiation. The most important sources of carotenoids are carrots, spinach, broccoli, pumpkin, lettuce, sweet potatoes, red peppers, rosehip, sour, bitter cherries, apricots. Lutein is found in fruits and green vegetables, red and yellow, such as peas, grapes, cabbage, pepper, oranges, kiwi. Lutein is one of the two carotenoids located in the macula of the eye (part of the retina which perceives light and provides maximum visual acuity and is able to filter out harmful blue light and thereby reduce the risk of cataracts and maculopapular dystrophy two of the causes of blindness). All these carotenoids participate in the formation of vitamin A in the body which in turn forms rhodopsin. In the absence of rhodopsin appear visual disturbances and in advanced forms occur conjunctiva and corneal lesions. Carotenoids are obtained mainly from fruits, vegetables and fresh herbs (see Figure 1).

Figure 1. Natural sources of Carotenoids

CONCLUSIONS

Determination of antioxidants network in food with Raman spectroscopy can be more effective than pursuing total antioxidant capacity of foods outside the bodies. Determination of carotenoids from fruits and vegetables with Raman spectrometers it would be a very useful method in the future. The development of modern methods and fast like this still takes place with or without the consent of many existing opposing forces on

the planet today who do not want the development of mankind and in this way simply because they follow other interest groups (usually financial). Any important contribution to people's health and extend life with health is a serious scientific contribution and deserve to be taken into account. The best way to prolong life is to strengthen the antioxidant defense network that can control the forces that drive the aging process. The main antioxidants that must be consumed daily are vitamins C, E and A. This is done easiest by a diet rich in fruits, vegetables and fresh greens.

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THE FIRST DETECTION OF FRUIT FLY *ZAPRIONUS TUBERCULATUS MALLOCH* (DIPTERA: DROSOPHILIDAE) IN THE EASTERN PART OF EUROPE (ROMANIA)

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Keywords*: invasive species, fruit fly, Zaprionus tuberculatus, Romania*

ABSTRACT

The trapping of Zaprionus tuberculatus Malloch 1932 (Diptera: Drosophilidae) in a site from the Northern part of Bucharest city (Southern Romania) represents a first record for Romania as well as for the Eastern part of Europe. A total of 100 specimens of Z. tuberculatus (57 females and 43 males) have been captured using 0.5 ml bottle traps baited with grape red wine used for Drosophila suzukii surveying, from wild blackberry (Rubus caesius L.) bushes from September to October 2014.

INTRODUCTION

The field surveying program on exotic fruit fly carried out in Romania during recent years, has offered us a special chance to reveal the presence of some invasive non-native species for our country. It is the case of *Zaprionus tuberculatus* Malloch 1932 (Diptera: Drosophilidae), a fruit fly from drosophilid species group, which was first recorded in Romania in 2014, after *Drosophila suzukii* had been identified in 2013. Like the most of the world countries, Romania is facing with the problem of invasive species whose magnitude permanently continues to increase, turning into a serious threatening over the economic security, biodiversity and people, as well.

Zaprionus tuberculatus is an exotic fruit fly originating from the Afrotropical Region and the islands of the Indian Ocean (Tsacas et al. 1977, Chassagnard &Tsacas 1993) having the status of invasive species for the European continent.

There are few reports that have been published regarding the presence of *Z. tuberculatus* on European territory, so far. Carles-Tolra and Andersen (2002) recorded the presence of this exotic fruit fly in Canary Islands (Spain). Cyprus, Greece and Malta are also countries where this species has been reported (Yassin & David, 2010). The first record of *Z. tuberculatus* in the continental area of Europe was reported in Northern Italy (Trento) in the autumn of 2013 (Raspi et al. 2014). Raspi et al.'s report offers a comprehensive analytic review in terms of the systematic classification history, taxonomic characters and pictures, geographic spreading area and pest potential to fruits specie of *Z.*

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tuberculatus. In Asia, this species was mentioned in Israel (Yassin & David, 2010) and in 2011 it was found in the southern part of Turkey (Patlar et al. 2012).

As no record on Z. *tuberculatus* has been published so far in the countries from Eastern Europe, where Romania is situated, we are entitled to consider our work to be the first record of the species in this zone.

According to the recent classification system of Yassin & David (2010) based on molecular and morphological analysis, this species is member of the *tuberculatus* species complex, which belongs to the subgroup of *tuberculatus* species, which is included to the group of *inermis* species, the subgenus and genus Zaprionus. Zaprionus is a Paleotropical genus described by Coquillett (1901) which comprises 2 subgenera: Zaprionus sensu strict, including the species of the Afrotropical region, and Anaprionus, comprising the species of the Oriental and Australasian regions.

The aim of our work is to present the results regarding the first presence of *Zaprionus tuberculatus* drosophilid species on Romanian territory, precisely in the Northern part of Bucharest city (Southern Romania).

MATERIAL AND METHODS

While we were on the process of identifying the captures of the spotted wing drosophila, *D. suzukii,* within the trapping program undertaken in 2014 in Romania, we detected some new flies with a special body design in the samples resulted from traps set up on wild blackberry *Rubus caesius* bushes in a site from the Northern part of Bucharest city.

Bucharest is situated in Romanian Plain located in Southern Romania. There were three bottle traps baited with red wine, with following geographical positions in sampling unit:(1)44.501866N/26.069593E;(2)44.502458N/26.068990E;(3) 44.501461N/26.068297E.

The location of the insects trapping is shown in Fig. 1.

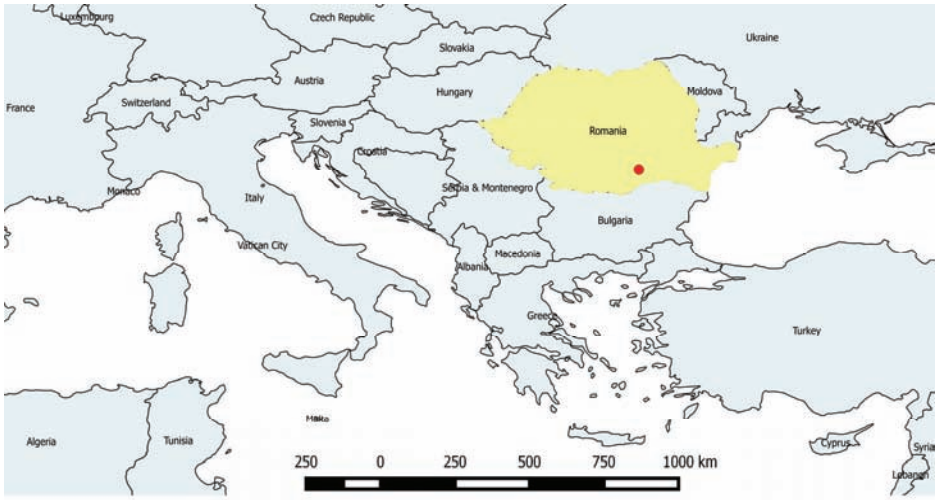

Figure 1. Location of Bucharest city in Southern Romania where *Zaprionus tuberculatus* flies were trapped

The new specimens were found to belong to the fruit flies group from Drosophilidae family but different from Drosophila genus. After comparing the morphological characters of the new detected drosophilids with the description sets

available in relevant scientific reports (Chassagnard & McEvey 1992, Chassagnard & Tsacas 1993, Yassin 2007, Yassin & David 2010, Patlar et al. 2012, Raspi et al. 2014), we have come to the conclusion that our specimens belong to *Zaprionus tuberculatus* species. For all our specimens, we distinguished the reddish-brown colour of the body, the presence of white, longitudinal stripes on the median and lateral sides of body, from the frontlet to the thorax and the scutellum (fig 2a), and the tuberculous formation bearing a long seta present on the fore-femur (fig 2b). We have also noticed a dense tuft of hairs located on the basal segment of tarsus at the male fore-legs (fig 2c).

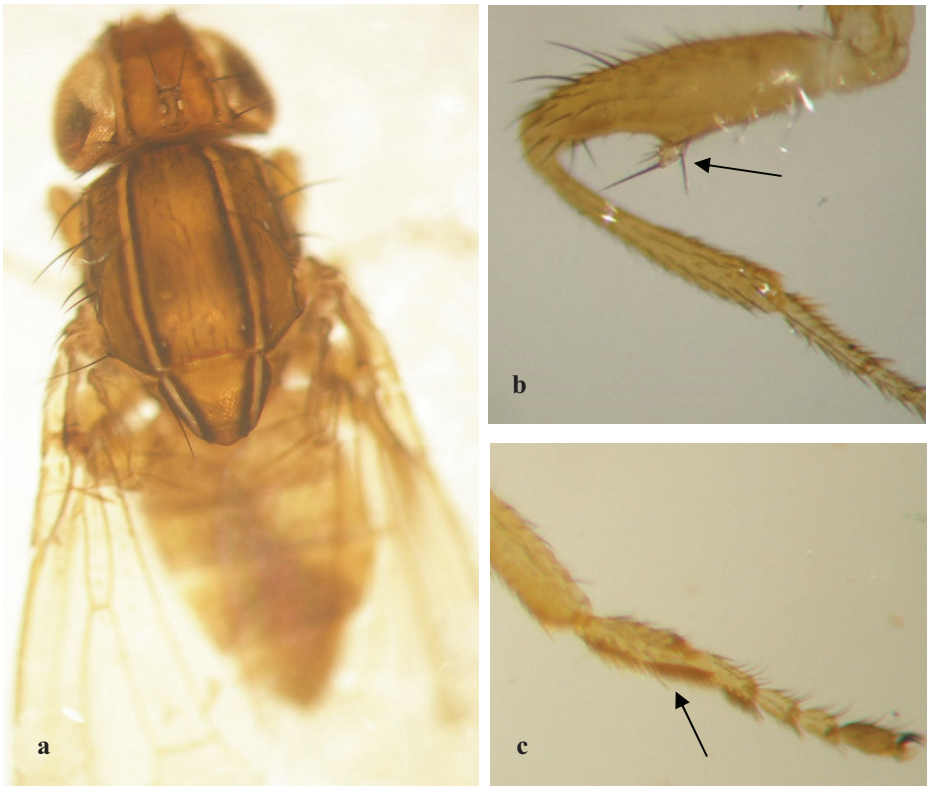

Figure 2. *Zaprionus tuberculatus*: a) Adult; b) Fore-femur with tuberculous formation bearing a long seta; c) Tarsus of male fore-legs

In order to make sure and consolidate our results, we contacted Prof. Alfio Raspi from the University of Pisa, who by a generous support confirmed that our drosophilid specimens belong to the species *Zaprionus tuberculatus.*

The traps used to detect the presence of *D. suzukii*, in which *Z. tuberculatus* were captured, were 3 bottle traps (0.5ml) baited with red wine, set up on wild blackberry bushes from August to November 2014. The traps were checked every week and the insects were collected accordingly. The liquid content was also replaced. Under a stereomicroscope (Olympus SZ61) in the laboratory, the flies were counted and separated by sex. The proportion of females and males and sex ratio (m/f) was performed for the total captures and for each collecting date. The *Z. tuberculatus* specimens are deposited (70% alcohol) at the Research-Development Institute for Plant Protection from Bucharest.

RESULTS AND DISCUSSIONS

A total of 100 specimens of drosophilid flies identified to belong to the species *Z. tuberculatus* were captured in an urban site from the Northern part of Bucharest city (Romanian Plain in Southern Romania) in the autumn of 2014. The fly captures were recorded in three bottle traps baited with red wine, used for *D. suzukii* survey, placed on wild blackberry bushes, *Rubus caesius*.

Data regarding the total captures and their allocation according to the trapping date for the fly *Z. tuberculatus* is presented in Table 1. For total population as well as for each five trapping date, the proportion of the two sexes, female and males, and sex-ratio parameter in natural populations of Z. *tuberculatus* are also presented in Table 1.

Table 1

Data on *Zaprionus tuberculatus* specimens collected in three red wine -based traps (used for *D. suzukii* monitoring) on wild blackberry *Rubus caesius* bushes in 2014

Date of trapping	*Zaprionus tuberculatus*					
	Number of flies trapped	Females		Males		Sex ratio (m/f)
		number	%	number	%	
24 IX 2014	6	5	83.3	5	83.3	0.2
1 X 2014	12	8	66.7	8	66.7	0.5
9 X 2014	14	4	28.7	4	28.7	2.5
15 X 2014	42	22	52.4	22	52.4	0.91
22 X 2014	26	18	69.2	18	69.2	0.45
Total	**100**	**57**	**57.0**	**57**	**57.0**	**0.75**

As our trapping results in 2014 reveal, the *Z. tuberculatus* species had a flight period of about 30 days in the autumn season, from late September to late October. Our findings are in line with those published in Italian literature, which indicated that the active period of *Z. tuberculatus* was in September-October in Northern Italy (Raspi et al. 2014). In Southern Turkey, Patlar et al. (2012) recorded the August month as flight period for *Z. tuberculatus*.

According to our results, the Z. *tuberculatus* species, just like *D. suzukii,* seem to have successfully passed the harsh winter conditions in Romania. This indicates the fact that it is possible for this species to adapt well to the country's weather conditions during the winters, which sometimes are unfriendly and too frosty.

The data from this investigation suggested that females of *Z. tuberculatus* were more numerous than males over the entire gathering period of flies. Out of one hundred of individuals trapped, 57 were females (57%) and 43 were males (43%) indicating a sex-ratio (m/f) of 0.75. Also, in almost all the trapping dates, more females were recorded.

The pest potential of *Z. tuberculatus* species on healthy fruit species has not been acknowledged, so far. Most species of the genus Zaprionus were found breed on fruits and rotting tree trunks. It was described to nourish from fallen rotting figs (Lachaise et al. 1982). In Italy, this species has been collected on deciduous wood plants in a park and in a public garden, while in Turkey it has been trapped in sites from urban, sub-suburban and rural areas, as well as in forested areas.

Our data reveal the existence of *Z. tuberculatus* in the traps placed on wild blackberry bushes fully of ripe fruits, where they were collected from. Despite the fact that

the Z. *tuberculatus* species was not found to feed on the healthy ripe fruits as *D. suzukii* did, we consider that their association could contribute to enhancing the latter's aggressive action upon the fruits. For a better understanding of this harmful association, we have planned further researches with a view to the extension of the monitoring survey of the fruit fly on different crops in areas of fruit production, which are economically relevant for our country.

CONCLUSIONS

Our data collection for Z. *tuberculatus* in 2014, together with the other invasive exotic fruit flies, such as *Drosophila suzukii* and *Ceratitis capitata,* detected by us in 2013, provide useful and practical background information, that could support the national plant protection organizations to evaluate their pest potential risk in fruit growing regions, and therefore to help producers take the most adequate decisions.

The wild plants that bear berries in plain areas with vegetation without chemical treatments appear to play an important role in hosting the fruit fly as drosophilids. One reason could be that they are more provider than those cultivated by supplying ripen fruits as a food source for insects on a longer period of time because their harvest is not usually a practice.

Also, these results may contribute to improving the knowledge regarding the geographical spreading areas of *Z. tuberculatus* and the pest abilities to adapt to new weather and ecological conditions in the Eastern part of Europe.

ACKNOWLEDGMENT

We express our full gratitude to Prof. Afio Raspi from the University of Pisa for his invaluable support in confirming the identity of our specimens as belonging to *Zaprionus tuberculatus*.

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ANTHROPOGENIC ACTIVITIES AND THEIR IMPACT ON FISH SPECIES OF NATIONAL/COMMUNITY INTEREST IN THE PROTECTED AREA NORDUL GORJULUI DE VEST

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Keywords*: anthropogenic, activities, fish, species*

ABSTRACT

Macroinvertebrates and fish can be used as indicators of water pollution with the advantages of low cost, easy identification and it provides a better reflection of water quality than using physicochemical parameters alone. In order to define accurate a site of high conservation, during 2013 - 2014 in the site of comunity importance "Nordul Gorjului de Vest", there have been made some researches regarding anthropogenic activities and their impact on some fish species of community importance listed in the IUCN Red List of Threatened Species: Barbus meridionalis Risso, Gobio uranoscopus Agassiz, Cottus gobio L.

INTRODUCTION

Nowadays, we can easily see that there are many pollutants in the environment due to anthropogenic activities. The destruction of natural habitats and the presence of environmental pollutants may affect the ecological balance of every ecosystem (Begon et al. 2009). Among various ecosystems in the world, rivers which cross different areas such as agriculture and industry are the most threatened and affected by anthropogenic activities (Leprieur et al. 2008).

Many living organisms (e.g. small mammals, fish, aquatic plants, algae, invertebrates) can be used to assess ecological water quality. Fish encompass different trophic levels, have a long life cycle, and high mobility, and can herewith be used to integrate the effects of habitat change and environmental pollution over a long period (Mathuriau et al. 2011).

A healthy environment supports a variety of native species. Different species of fish require specific habitats, and loss or alteration of fish habitat can lead to population declines.

It requires evaluations on ecological basis, a wide range of indicators of environment pressures and the ecological stress related with the changing of the reference values (Dodocioiu et al. 2013).

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Over the last century, many factors have altered water quality and fish habitat and subsequently affected native fish populations. Dams and other obstacles can prevent fish from migrating upstream to reach critical spawning habitat.

Industrial pollutants, urban and agricultural runoff and sewage overflows are some of the sources of pollutants that continue to impair water quality and impact fish habitat.

MATERIAL AND METHODS

In order to identify the anthropogenic activities with negative impact on the fish species, there were established four sampling stations; each of them was sampled three times, starting downstream.

The fishe specimens were sampled in August and September using electrical fishing equipment. There were established four sampling stations and each of them was sampled three times, starting downstream. The size of the sampling areas varied between 100 m^2 and 200 m^2, and with depths from 20 to 100 cm (Zippin 1958, Bohlin et al. 1989).

RESULTS AND DISCUSSIONS

On the territory of the protected area Gorjului Western North we have identified three species of fish listed by IUCN: *Barbus meridionalis, Cottus gobio* and *Gobio Uranoscopus.*

In our research regarding the state of conservation of the three fish species, a very important chapter has been the identification of anthropogenic activities with negative impact on these species.

Poaching and mining of granular materials (sand, gravel, etc.) in the minor beds of rivers, pollution of rivers and dams multiplication, reduced river flows through capture, contribute to the degradation so could jeopardize habitat populations of the three fish species of community importance.

Figure 1. Porcu river the exploitation of granite quarries

Anthropogenic activities with negative impact on the fish species of hational/community interest, on the Porcu River: anthropogenic activity taking place in the exploitation of granite quarries; poaching, garbage dumped along the watercourse (Figure1).

Anthropogenic activities with negative impact on the fish species on the Susita Verde and Seaca rivers: anthropogenic activity due to water supply stations, poaching.

Anthropogenic activities with negative impact on the fish species on the Tismana river: garbage dumped along the watercourse, poaching (Figure 2).

Anthropogenic activities with negative impact on the fish species on the Bistrita river: anthropogenic activity carried on the Bistrita Water Dam Vija-Clocotis, poaching.

Anthropogenic activities with negative impact on the fish species on the Bilta river: rafting in the Balta keys; poaching.

Anthropogenic activities with negative impact on the fish species on the Motru Sec: anthropogenic activity carried on the Valea Mare dam; poaching river.

Figure 2. Garbage dumped along the watercourse of Tismana river

CONCLUSIONS

Based on our research we can conclude that in the site of community importance Nordul Gorjului de Vest the three fish species of community importance are affected by anthropogenic activity.

Potential threat factors: poaching, extraction of granular materials (sand, gravel, etc.) of small beds of rivers, pollution of watercourses, multiply dams, decreased river flow through capture, contribute to habitat degradation, may thus endanger populations of these endangered species.

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BIOLOGICAL EVALUATION OF RENAL VASCULAR INDICES IN DEHYDRATED CANINES BEFORE AND AFTER REHYDRATION

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Keywords*: dehydrated, dogs, Doppler, kidney, resistive index, pulsatility index.*

ABSTRACT

Renal resistive index (RI) and pulsatility index (PI) represent indirect measurements that may provide information over changes in the renal blood flow resistance. Renal vascular indices has many intra and extra-renal determinants, RI is only one of these, and not the most important. There is a strong connection between the renal function and the degree of dehydration in dogs. The kidney during dehydration period may develop a decrease vascular perfusion; therefore the renal vascular indices may suffer variation (Ettinger & Feldman 2010, Shirreffs 2003).

The results of this study indicate that the mean renal vascular indices are slightly increased in dehydrated dogs than the mean values for the same cases after rehydration.

INTRODUCTION

The RI and PI was introduced in 1950 by Gosling as a semi-quantitative assay of intra-renal vascular resistance and Pourcelot in 1974, showed that the ratio was influenced by changes in vascular resistance distal to the point of RI assay (Pourcelot 1974).

Doppler-derived renal resistive indices have been used in the last years in veterinary medicine in a variety of clinical settings such as renal and extra-renal determinants. The RI and PI increase during various renal conditions such as chronic renal failure, urinary tract obstruction, obstructive renal diseases, renal vein thrombosis and acute kidney injury that are all associated with an acute increase in interstitial and venous pressure. In all these conditions, renal resistive indices represent a reliable marker of the severity of renal damage that are associated with dynamic or structural changes in intra-renal vessels and is considered a strong independent predictor of renal failure (Platt & Rubin 1991, Chirinos & Townsend 2014, Radermacher & Mengel 2003).

Renal vascular indices cannot always be considered a specific marker of renal disease. Extra-renal determinants that increase renal vascular indices are represented by systemic affection such as aortic stiffness, pulse pressure, tachycardia, sedation, anesthesia, hepatic diseases, diabetes mellitus (Novellas & Gopegui 2008, Novellas & Espada 2007, Mitchell & Toal 1998).

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The administration of saline solution, furosemide or mannitol determines a decrease of RI and PI in renal arteries. In addition, in human without obstructed upper urinary tracts IV administration of saline solution decreases the renal vascular indices (Shokeir & Provoost 1996, Shokeir & Nijman 1997).

Osmolarity represent the concentration of osmotically active particles in solution, which may be quantitatively expressed in osmoles of solute per liter of solution. Osmolarity is a function that expresses the concentration of solutes regarding the body water. Alterations of 1-2% in plasma osmolarity are detected by hypothalamic osmoreceptors, affecting water ingress through thirst and output through the antidiuretic hormone (ADH) (Chang & Chan 2010).

The normal range in dogs of serum osmolality is 285-295 mOsm/l. Acute changes in osmolarity create on osmotic gradient through the hemato-cephafic barrier. Acute hypo-osmolarity causes cerebral edema, leading to depression, irritability, seizures and death. Acute hyper-osmolarity causes cerebral dehydration and tearing of cerebral vessels causing hemorrhage and thrombosis. When serum osmolarity increases, it increases the produce of ADH hormone and then secondary kidneys conserve more water inside the body and urine becomes more concentrated. When serum osmolarity decreases, the body doesn't produce as much ADH, and the blood and urine become more dilute.

Clinical sings of dehydration in dogs can include one or more of the following: loose skin (loss of elasticity), wrinkled skin (due to dryness), vomiting, diarrhea, inappetance; anorexia, weight loss, lethargy, weakness and depression (Ettinger & Feldman 2010).

The objective of this study was to evaluate in dehydrated dogs with normal renal function the possible alterations of the renal vascular indices.

MATERIAL AND METHODS

Five unsedated dogs were examined at the Department of Internal Medicine of the Veterinary Medicine Faculty of Bucharest. All cases were subjected to an examination protocol consisting of physical examination, paraclinical tests to evaluate the renal function and the degree of dehydration (biochemical profile, electrolytes blood gases) and abdominal ultrasonography in order to evaluate the renal structure. After performing these tests, all the cases presented normal renal function and only clinical signs of dehydration. All the dogs were hospitalized for 48 hours. Serum osmolarity was calculated by formula: $2(Na + K) + GLU/18 + Na/2.8$ (Ettinger & Feldman 2010).

Food was withheld, water intake was restricted for dogs during this time. and dogs were confined to cages to reduce stress and limit exercise during intravenous (IV) therapy administration of saline solution. Twenty two-gauge catheter was inserted into a cephalic vein and connected to an infusion pump with an extension tube and IV solution was administered at proper rate according to the degree of dehydration for 24 hours; After 24 hours catheters were removed while pressing cotton soaked in alcohol around the insertion site after IV administration was stopped and reexamination was performed.

All the cases were ultrasonographically evaluated with the same ultrasound machine, technique and operator in order to avoid variations in results. Triplex Doppler ultrasonography was performed with the ESAOTE My Lab 30 Gold VET™ ultrasound machine. The hair was clipped and acoustic gel was applied to the skin. The dogs were placed in lateral right and then left recumbency, to scan the kidneys sequentially. We used a sectorial multifrequency transducer with different frequencies, of 5, 6.6 and 8 MHz, depending the dog size; and color Doppler to examine the intra-renal vascularization.

Interlobular arteries were examined using the frequency of 6,6 MHz at the width of 1 - 22 mm obtaining a subsequent pulse Doppler interrogation. The smallest scale that displayed the flow without aliasing was selected. A total of 6 to 10 Doppler waveforms were used to determine the mean R.I. and P.I. for each kidney, in two separate locations of the renal parenchyma (cranial and caudal pole). The ultrasound device automatically calculated the R.I. and P.I., after manually delimitation of peak systolic and diastolic velocity and time average of maximum velocity:

RI. = (peak systolic velocity - end diastolic velocity)/(peak systolic velocity);

PI = (peak systolic velocity - end diastolic velocity)/(time average maximum velocity).

The data collected was statistically analysed and represented using Microsoft Office Excel with the add-in Analysis Toolpack, and OriginPro 8.5 software. For group comparison, One-way ANOVA was used. The graphic representation was done through box-plot method, using the average, median, standard deviation and the minimum and maximum values, as well as the individual values collected. For the biochemical values and blood pressure represented graphically, the normal interval is represented by two red lines.

RESULTS AND DISCUSSIONS

The mean age was 8.16 years, with a range from 7.2 to 11.1 years old. Before IV solution administration the mean serum osmolarity was 345.366 mOsm/l. The mean RI and PI was 0.8 and respectively 1.63 (Table 1). After 24 hours of IV hydration the mean serum osmolarity was 300.482 mOsm/l and the mean RI and PI was 0.68 and respectively 1.34 (Table 2). The serum osmolarity, RI and PI values decreased during IV therapy. No clinical signs of over hydration were detected in dogs after IV administration of fluids was stopped.

Table 1

Serum osmolarity and renal vascular indices before hydration

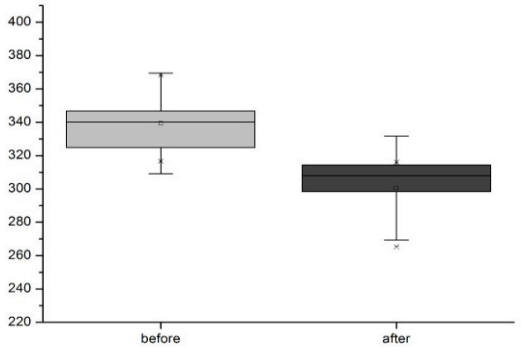
Case No.	Serum osmolarity (285- 310 mOsm/l)	RI	PI
1	368.28	0.89	1.90
2	346.89	0.84	1.63
3	340.24	0.87	1.90
4	324.78	0.71	1.17
5	316.64	0.69	1.58

Table 2

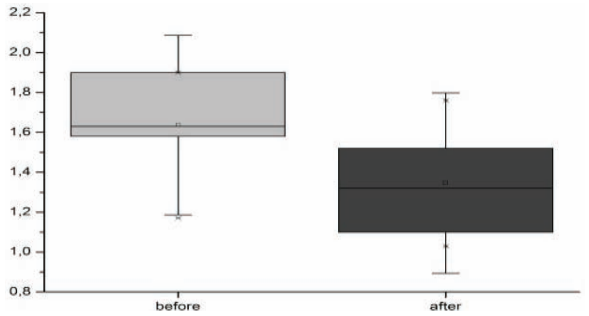
Serum osmolarity and renal vascular indices after hydration

Case No.	Serum osmolarity (285- 310 mOsm/l)	RI	PI
1	298.38	0.79	1.76
2	316.09	0.72	1.03
3	265.44	0.67	1.52
4	314.48	0.61	1.10
5	308.02	0.62	1.32

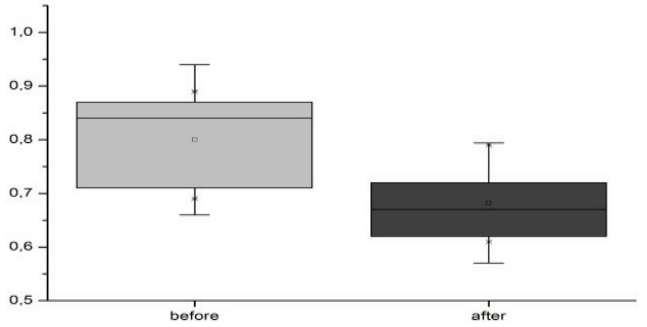
The osmolarity presented a descendent trend, the differences being statistically significant (p=0.169). Both RI and PI values decreased for all dogs included in the experiment. Although the vascular indices were also lower after the administration of IV fluids, the statistical analysis pointed out that there was no statistical difference between the values obtained before and after hydration (p=0.058 for RI and p=0.165 for PI). Nonetheless, these results are influenced by the small subjects included in the study and further research may confirm the vascular indices, especially RI, as indicators of hydration (Graph1, Graph 2, Graph 3).



Graph1. Osmolarity values before and after hydration



Graph 2. PI values before and after hydration



Graph 3. RI values before and after hydration

Results of this study indicated ultrasonographic determination of renal arterial RI and PI was easily performed and values of those variables were significantly lower after the rehydratation with IV administration of solution. Clinical signs of dehydration were not observed anymore after 72 hours. Therefore, RI and PI seemed to be more sensitive measures of dehydration than clinical signs, and determination of such values may be useful for monitoring of hydration status in dogs. Physiologic mechanisms decrease renal blood flow when the volume of fluid in the body of an animal decreases. (Ettinger & Feldman 2010)

Those findings suggested that IV administration of fluids in dehydrated dogs had effect on renal peripheral vascular resistance. Such responses may be the result of an increase in renal blood flow attributable to an increase in circulating volume of fluid. Consequently, renal peripheral resistance decreases, which results in a decrease in RI and PI values. However, the pulsed-wave Doppler ultrasonographic waveform signals were stronger for dehydrated dogs after received IV fluids and the serum osmolarity decreased (Figure 1, Figure 2).

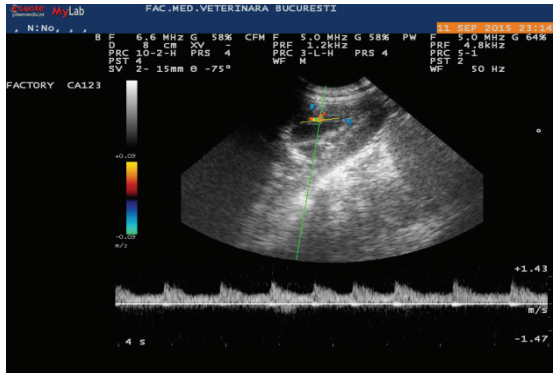


Figure 1. Doppler ultrasonography at case 1 before rehydration (characterized by a lower pulsed-wave Doppler waveform signal amplitude)

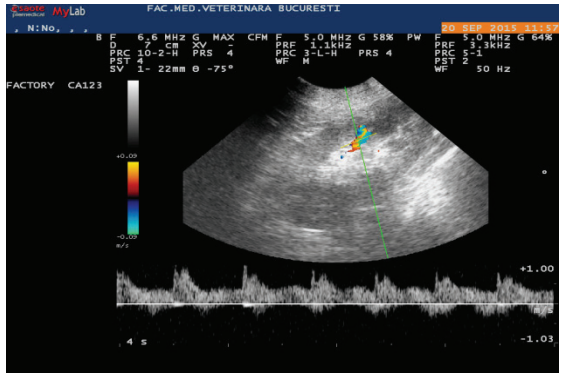


Figure 2. Doppler ultrasonography at case 1 after rehydration (characterized by a higher pulsed-wave Doppler waveform signal amplitude)

CONCLUSIONS

Renal vascular indices in dogs may have an extra-renal determinant the state of hydration.

The value of serum osmolarity, RI and PI decreased during IV administration of solution in dehydrated dogs.

Ultrasonographic determination of renal vascular indices is a noninvasive method and it can be a sensitive indirect method for identification the dehydration status in dogs.

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THE BIOLOGY OF VASCULAR RESISTANCE DETERMINATION WITH DOPPLER ULTRASOUND IN CANINES WITH CHRONIC RENAL FAILURE

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Keywords*: dogs, Doppler, kidney, resistive index, pulsatility index*

ABSTRACT

Organs with a rich arterial blood supply such as kidneys, liver, heart, and brain are more sensitive to blood pressure changes. The kidney is a well-vascularized organ and suitable to be evaluated by Doppler ultrasound, which is a non-invasive technique that can be used to estimate the renal vascular resistance by calculation the resistive index (RI) and pulsatility index (PI). RI was reported to be associated with early hypertensive renal damage and it's also correlated with systemic blood pressure in human patients (Jacob & Polzin 2003).

The aim of this paper was to assess renal vascular resistance in dogs with chronic renal failure (CRF) and to investigate the possible relationship between renal RI and PI with systolic blood pressure and biochemical, electrolytes and blood gases parameters in dogs with CRF.

INTRODUCTION

Duplex Doppler ultrasonography provides real-time information about anatomic and dynamic vascular flow. The ultrasound examination of the kidneys, which are particularly highly perfused organs, using Doppler ultrasonography, increases the effectiveness of the technique. Renal-pulsed wave Doppler waveforms can be obtained in the renal artery, interlobular or arcuate arteries. It permits blood flow measurements to provide indirect information about vascular resistance and velocities obtained from spectral Doppler spectrum during the cardiac cycle. Two major indices are used in clinical veterinary practice: RI and PI (Tublin & Bude 2003).

In human medicine, the RI and PI are related to the severity and progression of chronic renal failure. They are also related to the systolic blood pressure and age of the patient. RI was used for the diagnosis and follow-up of acute and chronic renal diseases that are associated with dynamic or structural changes in intra-renal vessels, and in the following years, RI was considered a strong independent predictor of renal failure (Novellas & Espada 2007).

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CRF and hypertension are intimately related. Renal diseases can lead to sodium and water retention resulting increased extracellular fluid volume, which increased and this increases the cardiac output, producing systemic hypertension. The activation of the renin-angiotensin-aldosterone system may further elevate systemic arterial blood pressure. High blood pressure causes proteinuria and arteriosclerosis due the hyper filtration and glomerular hypertension. Therefore, this vicious cycle represents a through self-perpetuating renal damage (Bartges &Willis 1996, Chang & Chan 2010, Brown 2003).

Constantinescu et al. suggested in 2015 that the upper values for renal vascular indices are 0.70 for RI and respectively 1.13 for PI, in normal dogs. Rosa Novellas et al. 2007 established a similar upper threshold for the RI of 0.72 and an upper level for intra-renal PI of 1.52 in normal dogs.

The aim of this study was to determine whether renal vascular indices increase in dogs with CRF and also to evaluate whether a correlation with biochemical, electrolytes and blood gases parameters could be found, as it was seen in human patients.

MATERIAL AND METHODS

The study was conducted over a period of ten months (December 2014- September 2015) in the Department of Internal Medicine of the Faculty of Veterinary Medicine Bucharest, on nine dogs diagnosed with CFR. The diagnosis was based on clinical, biochemical (blood urea nitrogen and creatinine) and diagnostic imaging findings in order to evaluate the renal structure.

Systemic Blood pressure was determined after 10-15 minutes of environmental adjustment for every case taken in study, using Pet-MAP™, a blood pressure measurement device; the cuff was placed in all cases on the coccidian artery.

All the cases were ultrasonographically evaluated with the same ultrasound machine, technique and operator in order to avoid variations in results. Triplex Doppler ultrasonography was performed with the ESAOTE My Lab 30 Gold VET™ ultrasound machine. The hair was clipped and acoustic gel was applied to the skin. The dogs were placed in lateral, right and then left recumbency, to scan the kidneys sequentially. We used a sectorial multifrequency transducer with different frequencies, of 5; 6,6 and 8 MHz, depending on dog size; and color Doppler to examine the intra-renal vascularization. Interlobular arteries were examined using the frequency of 6,6 MHz at the width of 1 - 22 mm obtaining a subsequent pulse Doppler interrogation. The smallest scale that displayed the flow without aliasing was selected. A total of 6 to 10 Doppler waveforms were used to determine the mean R.I. and P.I. for each kidney, in two separate locations of the renal parenchyma (cranial and caudal pole). The ultrasound device automatically calculated the R.I. and P.I., after manually delimitation of peak systolic and diastolic velocity and time average of maximum velocity:

RI. = (peak systolic velocity - end diastolic velocity)/(peak systolic velocity);

PI = (peak systolic velocity - end diastolic velocity)/(time average maximum velocity).

The data collected was statistically analysed and represented using Microsoft Office Excel with the add-in Analysis Toolpack, and OriginPro 8.5 software. For group comparison, One-way ANOVA was used. The graphic representation was done through box-plot method, using the average, median, standard deviation and the minimum and maximum values, as well as the individual values collected. For the biochemical values and blood pressure represented graphically, the normal interval is represented by two red lines.

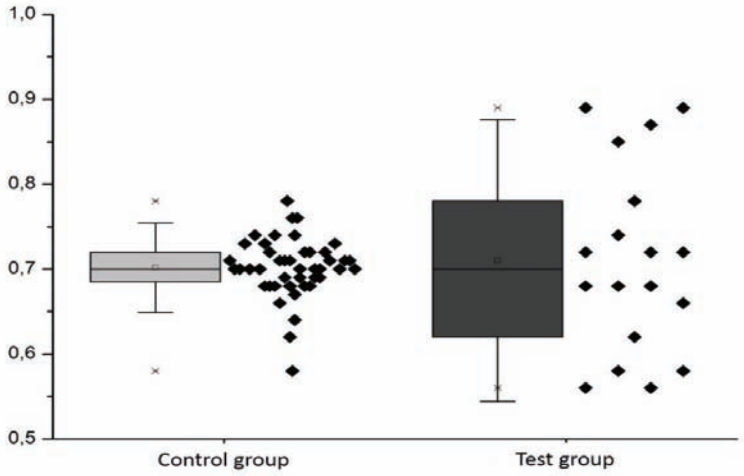
The values obtained for the two poles of the kidneys in dogs with chronic renal failure were compared among them and with the physiologic values of vascular indices as

described in healthy animals in the article "Evaluation of renal vascular resistance and blood pressure in dogs with different renal diseases" (Constantinescu et al. 2015).

RESULTS AND DISCUSSIONS

Six male (4 neutered) and 3 female (2 neutered) dogs presented with chronic renal failure were included in this study. Mean age was 7,46 ± 3,78 years.

The statistical analysis pointed out that there was no significant difference between the RI values of the cranial and caudal poles for the cases included in this experiment (p=0.90) (Table 1). Comparing the two groups, there could be observed a higher variability of the RI of dogs with cronic renal failuare, ranging between 0.56 and 0.89, as compared to 0.58 and 0.78 for the control group (Figure 1, Graph 1). Nonetheless, the mean values were similar and the diffrences observed were not statistically significant (p=0.65).



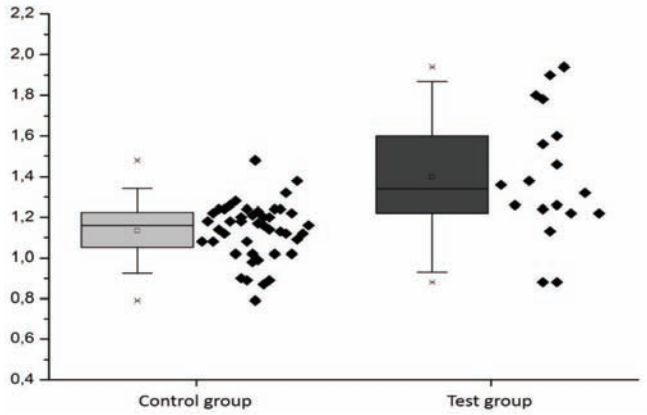
Graph 1.The values of RI in control group and test group (dogs diagnosed with CRF)

The PI values showed no statistically significant differences between the two kidney poles analysed for each dog included in the test group (p=0.87). On the other hand, when comparing the two groups, there have been found very significant variances (p<0.001), the test group having generally higher values than the control group. However, the range of PI values of the two groups interlap, as it can be observed in Graph 2. Thus, although this parameter can be usefull for the diagnosis of chronic renal failure, it cannot be used only by itself.

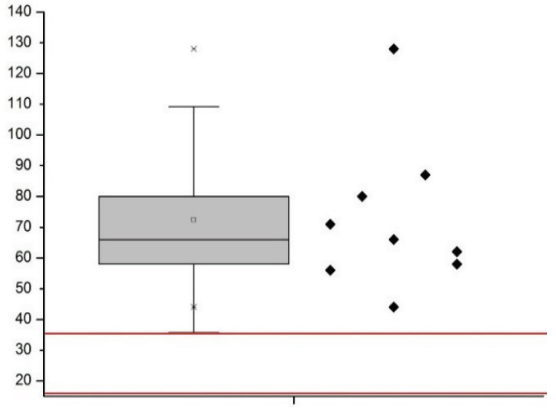
Regarding the biochemical analysis of the blood, there have been observed abnormal values for all investigated parameters (Table2). Blood urea nitrogen, blood creatinine and HCO_3 were elevated in all examined animals, as it can be seen in Graph 3, Graph 4 and Graph 5.

At the same time, blood pH was higher in the majority of cases, some animals presenting values within the physiologic range (Graph 6). The investigated minerals, although had individual values outside the normal range, had the mean values within the physiologic interval for dogs (Graph 7, Graph 8). The blood pressure was elevated in seven cases (77.77%) (Graph 9).

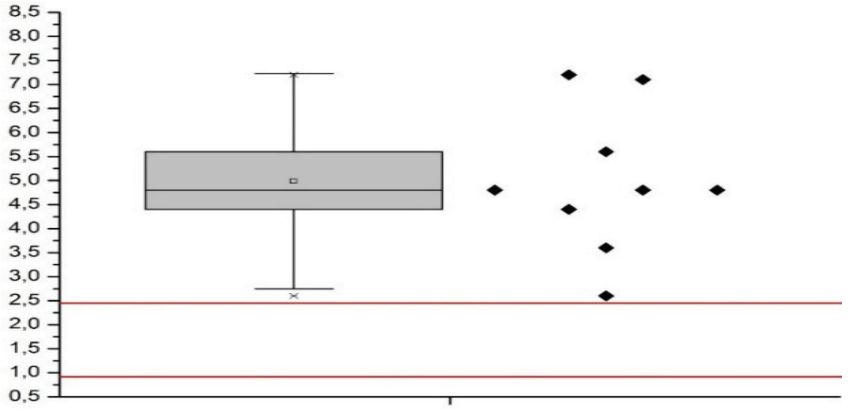
In dogs with CRF the RI may be increased due to the small vessel changes, arteriosclerosis that is characteristic with increased thickness of the tunica media, shrinking and fibrosis of the lumen (Ponte & Pruijm 2014).



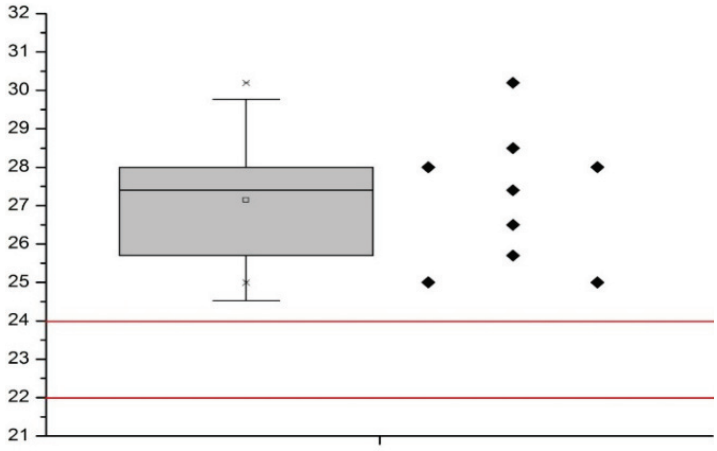
Graph 2. The values of RI in control group and test group (dogs diagnosed with CRF)



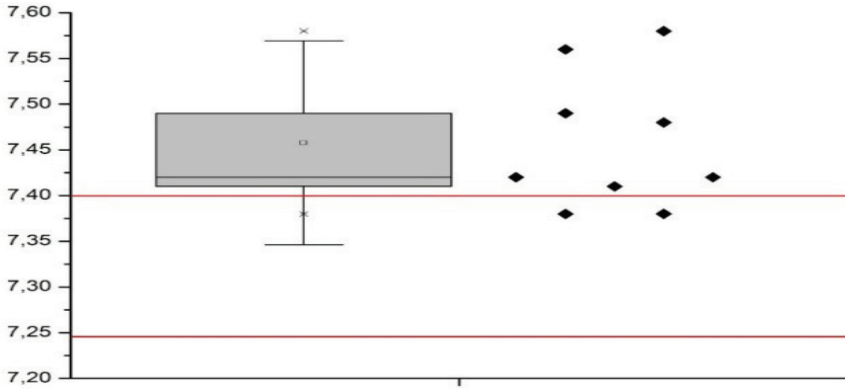
Graph 3. Values of blood urea nitrogen in dogs diagnosed with CRF



Graph 4. Values of blood creatinine in dogs diagnosed with CRF



Graph5.Values of blood HCO_3 in dogs diagnosed with CRF



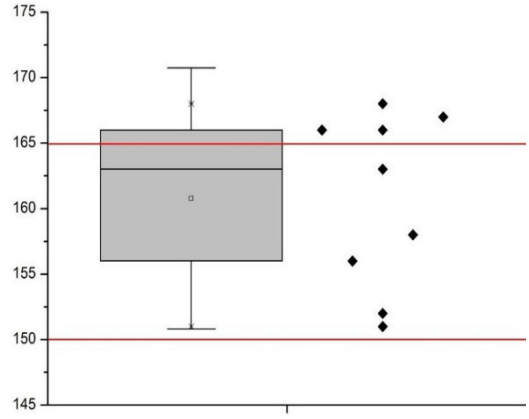
Graph 6. Values of blood pH in dogs diagnosed with CRF

PI is considered more accurate in differentiating abnormal waveforms because it incorporates mean velocity in its calculation. In human studies PI showed to correlate closer than the RI with some biochemical parameters and therefore recommended to be used as an indicator for renal vascular resistance. In the present studies, correlation between PI in healthy dogs and in dogs with CRF was higher than between RI for the same groups. These findings suggest that PI may be more accurate than RI in dogs diagnosed with CRF (Szatmari & Sotonyi 2001).

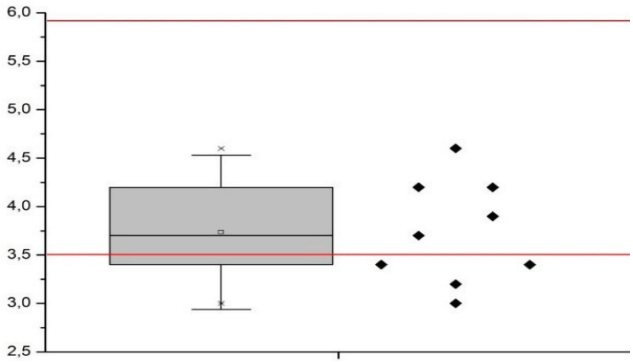
Table 1

Values of RI, PI, peak systolic velocity and diastolic velocity of interlobular renal arteries

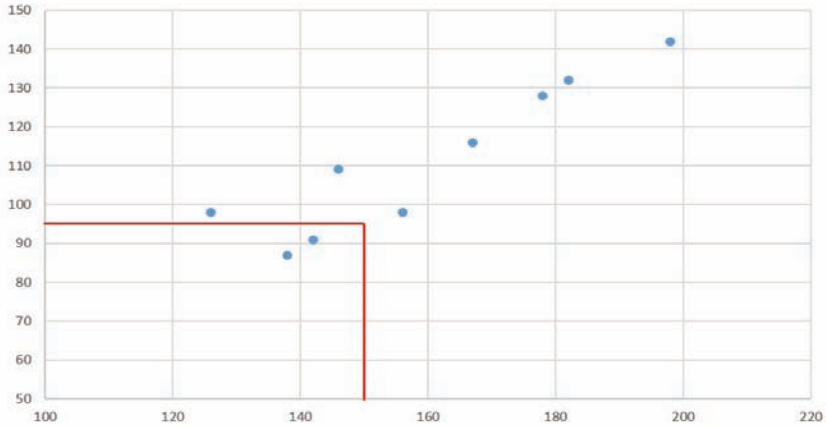
Clinical status / Case No	Chronic renal failure											
	RI value cranial pole	RI value caudal pole	Mean value R.I.	Peak systolic velocity cranial	Peak systolic velocity caudal	Mean systolic velocity (m/s)	PI value cranial pole	PI value caudal pole	Mean value PI	Diastolic velocity cranial	Diastolic velocity caudal	Mean diastolic velocity (m/s)
1	0.87	0.89	0.88	0.49	0.53	0.51	1.90	1.94	1.92	0.13	0.15	0.14
2	0.85	0.89	0.87	0.30	0.36	0.33	1.80	1.78	1.79	0.08	0.13	0.10
3	0.72	0.68	0.70	0.20	0.38	0.29	1.46	1.38	1.42	0.14	0.08	0.11
4	0.78	0.74	0.76	0.28	0.30	0.29	1.60	1.56	1.58	0.17	0.13	0.15
5	0.68	0.72	0.70	0.38	0.36	0.37	1.26	1.32	1.29	0.16	0.18	0.17
6	0.68	0.72	0.70	0.36	0.32	0.34	1.13	1.26	1.19	0.10	0.14	0.12
7	0.62	0.58	0.60	0.42	0.48	0.45	1.24	1.22	1.23	0.22	0.18	0.20
8	0.56	0.58	0.57	0.78	0.72	0.75	0.88	0.88	0.89	0.31	0.36	0.34
9	0.66	0.56	0.61	0.61	0.66	0.63	1.22	1.36	1.29	0.22	0.20	0.21



Graph7.Values of Na in dogs diagnosed with CRF



Graph 8.Values of K in dogs diagnosed with CRF



Graph 9. Blood pressure in dogs diagnosed with CRF

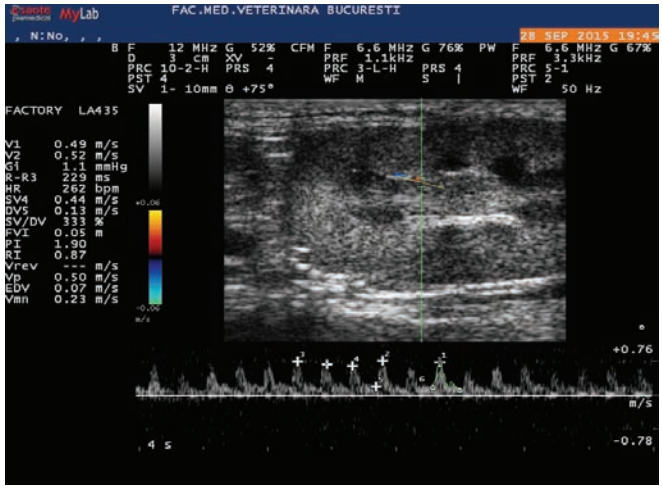


Figure 1.Doppler ultrasound image showing sample location (interlobular artery) and pulse wave in one dog with CRF

CONCLUSIONS

Dogs with CRF may present an increased RI, PI and blood pressure.

PI may be more accurate than RI in dogs diagnosed with CRF.

Correlation between PI and parameters of renal function were found.

The evaluation of renal vascular index represents a useful technique in evaluation and follows up of dogs with CRF.

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VERTISOILS - SPECIFIC SOILS OF OLT COUNTY

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Keywords*: physical and chemical properties, vertisoils, intra-zonal soils.*

ABSTRACT

Vertisoils are intra-zonal soils formed on parental material with fine texture and gonflable properties. There are found in Olt county on wide areas, representing 17.15% of the county's soils, being immediately after chernozioms which occupying 32.2%.

Vertisoils have fine texture, fragmented structure, with large structural elements, with great consistency, have low permeability to water and air, water and soil useful capacity is relatively small, the natural fertility of these soils is relatively low.

Applied agrotechnics to these soils is directed towards soil deep loosening through prick soil, execution of works at the required moisture periods, ensuring proper drainage, mineral and organic fertilization, all this leads to obtaining high yields.

INTRODUCTION

Vertisoils, under the conditions of our country, are intra-zonal relicts soils spread across relief represented by the piedmont plains, platforms, high terraces, which in the past were affected by the presence of the above, and/or near them, of lakes or watercourses. They were known by other names including: clay chernozioms (Seceleanu & Tamas 2008); ebonite; asphaltoide marshy grounds (Oprea 1960); compact chernozioms (Florea & Muntean 2012); soils zlotys or smolna.

From the geographical point of view, Olt County soils are divided into several units: zonal, intra-zonal and azonal, constituting the county's paedeological potential.

Zonal soils - are formed under the influence of climate and vegetation conditions specific to different natural areas (steppe, silvosteppe, forest) spread over large areas within the respective areas (chernozioms, luvisoils, etc.).

Intra-zonal soils - are formed amongst the different climatic zones under the influence of local rock conditions, underground water, stagnant water, etc. There are found in small areas, as a insular form, along with the zonal soils, represented by gleiosoils, stagnosoils, cambisoil, etc.

Azonal soils - are relatively young soils, undeveloped, with incipient soil formation processes, which may occur in any climatic zones, in most cases transiting these areas (regosoils, alluvisoils, erodisoils).

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In Olt county, vertisoils are totaling almost 75,000 ha, representing 17.5% of the arable Olt county, being immediately after chernozioms which occupying 32.3%. They use

Table 1

The distribution of soil with agricultural use, on genetic soil types

Soil units	Soil classes (SRTS-2012)	Genetic soil types	Surface * ha	Surface %
- zonal soils	- Cernisoils	- Chernoziom	144.210	3.23
		- Faeoziom	26.749	6.16
	- Luvisoils	- Preluvosoil	59.087	13.62
		- Luvosoil	54.165	12.48
		- Planosoil	6.121	1.41
- intra-zonal soils	- Protisoils	- Psamosoils	3.836	0.88
	- Vertisoils	- Vertisoils	74.437	17.15
	- Cambisoils	- Eutricambosoil	10.593	2.45
	- Hidrisoils	- Gleiosoils	2.700	0.63
		- Stagnosoils	811	0.18
	- Salsodisoils	- Aquisalids	70	0.01
		- Solonetzs	306	0.07
- azonal soils	- Protisoils	- Regosoils	2.915	0.67
		- Alluvisoils	41.093	9.48
	- Antrisoils	- Erodic	6.810	1.58
Total soil with agricultural use			433.903	100,00

(after *O.J.S.P.A. Olt, 31.12.2012)

compact areas on Olt - Vedea interfluve (Boianului Plain), in an area bounded on the south by Stoicăneşti - Văleni County Road, on north by Slatina - Corbu railroad, at west by Iminogului meadow and at east, by Vedea river floodplain. In combination with clay-alluvial, vertisoils are found in the southern part of Cotmeana Piedmont (Spinenilor Plateau) and Olteţului Piedmont (Balşului hills) which form the so-called microcomplex of Piscupia (Popovăţ & Carstea 1957).

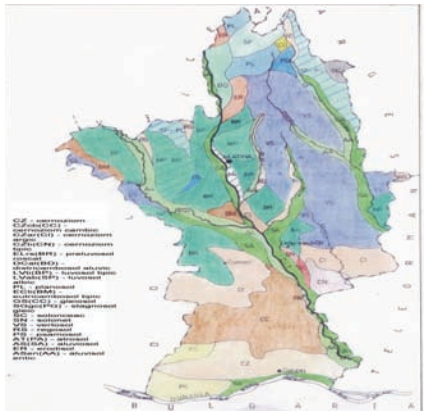

Figure 1. Genetic soil types from Olt county

MATERIAL AND METHODS

In order to characterize these soils, studies were made in the laboratory and field.

Description of soil profile consisted of:

- recording horizons, the main layers and parent material, literal notation with suffixes or prefixes;
- establishing horizons' depth and color depth and the transition between them;
- redoxmetric features and neoformations;
- texture, structure and soil composition;
- adhesion, plasticity, resistance to penetration.

Soil laboratory study. In the laboratory were carried out physical and chemical analysis after the methodology used by INCDPAPM determining the: fine sand, coarse sand, clay, density, total porosity, degree of compaction, higroscopic coefficient, coefficient of wilting, field capacity, hydraulic conductivity, pH, carbonates, humus, C/N, total nitrogen, phosphorus, mobile potassium .

Methods for analyzing the chemical characteristics were those provided by INCDPAPM Bucharest in the work "Methods of chemical and mineralogical analysis", Sitech Publishing, 2011.

RESULTS AND DISCUSSIONS

Today it is widely recognized that there are neither practical and nor can promote the agricultural technology systems that improve, enhance and preserve soil quality status without knowing the local specific (Mocanu et al. 2011)

Soils that belong to this class are characterized by pelic or vertic horizon whose upper limits are between 0 and 20 cm and the lower limit is at a depth of 100 cm. The upper limit of pelic or vertic horizons at cultivated soils is just below the plowing substrate. Also in this class are included very clayey soils which do no present the typical vertosoil characters.

The climate of the area in which were formed is characterized by annual average temperatures between 10 and 11°C and the average annual rainfall have values between 500 and 550 mm, but is almost mandatory that wet periods (which favors swelling) must alternate with dry periods (which favors contraction) contributing to the formation of cracks wide with depths of over 100 cm and oblique sliding faces amid a high clay content predominant gonflable (Dodocioiu et al. 2013).

Vertisoils were formed under vegetation initial hygrophile, humification and mineralization of organic matter occurring in successive wet and dry periods; later on these soils was installed specific steppe or silvosteppe vegetation (Popa & Coyne 2008).

The main subtypes found in Olt county are:

10.1 VS ti- K_4- t/a- NIa
10.2 VS ti- K_5- a/a- NIa
10.3 VS st- W_2- K_5- a/a- NIa
10.4 VS br-st- W_2- K_4- t/a- NIa
10.5 VS br-st- W_2- K_5- a/a- NIa
10.6 VS br-st- W_3- K_5- t/a- NIa

Vertosoil (Pelosoil) vertic mezocalcaric with formula Ap-A / B-BZY-B / C.
Locality Şerbăneşti,
Altitude 163 m,
The average annual temperature 10.0-11.1°C,
Precipitation 500-550 mm,
Ground water at 20 meters depth,
Agricultural use.
The morphological characterization:

Ap, 0-20 cm: processed horizon, color whilst wet 10YR4/3 (dark brown), average loam-clayish texture, small angular polyhedral structure, diffuse crossing.

A/Bzy, 20-45 cm: weak stagnogleizat transitional horizon, color matrix whilst wet 10YR5/3 (dark yellowish brown with 5-10% black spots 5YR4/4 (brown), clay loam texture, moderately compacted angular polyhedral structure large, diffuse crossing.

Bzy, 45-70 cm: pelic, vertic B horizon, color matrix whilst wet 10YR3/3 (dark brown), clay loam texture, very compact, large angular polyhedral structure, rare sliding faces, right diffuse crossing.

B2zy, 70-90 cm: pelic, vertic B horizon, color matrix whilst wet 10YR4/3 (dark yellowish brown), clay loam texture, large angular polyhedral structure, rare sliding faces, weak visual effervescence, diffuse crossing.

B/C, 90-125 cm: transitional horizon, color whilst wet 10YR4/3 (dark yellowish brown), clay loam texture, large polyhedral structure, weak visual effervescence, diffuse crossing.

Figure 2. Vertosoil

Physical and chemical properties shown in Table 2 reveals the following:

- the apparent density is high, 1.47 g/cm^3;
- the total porosity is low, 45.5%, degree of compaction is moderate;
- the withering coefficient has a high value of 15.22%, as well as the field capacity, of 28%;
- hydraulic conductivity is 2.78 mm/hour and is considered medium, as well as penetration resistance, which has a high value;
- soil reaction is slightly acidic (pH = 6.4);
- provision of nitrogen is weak;
- provision of phosphorus is weak;
- provision of assimilabile potassium is medium.

Since vertisoils' texture is fine, clay loam, often silty clay, they are compact soils with low total porosity, with cracks and frequent fissures in dry periods. Vertisoils are heavy and cold soils, have a high resistance to plowing, having an optimum short work. Soil reaction is slightly acid or neutral; soil humus content is relatively small in relation to the textural class.

Due to unfavorable physical characteristics they have low fertility; plants suffer both from lack of water and moisture excess. Improving the vertisols' aerohidric regime can be achieved by deep loosening, incorporating semi-fermented organic fertilizers or green manure, irrigation and drainage. This soils present middle favorability for field crop production (wheat, corn, sunflower), being contraindicated for fruit trees, vines and vegetables.

Table 2

Physical and chemical properties of vertic Pelosoil

Properties	Horizons				
	Ap	A/Bz	Bzy1	Bzy2	B/C
Depth, cm	0-20	20-45	45-70	70-90	90-125
Coarse sand, (20-0,20 mm) %	0.9	1.0	0.8	0.7	0.6
Fine sand (0.2-0.02 mm)	24.5	35.4	10.8	26.5	32.0
Dust (0.02-0.002 mm) %	40.8	20.8	43.6	18.8	18.8
Clay 2 (under 0.002 mm) %	33.8	42.8	44.8	54.0	48.6
Physical clay (under 0.001 mm) %	56.6	54.0	64.4	65.2	59.0
Texture	TT	AL	AL	AL	AL
Density (g/cm^3)		2.70			
The aparent density (g/cm^3)		1.47			
Total porosity (PT, %)		45.5			
Degree of compaction (GT, %)		+15			
Higroscopic coefficient (CH, %)		10.15			
Withering coefficient (CO, %)		15.22			
Field capacity (CC, %)		28.01			
Hydraulic conductivity (K, mm/hour)		2.78			
pH in H_2O	6.40	6.60	6.50	7.55	7.60
Carbonates ($CaCO_3$, %)		2.0			
Humus (%)	2.6	12.2			
C/N	12.6	0.126			
Nt, %	0.140	7.0			
P mobile, ppm	10.0	120			
K mobile, ppm	150				

The main cause of vertisoils' degradation is the high content of montmorillonite clay capable of producing soil compaction and cracking (Alakuku 1996).

Improving the compaction state is done by deep loosening, but on these soils is needed to be grown perennials that contribute to loosening of the soil and improvement and restoration of the soil structure, and simultaneously realizing the biological draining. Using green manure is always beneficial (Mocanu et al. 2013).

CONCLUSIONS

The physical and chemical characteristics of a soil, depends on the general background and the ecological conditions of its formation and development (Raducu et al. 2009, Grecu et al. 2010).

Vertisoils are intra-zonal soils formed on parental material with fine texture and gonflable properties. There are found in Olt county on wide areas, representing 17.15% of the county's soils, being immediately after chernozioms which occupying 32.2%.

Vertisoils have fine texture, fragmented structure, with large structural elements, with great consistency, have low permeability to water and air, water and soil useful capacity is relatively small; the natural fertility of these soils is relatively low.

Vertisoils are planted with wheat, corn, sunflower, clover, or are used as pastures. Because of aero-hydric regime is defectuos crops suffer from both excess moisture and water scarcity.

Applied agrotechnics to these soils is directed towards soil deep loosening through prick soil, execution of works at the required moisture periods, ensuring proper drainage, mineral and organic fertilization, all this leads to obtaining high yields.

Vertisoils are not suitable for sugar beet crop, potatoes, vegetables, vines and fruit trees.

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EVOLUTION OF FERTILIZERS CONSUMPTION AND PRODUCTIONS OF THE MAIN CROPS IN THE OLT COUNTY

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Keywords: *fertilizers, crop, soils.*

ABSTRACT

Olt County soils have a high yield potential, especially if we take measures to improve acidic, saline, gleyic-alkali soils and are irrigated and fertilized suitably. On these soils were obtained the following productions: at wheat crop, between 936-3,312 kg/ha; barley crop, between 881-4,000 kg/ha; rapeseed culture, between 1,040-2,100 kg/ha; sunflower culture between 396-1,758 kg/ha; at maize, between 590-4,139 kg/ha; vegetable crops between 13,585-20,607 kg/ha; fruit trees between 11,231-29,343 kg/ha; on vines between 2,032-2,642 kg/ha grapes. The amounts of chemical and organic fertilizers used per hectare have been reduced.

INTRODUCTION

The soil is heart of the terrestrial ecosystems (Mocanu & Dodocioiu 2010).

Soils of Romania, the country where we live and where our descendants will live, is the most precious wealth, the most valuable heritage that must be treasured, protected, preserved and valued at its true potential. The state of soil fertility is the key factor for practicing sustainable agriculture and performance and is a decisive indicator of socio-economic status and living standards of rural residents (Hera 2002).

Consequently, there must be an increasingly higher interest in sustainable technological systems that will prevent and minimize soil degradation and rebuild its productive capacity and its vital processes to support the biotic environment (Popa & Pătruşcă 2013). Soil is essential to life support, is considered as the basic natural resource of any efficient, productive and durable farming system (Popa & Coyne 2008, Dodocioiu & Tudosie 2012).

Promoting energy-intensive agriculture and generalizing the conventional "industrialized" technology system to produce bigger crops, leading to degradation of anthropogenic soil, currently endangers the health of the soil and other environmental components (Varallay 2006).

That is why it is necessary to monitor permanently soil quality and productivity.

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MATERIAL AND METHODS

For the evolution of soils, in general, and those of Olt in particular, it is very important to know besides the physical and chemical properties, the degree of fertility and culture system and technical means of improving and fertilizing to maintain and increase fertility status and their quality (Dodocioiu &Dobre 2015). In this respect we analyzed the period from 2006 to 2012.

Based on existing data from DGADR Olt we analyzed the following indicators:

- the main crops used in Olt county,
-surface occupied by each culture,
- the dynamic of cultivated areas in this period,
- the dynamic of production obtained,
-the quantity of organic fertilizers and chemicals used in the county,
-the quantity of fertilizers used in major crops.

RESULTS AND DISCUSSIONS

Olt County soils have a high yield potential, especially if we take measures to improve acidic, saline and gleyic-alkali soils and are irrigated and fertilized suitably.

This potential is reflected in Table 1, which highlights the productions that have been achieved to the main crops during the years 2006 to 2012.

Thus, areas cultivated with wheat during this period had an annual decreasing trend from148,992 hectares in 2006 to 108,992 ha in 2012. This evolution is due to low yields that were obtained by the small producers, that are not profitable, and they renounce at wheat culture and leave the land uncultivated (Babean uet al. 2008, Mocanu et al. 2013).

The productions obtained at the wheat culture had an evolution determined, on the one hand, by climate conditions and, also, by the technology used. Thus, in 2007, a drought year, wheat production obtained was only 936 kg/ha, while in 2010, another unfavorable climatic year, wheat production was 2,378 kg/ha. It is noted, however, an increasing trend of wheat production from 2006 to 2012 and from 2,137 to 2,635 and to 3,312 kg/ha.

At the barley crop there was a declining tendency of cultivated surfaces from 8,350 to 8,059 ha in 2012. Production of barley, however, showed a clear increasing tendency, mainly on account of improving used technologies corresponding to appropriate works of the soil. In this way, barley production per hectare increased from 2,280 kg/ha in 2006 to 3,495 kg/ha in 2012.

Rapeseed culture follows a spectacular evolution of the cultivated surfaces in this period. Area under cultivation in 2006 was 2,709 ha and in 2011 reached 16,419 ha, so increased 6.1 times because this crop is more profitable than wheat and barley, given the selling price. The rapeseed productions have not had the same trend as cultivated areas, they remained at levels of 1,500-2,000 kg/ha.

Sunflower, a fairly widespread culture in Olt had an oscillatory evolution of areas under cultivation from 2006 to 2012, increasing from 39,232 ha to 63,504 ha, almost double. Sunflower production has, however, a slight increase from 1,412 kg/ha in 2006 to 1,758 kg/ha in 2012.

Maize is the second crop after wheat in size from Olt County. It recorded a rising trend from 106,821 hectares in 2006 to 136,338 hectares, which proves that the technology applied to soil makes the crop to be longer profitable, which appears quite clear from developments in production; from 3,491 kg/ha in 2006 to 4,139 kg/ha in 2009 and 4,381 kg/ha in 2010.

It is encouraging that in 2007 appeared in Olt County the rice crop on an area of 85 ha. This area has evolved, reaching in 2012 to 1,190 ha. Rice crops occupy usually

aquisalids and solonetzs being an ameliorative crop on these soils. And rice production has been increasing, from 5,000 kg/ha in 2007 to 6,000 kg/ha in 2011, yields are quite good, which shows that there is used the appropriate technology for this crop.

Table 1

The dynamics of areas and productions obtained in the period 2006-2012 in Olt County for the main crops

Culture	Indicator	2006	2007	2008	2009	2010	2011	2012
Wheat	Surface, ha	148992	134424	136294	146055	134701	131346	108992
	Average production, kg/ha	2137	936	3237	2719	2378	3312	2635
Barley	Surface, ha	8350	8290	8102	13104	12150	7160	8059
	Average production, kg/ha	2280	881	3500	2634	2650	4000	3495
Winter barley	Surface, ha	1028	2419	910	956	605	677	770
	Average production, kg/ha	3084	678	3120	2840	2268	2300	3097
Spring barley	Surface, ha	1949	1707	2907	2055	2234	1725	1390
	Average production, kg/ha	2707	808	3284	1825	1700	2837	1850
Rapeseed	Surface, ha	2709	16205	17911	25357	31591	16419	5670
	Average production, kg/ha	1650	1040	2100	1686	1732	1490	1550
Oats	Surface, ha	4912	5206	6947	4978	5984	4989	5168
	Average production, kg/ha	2099	919	1812	2080	1800	2400	1800
Pea	Surface, ha	130	290	391	772	366	220	370
	Average production, kg/ha	1446	566	2164	1302	1831	1200	1157
Sunflower	Surface, ha	39232	36388	39519	32000	32491	41393	63504
	Average production, kg/ha	1412	396	1400	1715	1718	1650	1250
Maize	Surface, ha	106821	95760	101369	100524	105121	125514	136338
	Average production, kg/ha	3491	590	2054	4139	4381	3680	1000
Rice	Surface, ha	0	850	1100	1132	1150	1120	1190
	Average production, kg/ha	-	5000	5454	5742	5500	6000	4624
Fodder plants	Surface, ha	18222	20225	23892	22651	20670	19876	21652
	Average production,	17258	10860	10694	12640	15155	32517	17231

Culture	Indicator	2006	2007	2008	2009	2010	2011	2012
	kg/ha							
Vegetables	Surface, ha	9716	9602	9409	9600	9502	9615	9304
	Average prod., kg/ha	17700	13585	14798	17054	15179	20607	18804
Fruits	Surface, ha	3692	2150	4375	3915	3500	6986	7484
	Average production, kg/ha	16779	11231	18374	16460	14700	29342	24626
Grape vines	Surface, ha	3207	4059	4000	4276	3324	4645	4949
	Average production, kg/ha	2032	2465	2642	2244	1948	2754	2954

Areas occupied by fruit trees were also growing, doubling since 2006 (3,692 ha) by the year 2012 (7,484 ha), which proves that through applied technology, culture becomes profitable. This was possible through the establishment of new plantations of 3,000 ha in 2007 and 2008 on preluvisoils and eutricambosoils and even erodisoils.

Thanks to the technology used and the proper soil works, production increased from 16,779 kg/ha in 2006 to 24,626 kg/ha in 2012, productions that are economically efficient.

Vines had also an ascendant trend in terms of surface area occupied, increasing from 3,207 ha in 2006 to 4,949 ha in 2012. Grape yields obtained are low compared to soils that are cultivated and technologies that are applied. They had a slight increase from 2,032 kg/ha in 2006 to 2,954 kg/ha in 2012. The lower production is primarily due to the existence of hybrid vine on 72% of area.

Table 3

The quantities of chemical and organic fertilizers applied in Olt county in 2012

Type of fertilizer	Quantity, tons	The surface on which was applied, ha	The quantity of fertilizer kg/ha
Chemical fertilizers, total	13880	257503	53.9
- nitrogenous	10147	191305	53.0
- phosphatic	3732	65823	56.7
- potassium	1	375	2.67
Organic fertilizers	20476	2137	9582

Table 4

The quantities of chemical and organic fertilizers applied to various crops in 2012

Culture	Nitrogen fertilizers		Phosphorus fertilizers		Potassium fertilizers	
	Total, tons	Kg/ha	Total, tons	Kg/ha	Total, tons	Kg/ha
Wheat	5119	50.0	1837	59.1	-	-
Grain maize	2435	60.44	12	0.29	-	-
Sunflower	1157	57.03	860	57.08	-	-
Vegetables	216	50.00	85	50.0	-	-
Fodder plants	20	40.0	12	40.0	-	-
Meadows	94	40.0	-	-	-	-
Grape vines	1	2.67	1	2.67	1	2.67

The use of fertilizers and irrigation on the soils of Olt County

As two of the main factors contributing to the rational use of soils in Olt County are represented by filling in water scarcity by irrigation and deficit nutrients through organic and chemical fertilizers, we analyzed how where used these two factors.

Regarding the use of irrigation as the main mean to combat drought and increasing yields per hectare we must show that very little was done in this field in Olt County. Thus, in 2012 the actual irrigated area was 273 ha of which 143 ha of maize and 130 ha vegetables.

In the field of using chemical and organic fertilizers we can say that compared to other counties, Olt County is somewhere in the middle in terms of the amount of fertilizer used. In this respect we can show that in 2012 in Olt County has been used a quantity of 13,880 tons of chemical fertilizers on an area of 257,503 ha, returning an amount of 53.9 kg chemical fertilizer per hectare.

Of these, nitrogen fertilizers were applied in an amount of 10,147 tons on an area of 191,305 ha, returning 53.0 kg/ha.

The phosphorus fertilizers were used in an amount of 3,732 tons on a surface of 65, 823 hectares returning 56.7 kg/ha of arable land fertilized.

The situation is, however, very critical in the field of potassium fertilizer, there was applied only a ton from these fertilizers on a surface of 375 ha, returning 2.67 kg/ha.

The organic fertilizers have been used only on an area of 2,137 ha in an amount of 20, 476 tons, returning 9.6 tons/ha.

Analyzing the use of chemical fertilizers for different crops (Table 3) in 2012 result the following conclusions:

At wheat crop was used 50 kg/ha of nitrogen fertilizers, 59.1 kg/ha phosphorus fertilizers and 0 kg/ha potassium fertilizer.

At the maize grains were used 60.44 kg/ha of fertilizers with nitrogen, 0.29 kg/ha of phosphorus fertilizers and 0 kg/ha potassium fertilizer.

At vegetable crops were used 50 kg/ha of nitrogen fertilizers, 50 kg/ha phosphorus fertilizers and 0 kg/ha potassium fertilizers.

At the fodder plants were used 40 kg/ha of nitrogen fertilizers, 40 kg/ha phosphorus fertilizers and 0 kg/ha potassium fertilizer.

At the vineyards were used just 2.67 kg/ha nitrogen, phosphorus and potassium fertilizers per hectare using also around 20 t/ha of livestock manure.

All these quantities of chemical and organic fertilizers used are below the needs of the plants and contributes to the decline in fertility degree of soils in Olt County. This even more so as these amounts relate only to fertilized soils, with large areas, which in 2012 did not receive mineral fertilizer.

Thus, at maize crop, of the 136,338 hectares cultivated are fertilized only 40,659 ha, at sunflower crop from the 63,504 ha were fertilized only 35.350 and at vegetables from 9,304 ha were fertilized only 6.020 ha.

CONCLUSIONS

The productions which are obtained at various crops are well below those obtained in the European Community, fact that is highlighted for the period 2006-2012 in the numbers below:

- at wheat crop, between 936-3,312 kg/ha;
- barley crop, between 881-4,000 kg/ha;
- rapeseed culture, between 1,040-2,100 kg/ha;
- sunflower culture between 396-1,758 kg/ha;

- at maize, between 590-4,139 kg/ha;
- vegetable crops between 13,585-20,607 kg/ha;
- fruits between 11,231-29,343 kg/ha;
- on vines between 2,032-2,642 kg/ha grapes.

The amounts of chemical and organic fertilizers used per hectare have also been reduced:

- 53.9 kg/ha nitrogen fertilizer used only on an area of 191,305 ha;
- 53.0 kg/ha of phosphorus fertilizers used only on an area of 65,823 ha;
- 2.67 kg/ha potassium fertilizer used only on the surface of 375 hectares,
- 9,582 kg/ha manure used only on the surface of 2,137 ha.

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THE ECOLOGICAL ASSESSMENT OF RIPARIAN ECOSYSTEMS OF PINIOS RIVER IN TRIKALA'S PREFECTURE, CENTRAL GREECE

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Keywords*: Ecological assessment, riparian ecosystem, Pinios River, central Greece*

ABSTRACT

Pinios river runs across central Greece and it's the third longest River of Greece. The aim of this study is the assessment of Pinios river quality, particularly in the middle course and the part crossing Trikala Prefecture, with respect to their hydromorphological attributes and the impact of human activities. According to the Water Framework Directive 2000/60/EC it is required the evaluation water morphological, biological and Natural chemical elements. The status of riparian ecosystems was studied, according to the Rivers Habitat Survey (RHS) protocol, and especially by means of the HMS index is required for the complete evaluation of quality of river of ecosystem. The overall river status was evaluated using QBR index to achieve a global view of the ecological quality of the study areas.

The results of this research showed that Pinios river in the study area is mostly non-modified habitat. Its ecological quality however ranges from moderate to poor.

INTRODUCTION

Rivers are important for humans because they provide drinking water, food, irrigation water, hydroelectric energy and water, they comprise roads of transportation, commerce and culture. Ancient Greeks had deified rivers and dedicated to them sanctuaries and altars in riparian forests, which were kept in their valleys. Through the ecosystems of large rivers such as in Nile, Tigris, Euphrates and Nestos major civilizations emerged and flourished in ancient times.

Riparian vegetation zones, and riparian forests apart from their rich biodiversity, are providing the interface between terrestrial and aquatic environments and have high productivity (Efthimiou 2000, Brouziotis et al. 2010).

The Framework Directive on Water (2000/60/EU), aims to prevent deterioration of water status and to achieve their good quality by 2015. According to the provisions of the Directive on integrated Water management it should be initiated by assessing the current situation (biotic and abiotic elements).

In recent years several attempts have been made in Greece to assess the ecological quality of river systems, utilizing methods that assess a) the river habitat (River Habitat Survey, RHS) (Raven et al. 1997, Chatzinikolaou et al. 2006, Manolaki & Papastergiadou

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2006, Lekka et al. 2004), b) the riparian ecosystem - riparian zone, Qualitat del bosc de ribera (Riparian Forest Quality Index, QBR) (Munné et al. 2003) (Zogaris et al. 2008, Fotiadis et al. 2010, Manolaki 2012). With the QBR index, the assessment of ecological quality of riparian ecosystems is possible.

On the completion of the RHS protocols useful conclusions have been deduced for the riparian ecosystem protocols a) by the Evaluation indicator of habitat quality (Index of Habitat Quality Assessment) which assesses the diversity and "naturalness" of a region and b) the index Habitat Modification Score (HMS), which assesses the artificial modification of the physical structure of the river/channel (Manolaki 2012).

The objective of this research project is to assess the ecological status of section of the medium course of the river Pinios, in Trikala Prefecture, using hydromorphological parameters. This is a first indication of the quality and the degree of modification of the river habitat of the Thessaly part of Pinios so as to allow monitoring of water quality and management always in accordance with the criteria referred to in the Water Framework Directive 2000/60/EC.

Study Area. Pinios River 205 Km in length is the third longest river of Greece, with total basin area of 9.500 Km^2 (Mantouza 2008). It flows from the western slopes of the southern Pindos at the border between the prefectures of Ioannina and Trikala. The ecological importance is great as it has been included in the European ecological network Natura 2000. The following sections are in the ecological network Natura 2000: aesthetic Valley forest Tempe GR1420005, Straits of Kalamaki (GR1420010) and the Delta of Pinios (GR1420015) Stena Kalamakiou and Ori Zarkou (GR1420009).

Pinios or Salavrias is the main river of Thessaly in central Greece that stems from the Pindos, crosses the plain of Thessaly, the Tembi Valley (between Olympus mountains and Ossa) and flows eventually to Thermaikos Gulf, creating its Delta close the settlement Stomio. The main tributaries of Pinios is: Titarisios, Neochoritis, Litheos, Pamisos, Malakasiotis, Kleinovitkos, Portaikos, Farsaliotis, Sofaditis, Enippea, Kaletzis and Karabalis.

The section of the Pinios river which wets the prefecture of Trikala was chosen as our study area, namely, from the bridge of the National Road Arta - Trikala to the bridge of the National Road Trikala - Karditsa (Map 1).

Map 1: Study area.

MATERIAL AND METHODS

There are several methods for assessing the ecological integrity of a river. Very few methods though were specifically developed for the characterization of riparian habitats. One of these is the method QBR (Qualitat del bosc de ribera), which was implemented at first in the rivers of northeast Spain. The calculation of the QBR index, concerns the assessment of the riparian zone with identifiable and measurable characteristics (Munné et al. 2003). The QBR index ranges between 0 and 100 and is the sum of four riparian quality aspects (Chatzinikolaou 2001, Manolaki 2012). In Table 1 the Quality classes according to QBR index are presented.

This research indicated to the part of the river Pinios, wich is located in the prefecture of Trikala concerns the assessment of the ecological status of riparian ecosystems Pinios river on the basis of hydromorphological elements. For conducting of the research the protocols Evaluation models of the riparian zone (QBR) (Munné et al. 2003) and river habitats (RHS) (Raven et al. 2010) and the Index Modification Habitat (HMS) were used in the field. The Quality Assessment Protocol of riparian ecosystems is totally carried out in the forecast by the control points method (spot-ckecks) in a total of 20 sampling stations.

The RHS is a character assessment system of the physical structure of a river (Nikolopoulou 2010). To capture the structure of the sampling stations we used the manual RHS 2003 Field Survey Guidance Manual (UK Environment Agency 2003) modified and adapted to the Mediterranean data of Greek rivers (Dacos 2001, Chatzinikolaou 2001). For the evaluation of the situation of habitats of the river (RHS) the ratio Modifier Habitat HMS (Habitat Modification Score) was used, which records the possible artificial modifications of the river, such as aid shores, bed arrangements, dams (Raven et. al. 1998).

Table 1

Quality classes of riparian habitats according to the QBR Index and comparison with the categories of the Framework Directive on Water (WFD) 2000/60/EC (Brouziotis et al. 2010).

QBR index	WFD Quality	QBR Category	Color indicator
Natural	High	> 95	Blue
Good	Good	75-90	Green
Moderate	Moderate	55-70	Yellow
Poor	Poor	35-50	Orange
Bad	Bad	< 25	Red

RESULTS AND DISCUSSIONS

In the research part of the Thessaly Pinios were selected twenty (20) sampling stations, a modified form of RHS southern European river (South Europe RHS 2003). The field work took place during the period March - April 2013. The sampling sites in the study

area are representative of the range of different features to record objectively and comprehensively the ecological state of the river.

The twenty (20) representative sampling stations from S.1 to S20 (marked as ΣX1 to ΣX20) are shown on the map 2.

A. Habitat Modification Score (HMS)

After the recording and processing of field data the degree of Habitat Modification (HMS) was calculated for each point of the study area (Table 2).

By recording the HMS, found that in the study area of the river Pinios, 90% (18 stations) is characterized as Mostly non-modified and only 10% (2 stations) was classified as Semi natural.

Map. 2. Map of Sampling Stations in study area of Pinios river (Maps Google Data).

B. Results of QBR index.

The results of the ecological quality of stations based on QBR process for 20 sample stations of the River Pinios is given in Table 3 (final score and characterization for each station). Table 4 summarises the results grouped by classification-class quality (numerically and in percentage). It can be seen that the riparian ecosystem in the study area is characterized in 80% of the cases as poor and moderate (contour 40% each), in 15% as Bad and only 5% as Good quality.

CONCLUSIONS

This work is a first approach to studying and continues the ecological quality of the river basin of Pinios, parts of which belong to the ecological network Natura 2000. The study area is dominated by eastern plane tree forests.

Based on the results of both ecological assessment methodologies (RHS and QBR) applied, the following emerged:

From the results obtained by the index level modification (HMS), part of Pinios in Trikala is mainly characterized as "Mostly non-modified" and secondarily "Semi natural". Based on the results of the ecological quality index (QBR), the riparian ecosystem in the study area characterized in 40% of the cases as being of moderate ecological status (with a score of 55-70), 40% as poor (with a score of 30- 50) while 15% bad ecological state (score ≤25).

The areas of high modification were characterized by low ecological quality and low quality riparian zone (QBR) (Manolaki 2012). The results of the application of QBR

can be used in many ways. The areas that received high scores are those on which conservation of river ecosystems need to focus. Areas that do not have high quality riparian environment are areas that need the implementation of management actions to improve the ecological quality throughout the basin.

The study area is located near settlements and receives a lot of pressure from human activities such as agriculture, animal husbandry, wells, illegal logging, construction of major engineering projects. All these affect, in varying degrees, and degrade riparian ecosystems of Pinios with all the consequences that this entails for the ecological quality of the whole river system. Knowledge of ecological status and degree of habitat modification of the study section of Pinios river, may be useful for the management and the determination of the necessary measures as required by the Water Framework Directive 200/60/EC.

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Table 2

Habitat Modification Score (HMS) of Pinios river in the study area

No	Sampling Stations	HMS Score	HMS Class
1	ΣX1	2	Semi natural
2	ΣX2	4	Mostly non-modified
3	ΣX3	4	Mostly non-modified
4	ΣX4	4	Mostly non-modified
5	ΣX5	4	Mostly non-modified
6	ΣX6	3	Mostly non-modified
7	ΣX7	3	Mostly non-modified
8	ΣX8	4	Mostly non-modified
9	ΣX9	4	Mostly non-modified
10	ΣX10	4	Mostly non-modified
11	ΣX11	4	Mostly non-modified
12	ΣX12	4	Mostly non-modified
13	ΣX13	4	Mostly non-modified
14	ΣX14	3	Mostly non-modified
15	ΣX15	3	Mostly non-modified
16	ΣX16	4	Mostly non-modified
17	ΣX17	4	Mostly non-modified
18	ΣX18	4	Mostly non-modified
19	ΣX19	4	Mostly non-modified
20	ΣX20	2	Semi natural

Table 3

Overall rating category and quality of the sampling stations under QBR index

No	Sampling Stations	QBR	QBR index Quality	Color
1	ΣX1	60	Moderate	
2	ΣX2	40	Poor	
3	ΣX3	35	Poor	
4	ΣX4	55	Moderate	
5	ΣX5	65	Moderate	
6	ΣX6	65	Moderate	
7	ΣX7	40	Poor	
8	ΣX8	60	Moderate	
9	ΣX9	65	Moderate	
10	ΣX10	60	Moderate	
11	ΣX11	20	Bad	
12	ΣX12	30	Poor	
13	ΣX13	65	Moderate	
14	ΣX14	75	Good	
15	ΣX15	20	Bad	
16	ΣX16	30	Poor	
17	ΣX17	30	Poor	
18	ΣX18	40	Poor	
19	ΣX19	15	Bad	
20	ΣX20	35	Poor	

Table 4

Grouping of sampling stations in riparian ecosystem quality grades

QBR-Index Quality	Total Number of Stations	(%)
Natural	0	0
Good	1	5
Moderate	8	40
Poor	8	40
Bad	3	15
TOTAL	20	100

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RESEARCH AND MANAGEMENT OF RIPARIAN FOREST OF RICHIOS RIVER (MACEDONIAN TEMPI), N. GREECE

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Keywords: *riparian forest, management, Richios River, Platanus orientalis, Populus alba.*

ABSTRACT

Richios River is a small river in an area that crosses the Rentina's Gorge or Macedonian Tempi. Aim of this research is a first approach to the study of riparian forest, along with the study of its' structure, identifying problems, ecological assessment and proposal management measures.

The survey recorded that the riparian forest of Richios is an all aged forest with mixed single-storey stands of Platanus orientalis and Populus alba, in wich the average Dbh is 62.92 cm for Platanus and 46.85 cm for Populus. The natural regeneration of riparian forest species is non-existed, probably by the strong presence of human activities in the area of Macedonian Tempi.

INTRODUCTION

Riparian forests are ecosystems of great value because of their high biodiversity. These forests are degraded due to severe pressure from human activities (Efthimiou 2012).

The differences of the riverside riparian vegetation between a river and a wetland reflect the particular characteristics of the river: the powerful stream of water and the seasonal succession of floods and drought (Zogaris et al. 2007).

In recent decades efforts have been made at European and world level, for the protection, conservation and restoration of riparian ecosystems and therefore of riparian forests. Also our country follows this scientific trend with several examples throughout the Greek territory, most important of them are Lake Volvi, Nestos delta, lake of Agra etc.

About the evaluation of a riparian erine forest it is needed to study its structure in order to record the existing situation, identify the problems, pressures and propose appropriate management measures (Efthimiou 2000; Efthimiou 2014).

Macedonian Tempi or Rendina's Gorge is an area of rare natural beauty, protected by Greek legislation and international conventions related to the avifauna, ecology and biodiversity. This area belongs to the National Park of Koronia-Volvi and Macedonian Tempi, as endorsed by State Law 248/D/5_3_2004, which in turn belongs to the Ramsar networks and NATURA 2000 sites and is in an area of refuge wildlife. It is managed by the Management Body of National Park Koronia-Volvi and Macedonian Tempi which aimed at restoring, improving and perpetual protection and preservation of Richios River which is the natural extractor of lakes Koronia and Volvi and ensures communication with the sea and the "specially protected Mediterranean region" and high aesthetic value riparian forest.

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MATERIAL AND METHODS

A. Sample plots and data collection. In order to study the structure of the riparian forest of the low-water river, two representative sample plots were established, 0.2 Ha in size (Map 1). In each sample plot diameter at breast height (Dbh) and total height of all trees with a diameter greater than 4 cm were measured. The measurements were made in Spring 2015. Additionally all trees were classified according to the IUFRO classification system. The statistical analysis was carried out by the use of SPSS ver. 21.

B. Study area. Richios river was chosen as the research area. Richios flows from Rendina village and after crossing the valley between the mountains Kerdylio and Stratoniko (Figure 1 & 2), forms the "Macedonian Tempi" and flows into the Strymonikos gulf between the villages of Stavros and Asprovalta.

The ancient Via Egnatia were going through the valley of Richios, which indicates the importance of the region since ancient times and leads to the Castle of Rentina.

The riparian vegetation of Richios is rich and consists of *Platanus Orientalis*, *Populus alba*, *Salix alba*, *Alnus glutinosa*, *Ulmus minor*, *Juglans regia*, *Cornus sp*., while in the area found *Tilia sp*., *Fraxinus sp*., *Carpinus orientalis* and *Ostrya carpinifollia.* In understorey *Vitex agnus-castus Nerium oleander*, *Ruscus spp* and *Phragmites australis*, *Pteridium aquilinum* and *Rubus sp.* dominate. The presence of climbing plants, *Hedera helix*, *Clematis vitalba*, *Humulus lupulus*, is very impressive.

Concerning the fauna of Richios there are no references of bibliography. In the region of the neighboring lakes Volvi and Koronia recorded 248 species of birds, a figure equal to 58% of the total of Greece, of which 106 nest in the area. Indicative species of fish recorded in Richios are: *Chelon labrosus*, *Rhodeus amarus* and *Leuciscus cephalus*. (Koutrakis et al. 2000).

Richios river has flow of 0.8 m^3/sec and the water temperature ranges from 7.9 °C - 29.4 °C. (Koutrakis et al. 2003; Tzimopoulos et al. 2005) and it is part of the basin of an ancient lake Mygdonia (Efthimiou et al. 2014).

RESULTS AND DISCUSSIONS

In riparian forest Richios found mainly mixted stand with *Platanus orientalis* and *Populus alba*. As shown in the Figure 3 were found trees of all classes in diameter from 6 cm up to 122 cm.

Figure 1. Richios River

Figure 2. Sample plot

Platanus orientalis has an average diameter of 62.92 cm and average height of 20.45 m and a density of 130 stems/ha (Table 1) presents two major concentrations of trees of a stage of logs (34-54 cm) and a stage of thick logs (70-86 cm) (Fig. 3). The larger diameter which is recorded in *Platanus* was 121 cm, while the maximum height was 33 m.

Populus alba has an average diameter of 46.85 cm and average height 23.90 m, with a density of 50 stems/ha and the largest concentration of trees in the process of recorded logs, for d values ranging between 46-62 cm (Fig. 3). The highest tree found 30 m and the largest diameter was 59 cm.

Table 1

Structure parameters of the riparian forest species in Richios river

Species	N/ha	D mean (cm) (St. Dev.)	H mean (m) (St. Dev.)	G (m^2/ha).
Platanus orientalis	130	62.92 (23.53)	20.45 (4.72)	46.82
Populus alba	50	46.85 (11.22)	23.90 (2.67)	9.10
Total	180			55.92

As shown in Figure 3, from the data structure initially was *Platanus* forest and gradually appeared individuals of *Populus alba*. Research in the riparian forest of Richios should be continued to investigate the possible existence of other stages of development of natural regeneration.

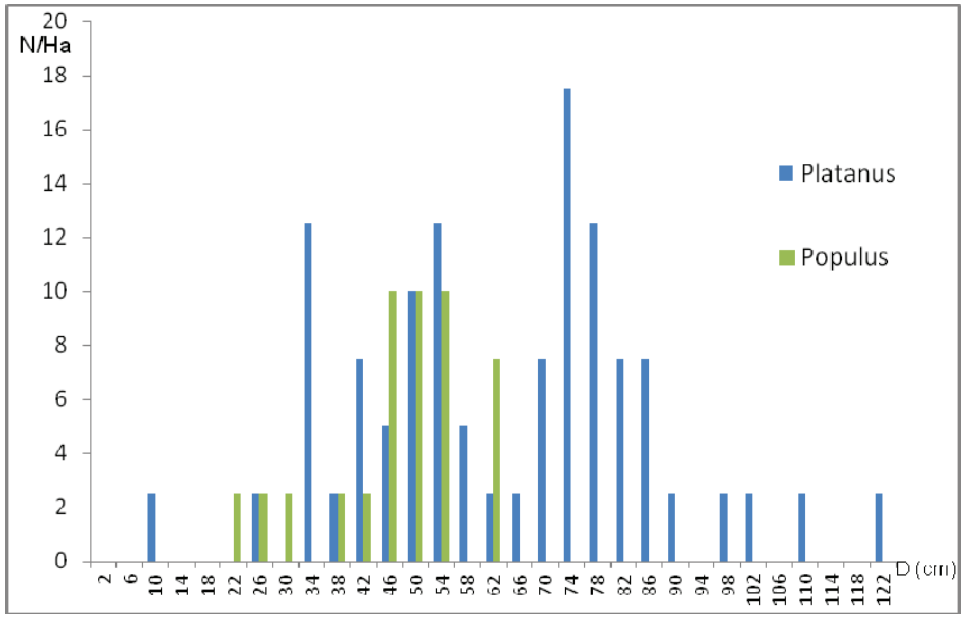

Figure 3. Histogramm of diameter distribution of *Platanus orientalis* and *Populus alba* plots

Table 2

Distribution of units in clumps of different species per storey, in Richios riparian forest

Species	N/ha	Over-storey (%)	Middle-storey (%)	Under-storey (%)
Platanus orientalis	130	113 (87%)	15 (11%)	2 (2%)
Populus alba	50	48 (96%)	2 (4%)	- (-)
TOTAL	180	161 (89.5%)	17 (9.5%)	2 (1%)

Riparian forest of Richios consists of single storey clusters, in which the 89.5% of units found in over - storey and 9.5% in the middle - storey. Table 2 shows that the *Platanus* orientalis mainly dominates in over - storey and secondarily on the middle - storey, while *Populus alba* dominates only in overstorey. The lack of units in the under - storey indicates the possible absence of natural regeneration which should be a priority to manage.

CONCLUSIONS

The first approach of the study about structure of Richios riparian forest shows that it is an all aged forest in which there are trees of all diameter classes. The *Populus* and *Platanus* species are fast-growing trees.

Richios river crosses a long Macedonian Tempi, and alongside the riverbed, there is the old highway Thessaloniki-Kavala, with a limited importance today because the major traffic circulation transferred to the new highway, Egnatia. There is only tourist - seasonal move to the beaches of Asprovalta, Stavros, Vrasna. Because of the relief level it is easy to access and cross the riparian forest with all that means for the pressure from human activities. The absence of natural regeneration should be dealt with by the prevention of access, reduction of grazing and artificial reforestation in positions where drafted accordingly to a study.

The controlled and directed traffic is a management measure for the protection and conservation of riparian forest. The existing infrastructure of the recreation area (bridge, fence, trail, living, observatories, etc) should be maintained and strengthened by new construction, making new paths, new appropriate signs and information signs for the biodiversity of riparian forest, historical and cultural value of the area.

It’s necessary, the recording and removal of alien species in the region and the non-use of these plantations and surrounding settlements to reduce the risk of natural riparian vegetation of the alien species.

Protection, recovery and restoration of riparian forest on in Richios river is going to work as suburban green spaces and space for recreation, sports, climbing, etc for residents and seasonal visitors of the four neighboring by the river settlements.

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Map 1. Sample plots (Google Map Data)

Map 2. Study area

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EFFECTS OF BIOGAS PRODUCTION LIQUID WASTE ON THE CHEMICAL PROPERTIES OF SOIL MIXTURE WITH MANURE

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Keywords: *biogas liquid waste; manure; chemical properties; organic matter biodegradation, soil.*

ABSTRACT

This paper investigates the addition of various amounts of biogas production liquid waste to the soil with the presence of manure, in an incubation experiment in the laboratory. The liquid waste incorporated in three different ratios (10 ml, 20 ml and 30 ml) with 50 g of soil and 5.11 g of manure containing 2.5 g of organic matter, resulting in the increase of the available forms of P, Cu, Zn and Mn. Furthermore the addition of the lower dose of these positively influences the mineralization of organic matter and does not cause any increase in salinity of the soil-manure mix. The results of this study show that the incorporation of small quantities of liquid waste in soil with in the presence of manure could be used as a composting material without adverse effects on the chemical properties of soil.

INTRODUCTION

Anaerobic digestion of energy crops biomass and wastes is of increasing interest in order to reduce the greenhouse gas emissions and to facilitate a sustainable development of energy supply by biogas production. Biogas provides methane a versatile carrier of renewable energy, as it can be used for replacement of fossil fuels while digested residue from acidogenesis and methanogenesis that is produced can be applied as a raw material in the form of fertilizer (Weiland 2010).

The soil organic matter regulates the biological activity of soil and increases its fertility (Chouliaras et al. 1998).

Experiment on incubation of solid and liquid waste from the olive-mill into the soil, showed that the organic content of the liquid waste is subjected to a high degree of degradation while the solid one showed a resistance to degradation (Gougoulias et al. 2013). The impact of olive mill waste on the chemical properties of soil in field experiments was studied by Lopez-Pineiro et al. 2008; Carbonnell et al. 2010; Gougoulias et al., 2014.

The purpose of this paper is to examine the effects of biogas production liquid waste on the chemical properties of soil and manure mixture, in vitro.

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MATERIAL AND METHODS

In this study an incubation experiment applied in the laboratory, with manure containing 49.07% organic matter, soil containing 0.57% organic matter and with varying amounts of biogas production liquid waste containing 0.59% organic matter (Table 1). Manure and soil were taken from the agricultural facilities of TEI Thessaly while liquid waste was received from a biogas plant located in the industrial area of Larissa (Greece).

More over the waste came out from a new biogas plant, with a production capacity of 0.5 MWatts of electrical power. The mixture used in the digester, at the time of sampling, consisted from pig manure, dairy cows manure and whey. The feeding of the digester is continuous and a certain amount of waste is produced every day. The waste is collected in a concrete tank and after that goes to solid – liquid separator and from there the liquids goes to lagoons. In the concrete tank there is a mixer that mixes all the content before they go daily to the separator. 30 samples of 0.5 L each were taken every 2 minutes from the pipe line that goes from the tank to the separator. All the samples were mixed together and from those 2 samples of 4 L each went to the laboratory.

In 50 g soil and 5.11 g of manure containing 2.5 g organic substance, small amounts of 10 ml, 20 ml and 30 ml of biogas liquid waste were added in a way to avoid creating increased salinity in soil-manure mixture. Therefore an experimental unit consists of 50 g of soil, 5.11 g of manure and variable amounts of liquid waste. These treatments were maintained in an incubator.

In the incubator, the treatments were prepared in four replicates and kept at 28 ^{o}C for a period of 15 weeks. During the first three weeks of the incubation period, the moisture was maintained at two-thirds of field capacity, but for the next three weeks the soils were left to dry. This process was repeated until the end of the incubation period. According to (Wu & Brookes 2005), the alternation of drying and rewetting soil samples enhances mineralization of both soil biomass organic matter and non-biomass organic matter.

At the end of the incubation period, soil samples were analysed using the following methods which are referred by (Page et al. 1982, Hesse et al. 1972).

Organic matter was analyzed by chemical oxidation with 1 mol L^{-1} $K_2Cr_2O_7$ and titration of the remaining reagent with 0.5 mol L^{-1} $FeSO_4$.

Both ammonium and nitrate nitrogen were extracted with 0.5 mol L^{-1} $CaCl_2$ and estimated by distillation in the presence of MgO and Devarda's alloy, respectively.

Available P forms (Olsen P) was extracted with 0.5 mol L^{-1} $NaHCO_3$ and measured by spectroscopy.

Organic phosphorus was measured after mineralization by combustion of the sample and subtraction of the mineral phosphorus amounts, which had previously been estimated in the laboratory. The mineral amounts were extracted with 1 mol L^{-1} H_2SO_4 and all forms were measured by spectroscopy.

Exchangeable forms of potassium and sodium were extracted with 1 mol L^{-1} CH_3COONH_4 and measured by flame Photometer (Essex, UK).

Available forms of Mn, Zn, and Cu were extracted with DTPA (diethylene triamine pentaacetic acid 0.005 mol L^{-1} + $CaCl_2$ 0.01 mol L^{-1} + triethanolamine 0.1 mol L^{-1}) and measured by atomic absorption.

For the determination of total metals Mn, Cu and Zn, 1 g of wet material, was digested at 350 ^{0}C + 10 ml HNO_3 + 5 ml $HClO_4$. According to the method described by (Allen et al. 1974, Varian 1989), the samples were analyzed by Atomic Absorption (Spectroscopy Varian Spectra AA 10 plus, Victoria, Australia), with the use of flame and air-acetylene mixture.

The experiment was repeated and the completely randomized design with four replications was used. Tukey's procedures were used to detect and separate the mean treatment differences at P = 0.05. Statistical analyses were performed by the statistical program MINITAB (Ryan et al. 2005).

Table 1

Chemical properties of soil samples, manure and biogas wastewater

Property	Soil	Manure	Biogas wastewater (wet basis)
Texture	Sandy Loam		-
pH	7.83 ± 0.03 (1part soil:5parts H_2O)	7.144 ± 0.02	7.43 ± 0.19 (raw waste)
Electrical conductivity, extract (dS m^{-1})	0.28 ± 0.04 (1part soil : 5 parts H_2O)	0.77 ± 0.04	19.62 ± 0.98 (raw waste)
Organic matter (%)	0.57 ± 0.04	49.06 ± 1.45	0.59 ± 0.03
$CaCO_3$ (%)	8.60 ± 0.39	-	-
N -total (g kg^{-1})	1.54 ± 0.11	22.25 ± 1.1	1.49 ± 0.08
N-NH_4^+ (mg kg^{-1})	27.7 ± 2.88	-	-
N-NO_3^- (mg kg^{-1})	99.1 ± 10.90	-	-
Exchangeable-K (mg kg^{-1})	276.9 ± 12.1	-	-
K-Total (g kg^{-1})	5.3 ± 0.24	20.33 ± 1.0	0.384 ± 0.02
Exchangeable-Na (mg kg^{-1})	211.6 ± 11.67	-	-
Na-Total (g kg^{-1})	0.62 ± 0.04	10.18 ± 0.50	1.64 ±0.09
CEC (cmol kg^{-1})	20.6 ± 1.19	-	-
P –Olsen (mg kg^{-1})	11.2 ± 2.56	-	-
P-organic (mg kg^{-1})	53.2 ± 2.84	-	-
P -Total (g kg^{-1})	0.25 ± 0.02	7.42 ± 0.36	0.39 ± 0.02
Cu –DTPA (mg kg^{-1})	0.98 ± 0.09	-	-
Zn -DTPA (mg kg^{-1})	0.42 ± 0.02	-	-
Mn -DTPA (mg kg^{-1})	5.41 ± 0.78	-	-
Cu –Total (mg kg^{-1})	67.4 ± 3.41	76.2 ± 0.08	0.72 ± 0.04
Zn -Total (mg kg^{-1})	67.1 ± 3.28	246.0 ± 0.26	2.73 ± 0.14
Mn -Total (mg kg^{-1})	595.1 ± 36.75	307.6 ± 0.31	0.95 ± 0.05
Moisture (%)			98.66

Data represent average means and SD standard deviation (n = 4, number samples)

RESULTS AND DISCUSSIONS

The results of the laboratory experiment (Figure 1) after the end of incubation period, showed that in the soil and manure samples that modified by liquid waste, the organic matter suffered increased biodegradation relative to the control, only in the treatment where the lower rate of waste was applied while in the other treatments the organic matter did not show statistically significant differences compared to the control (soil and manure).

Increasing salinity and pH revealed when the two higher rates of waste were applied, while the addition of the lower rate showed no change in salinity and pH of the control. The increase in exchangeable Na did not cause any sodification hazard in soil. Assimilable forms P, and K were increased in all treatments with waste addition, while organic P was decreased in the respective treatments compared to the control.

By applying the biogas liquid waste in the soil after the end of the incubation period, the composition of N-NO_3^- was decreased relative to the control for the three rates of waste, with the lower reduction however to be observed in the application of the lower rate of waste. The composition of N-NH_4^+ was increased compared to the control when the lower rate of waste applied, while the two higher doses of waste application N-NH_4^+ did not show statistically significant differences compared to the control.

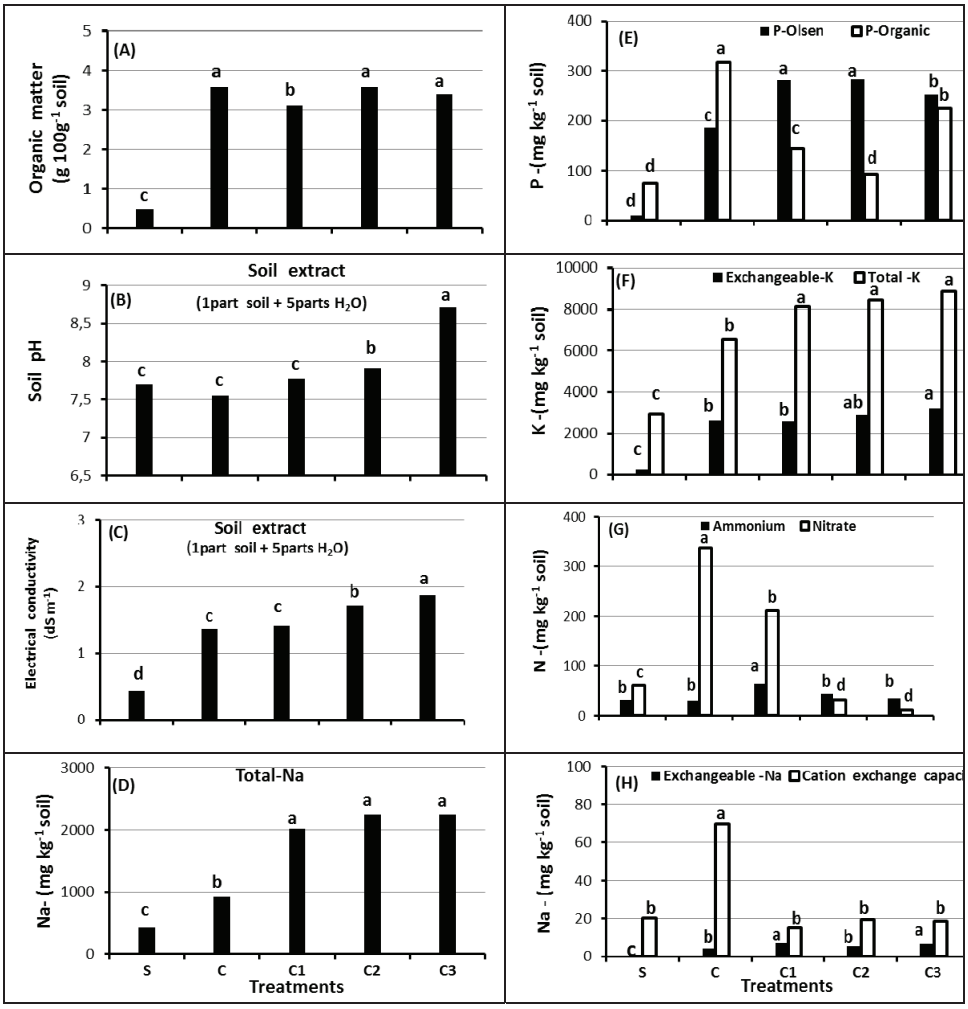

Figure 1. Effect of biogas wastewater added rates on (A) soil organic matter; (B) soil pH; (C) soil extract electrical conductivity;(D) total Na; (E) organic P and available; (F) available K and total K; (G) mineral forms of N: ammonium and nitrate; (H) exchangeable Na and cation exchange capacity. Columns in each characteristic of each graph with the same letter do not differ significantly according to the Tukey's test (P=0.05).S, soil; C, control (soil plus manure); C1, C2 or C3 biogas wastewater 10, 20, 30 ml per 50 g soil, respectively.

The concentrations of assimilable forms of Cu and Mn were increased significantly, and even the higher was the addition of liquid waste to the control the higher was the increase, while assimilable Zn showed the same degree of increase in all treatments were waste added. Moreover, with the addition of liquid waste to the control after the end of the incubation period, the total concentrations of Na, K and Mn were increased in all waste application treatments. Finally, the total concentrations of Cu and Zn did not show statistically significant differences compared to the control.

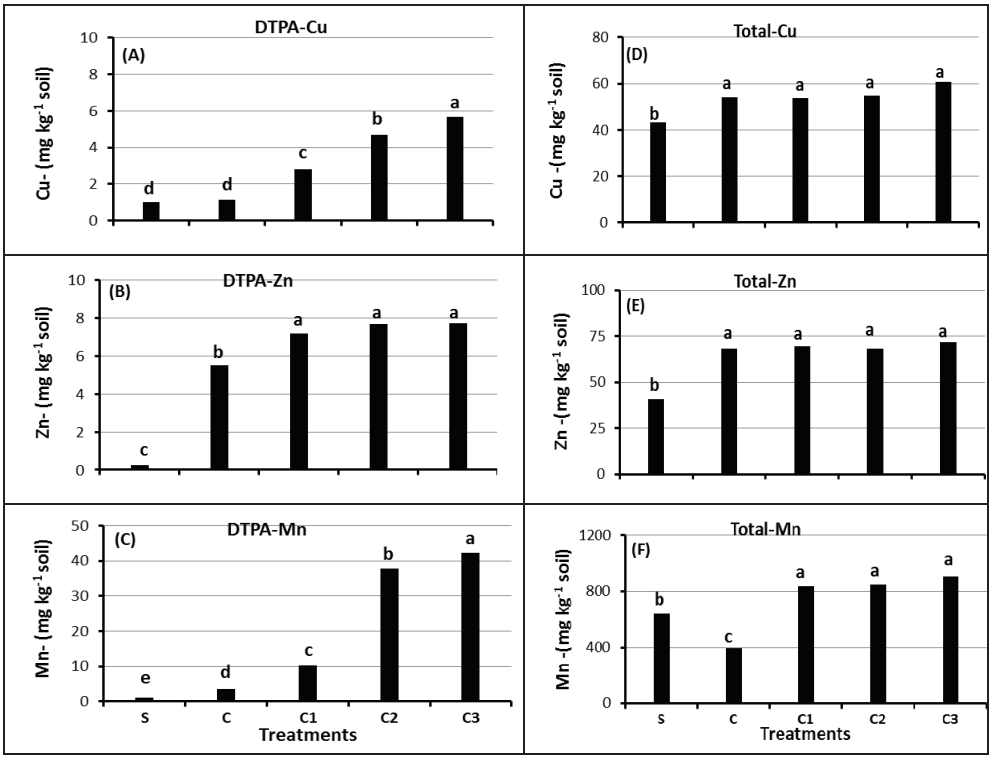

Figure 2. Effect of biogas wastewater added rates on (A) available Cu; (B) available Zn; (C) available Mn; D) total Cu; (E) total Zn; (F) total Mn. Columns in each characteristic of each graph with the same letter do not differ significantly according to the Tukey's test (P=0.05).S, soil; C, control (soil plus manure); C1, C2 or C3 biogas wastewater 10, 20, 30 ml per 50 g soil, respectively.

CONCLUSIONS

The results of this study showed that the addition of biogas production liquid waste on soil in the presence of manure, influenced indirectly but importantly the chemical soil properties while the waste addition increased the available forms of P, Cu, Zn and Mn in the soil after a long incubation period. Instead, the available forms of $N\text{-}NO_3$ were decreased, while in general there were no changes on assimilable forms of K and $N\text{-}NH_4^+$. The pH and the electrical conductivity increased by the addition of the two higher doses, but the lower dose of waste did not significantly affect the pH and the electrical conductivity of the soil compared to the control.

Also, this study shows that the addition of biogas liquid waste with the lower dose (10 ml) enhanced the mineralisation of soil organic matter as amended with the addition of manure, while after the addition of two higher doses, the organic matter did not show statistically significant differences compared to the control.

These results confirm that biogas production liquid waste, particularly in small amounts, in combination with an organic fertilizer is a valuable ingredient for composting products.

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EVALUATION OF CERTAIN QUALITATIVE AND QUANTITATIVE CHARACTERISTICS OF HYDROPONIC TOMATO GROWN TO A GEOTHERMAL AND A CONVENTIONAL GREENHOUSE

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Keywords: *antioxidant activity FRAP; hydroponic systems; tomato; total phenolics*

ABSTRACT

In this paper for two consecutive hydroponic tomato crop seasons a comparison was made between two different closed type greenhouses (a conventional and a geothermal) in certain qualitative and quantitative characteristics of tomato. The results showed that in the first growing season the content of total phenols was higher in the geothermal greenhouse compared to the conventional giving values of 324.5 μg/g fresh weight and 179 μg/g f.w., respectively. The antioxidant capacity FRAP, the total soluble solids and pH showed no statistical differences in relation to the type of greenhouse. Conversely the total acidity of the tomato juice was higher in the conventional greenhouse compared to the geothermal, with values of 0.44 and 0.36 g of citric acid/100 ml of juice, respectively. During the second growing season all the qualitative and quantitative characteristics examined showed no statistical differences in relation to the type of greenhouse.

INTRODUCTION

Greenhouses are one of the largest low-enthalpy energy consumers in agriculture. In an efficient soilless cultivation (hydroponics), the plants are free from diseases, and grow faster than in the soil. The development of today's hydroponic growing systems (Azad et al. 2013, Buwalda et al. 2013, Gougoulias et al. 2015), is based on modern distribution systems of nutrient solution (Inden et al. 2004, Bissonnette et al. 2012, Domingues et al. 2012). Geothermal energy is derived by absorption of solar radiation, is stored from the earth's surface up to depth 200 m with a temperature of 10-18 °C. Geothermal energy provides economic benefits, while contributes to a reduction of greenhouse gases (Popovski 1998, Bloomfield et al. 2003). The environmental thermal energy is used by heat pumps, which are now an important tool for energy savings and reduction of polluting fuels (Papageorgakis 1992, Papaioannou et al. 2013).

Tomato consists a natural reservoir for nutrients such as folate, vitamin C, and potassium, carotenoids and phenolics (Preedy & Watson 2008, Fraga 2010, Gougoulias et al. 2012).

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Furthermore, tomato cultural techniques and cropping systems always affect the levels of antioxidant content (Benton 2008).

The purpose of this study was to compare the geothermal greenhouse with the conventional in terms of productivity and some qualitative and quantitative characteristics of hydroponic tomato.

MATERIALS AND METHODS

Greenhouse facilities. The experiment was conducted in two greenhouses of Technological Educational Institute of Thessaly. The greenhouse (A), closed type to the system water recycling, be based on shallow geothermal energy and the greenhouse (B), conventional.

The energy requirements of the geothermal greenhouse for cooling, heating and converting the water vapor into water, covered by closed circuit exchangers (Photo:1) that are constructed adjacent to the greenhouses at a depth of 100 meters.

The geothermal greenhouse, for dehumidifying the air and for the water collection has a special metallic conduit that recycles part of the air in the greenhouse environment (Photo: 2), the remaining ventilation systems in both greenhouses are identical, as well as dimensions and cover materials.

Photo: 1. The ground heat exchangers

Photo: 2. The air dehumidification system

For the air conditioning of greenhouses there is the optimal heating and cooling system with both heat pumps (Photo: 3). The overall flow of water with in the greenhouse is controlled by modern automation which continuously adjusts the flow in the system.

Crop: In an area of 100 m^2 for each greenhouse, was cultivated tomato variety merilia for two consecutive seasons. The duration of the first growing season was from 21-10-2014 to 21-01-2015, while of the second growing season was from 05-03-2015 to 17-06-2015. Substrate stone wool slabs, were placed in double rows, with a distance of plants in each slab of 30 cm. While, secondary pipes were placed in a specially designed table, in order to reduce heat loss to the environment and to heat the plants in the root zone (photo: 4). The crop was fertilized through a stably chemical nutritive solution at the rates of 58.9 ml/min for 3 minutes, repetitively 4 times a day. The nutritive solution consisted of Ca^{++} = 169meq/L, K^{+} = 253.4 meq/L, Mg^{++} = 64.8meq/L, NH_4^{+} = 18.3 meq/L, H^{+} = 112meq/L, Fe^{++} = 0.6 meq/L, NO_3^{-} = 281.3meq/L, PO_4^{---} = 143.3 meq/L and SO_4^{--} = 193.5 meq/L, while, its pH was about 6 and electrical conductivity EC about 2 dS m^{-1}.

Eight plants of each greenhouse were selected for measurements. The four of those were always the same, while the other four were selected randomly. The width and the height of plants, the number of leaves and inflorescences were measured once per week.

Extract preparation: For phenols determination, 80% v/v of methanol was added in test tubes which contained 10g of fruit sample. Test tubes were kept for 1 h in dark at room

temperature. After centrifugation the extracts were brought to 20 ml with aqueous methanol and used for further chemical analysis (Kanner et al. 1994).

Photo: 3. Heat pump

Photo: 4. Placement of the secondary tubes

Total phenols (TP) content were determined with the Folin-Ciocalteu reagent according to the method of (Singleton & Rossi 1965) and were expressed as gallic acid equivalent (GAE) in μg/g fresh weight. The ferric reducing antioxidant power (FRAP) of the methanol extracts was evaluated according to the method of (Benzie & Strain 1999) and was expressed as ascorbic acid equivalent (AA) in μM /g fresh weight.

The pH, the Brix degrees and the total acidity were measured in fruit juice. The Brix degrees by a Zeiss refractometer while the total acidity by titration with 0.1N NaOH solution and expressed in g of citric acid/100 ml juice.

Statistical analysis. The experiment was completely randomized with four replications. Data analysis was made using the MINITAB statistical package. Analysis of variance was used to assess treatment effects. Mean separation was made using Fisher's test when significant differences between treatments were found (Ryan et al. 2005).

RESULTS AND DISCUSSIONS

From the measurements (every seven days) of the morphological characteristics of tomato plants throughout the duration of the first and second growing season, the average height of the plant, the average thickness, the average number of inflorescences and the average number of leaves of plants showed no difference in relation to the type of greenhouse ($p>0.05$). On the second growing season, a larger number of leaves was observed compared with the first growing period, regardless of the type of greenhouse ($p<0.05$). Also, on the second growing season a higher average plant height was observed relative to the first cultivation, regardless of the type of greenhouse ($p<0.05$). Table presents the results of the morphological characteristics of tomato plants at the end of the first season (day 90) and at the end of the second season (day 102).

On the first crop growing season of hydroponic tomatoes in the geothermal greenhouse the average weight of the fruit was 238 g with the total output of 135 tons/ha, while in the conventional greenhouse the average weight of the fruit was 208 g with a total production of 117.9 tons/ha. In the second growing season, in the geothermal greenhouse the average weight of the fruit was 250 g with a total production of 120 tons/ha, while in conventional greenhouse the average weight of the fruit was 230 g and the total production 104 tons/ha.

The monitoring of water by the use of water meters during the two growing seasons revealed that the water consumption in the geothermal greenhouse was 10 % less compared with conventional greenhouse.

In the first crop season and during the fruit maturity, the level of total phenols in tomato of geothermal greenhouse was higher than that of the conventional one while in the second season the content of total phenols in tomato did not show any statistical variation between the two greenhouses (Fig. 1).

Table 1

Morphological characteristics of tomato plants at the end of the first and second growing seasons for the conventional and the geothermal greenhouse

	First crop season (90^{th} day)		Second crop season (102^{nd} day)	
	Conventional greenhouse	Geothermal greenhouse	Conventional greenhouse	Geothermal greenhouse
Mean plant height (cm)	160.5b	168.4b	279.5a	273.4a
Mean plant width (mm)	13.4a	15.5a	16.0a	16.0a
Mean number of leaves	14.6b	14.16b	26a	26a
Mean number inflorescences	6b	7b	10a	9a

Mean separation was made using Fisher's test when significant differences between greenhouses were found (P=0.05)

Moreover, a higher content of total phenols was observed in the first season tomatoes compared with tomatoes of the second season likely due to illness. The antioxidant capacity FRAP of hydroponic tomato shows no change with respect to the type of greenhouse, whereas the antioxidant capacity FRAP of hydroponic tomato was slightly higher in the second growing period than the first.

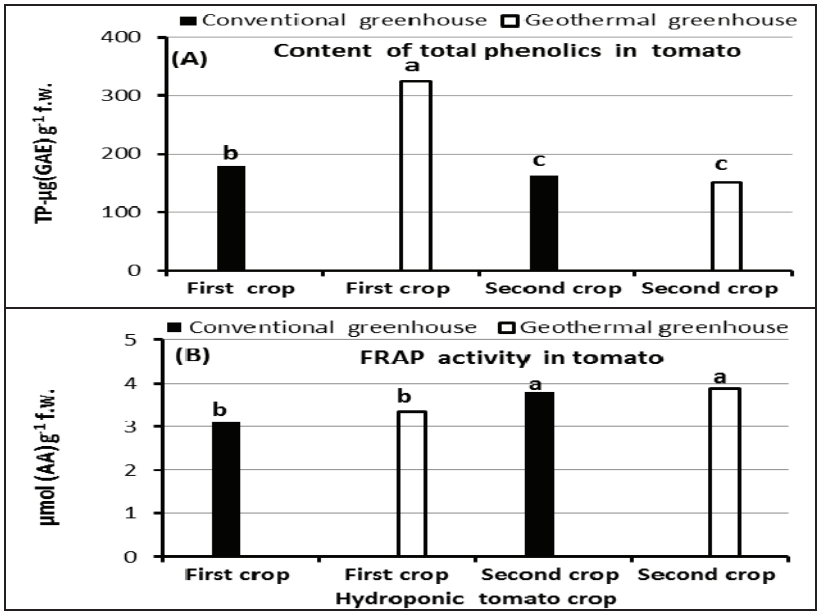

Figure 1. Total phenolic content (A) and antioxidant activity FRAP (B) of tomato fruit cropped in geothermal and conventional greenhouse, for two seasons at the stage of ripening. The letter above each bar gives differences between treatments according to Fisher's test (P=0.05).

Figure 2 presents some basic qualitative characteristics of tomato fruit during the ripening stage. The results dealing with tomato juice show that the total acidity in the first growing season is higher for juice of tomato cropped in the conventional greenhouse compared with the geothermal greenhouse while at the second growing period there were no statistical differences in the total acidity in the two types of greenhouses. The Brix

degrees instead showed no variation with respect to the growing season and the type of greenhouse.

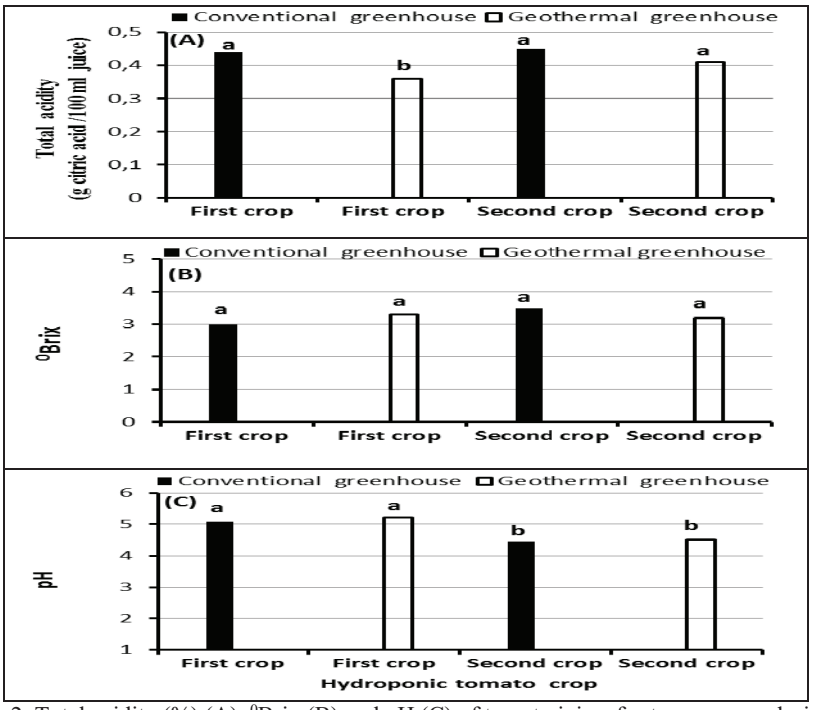

Figure 2. Total acidity (%) (A), ^{0}Brix (B) and pH (C) of tomato juice, for two seasons during the ripening stage in geothermal and conventional greenhouses. The letter above each bar gives differences between treatments according to Fisher's test (P=0.05).

CONCLUSIONS

The results show that during the first growing season of hydroponic tomato, the content of total phenols was higher in the geothermal greenhouse than in the conventional one. Conversely total acidity of the tomato juice was higher in the conventional greenhouse compared to the geothermal. Moreover, the pH, the Brix degrees and the antioxidant capacity FRAP showed no statistical differences between the two types of greenhouses. For the second growing season the content of total phenols, the antioxidant capacity FRAP, the total acidity and soluble solids (^{o}Brix), showed no statistical differences between the two greenhouses.

The tomato yield of the first growing season was 12.5% higher in the geothermal greenhouse compared with the conventional, while on the second growing period was 13.3 % higher in the geothermal greenhouse compared with the conventional. In addition, there was a 10 % of water savings in the geothermal greenhouse compared with the conventional one, during the two growing seasons.

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EFFECT OF DIFFERENT CULTIVATION PRACTICES ON SOIL ORGANIC MATTER AND ON YIELD OF ENERGY CROPS, UNDER THE ENVIRONMENTAL CONDITIONS OF THESSALY REGION (PRELIMINARY RESULTS)

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Keywords: *energy crops; chemical properties; organic matter; soil tillage*

ABSTRACT

In the present work it was studied the effect of five soil treatments (conventional, reduced treatment using a heavy cultivator, reduced treatment using rotary cultivator, shallow treatment using disc harrow and no-till) on the yield of two consecutive cultivations of energy crops (Sorghum and a mix of Pisum Sativum and Triticale) and on changes of chemical properties of the soil. The conventional treatment of soil as well as the using disc harrow, showed increased yield of dry biomass of Sorghum Bicolor, while increased yield of the mixture of Pisum Sativum and Triticale was found in all treatments, compared to the rotary cultivator application; the soil organic matter for the depth of (0-15) cm was reduced at the conventional tillage treatment as well for disc harrow treatment, after the end of the crops, by 19% and 18% respectively, while for the next depth (15-30) cm it was increased for the no-till treatment of about 9%.

INTRODUCTION

Energy crops are able to produce biomass, which is used for energy purposes, heat and electricity and for the production of liquid fuels such as bioethanol and biodiesel (Fontarasetal 2012; Koçar & Civaş 2013). Energy crops for burning or for second generation biofuels will use all lignocellulosic material and will leave soils bare under the effects of rain drops leading to increased erosion and reduced soil organic matter.

Some of the energy crops, such as miscanthus, switchgrass and sweet sorghum, give high biomass yield even in infertile soils (Koçar & Civaş 2013). Energy crops, in order to be sustainable, they should have low energy inputs during the production process of dry matter/ha, with high energy value (MJ/kg).

It is widely known that soil treatment affects soil erosion, the decline of organic matter and the soil compaction. Soils exploited with sustainable reduced or no tillage, receive low energy inputs during the production process (Hernanz et al. 2014), increasing the organic matter in the upper layers up to a depth of 15 cm (Salinas-Garcia et al. 2001; Simon et al. 2009) and maintain the organic matter of the deeper layers of a depth up to 30 cm,

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(Gal et al. 2007, Spargo et al. 2008). Soil organic matter affects the soil structure (Reeves 1997), the water holding capacity and nutrients (Larney & Lindwall 1995). According to Bescansa et al., (2006), the water holding capacity has been increased in soils where reduced treatments have been applied.

This study aims to compare five different soil treatments (conventional and reduced) with the efficiency of the cultivation of two consecutive energy crops, in relation to chemical properties change of the soil, under the environmental conditions of Central Greece.

MATERIAL AND METHODS

The experiment took place in Central Greece, in the University of Thessaly Farm, in an area of 2520 m^2, in a Sandy clay loam soil (SCL), during spring (irrigated) and winter (rain fed) rotation of energy crops. *Sorghum Bicolor* (Variety Sisco BMR) was the spring crop. Sowing took place on 05-06-2013 with 3.5 kg *Sorghum Bicolor* seed /ha. Harvesting took place on 23-10-2013. A mix of *Triticale* (Variety Vronti) with *Pisum Sativum* (Variety Dodoni) was the winter crop. Sowing took place on 06-12-2013, with 90 kg *Triticale* seed and 140 kg *Pisum Sativum* seed per hectare respectively, and they were harvested on 06-05-2014.

Five tillage methods were compared in order to rely on the suitability of the crops (*Sorghum Bicolor, Triticale* with *Pisum Sativum*), in terms of biomass production and on the chemical properties of the soil, under the environmental conditions of Central Greece. The conventional treatment (C) included plowing in depth (25-30) cm, while the sowing bed was prepared with the use of a disc harrow; reduced treatments with the use of a heavy cultivator (H), included a pass in depth (20-25) cm and the preparation of the sowing bed was done with a disc harrow; reduced treatment with the use of a rotary cultivator (R) contained a passage to a depth of (12-15) cm while the preparation of the sowing bed was done once again with the disc harrow; reduced treatment concerned also the use of a harrow (shallow treatment) (D) and no-till (W), including the direct sowing on the rough surface with the use of conventional seeders and the removal of plant residues from the soil surface. Furthermore the germinated weeds were destroyed with the application of glyphosate, shortly before or immediately after sowing. The experimental design was completely randomized blocks with five treatments and four replications, each experimental unit had area 126m^2.

The experimental field of Thessaly University, during the previous year, before the cultivation of Sorghum, was cultivated with a mixture of *Avena Sativa* and *Vicia Sativa*, following the same cultivation practices in the same experimental plots.

For the cultivation of *Sorghum Bicolor,* 202 kg nitrogen, 34 kg phosphorus and 54 kg potassium per hectare were added. Six irrigation water applications were done during the cultivation period with a total of 6530 m^3 of water / hectare. For the winter cultivation (mixture of *Triticale* with *Pisum Sativum*) irrigation was **not** applied, whilst it was fertilized by adding only 64.6 kg phosphorus and 64.6 kg potassium per hectare.

Methods of analyses: Soil samples from each plot were taken. The chemical analyses were performed in soil samples of (0-15) cm and (15-30) cm deep, in the Soil Science Laboratory to the Technological Educational Institute of Thessaly. Samples were analyzed using the following methods which are referred by Hesse et al., (1972) and Page et al., (1982):

Organic matter was analyzed by chemical oxidation with 1 mol L^{-1} $K_2Cr_2O_7$ and titration of the remaining reagent with 0.5 mol L^{-1} $FeSO_4$.

Available P forms (Olsen P) was extracted with 0.5 mol L^{-1} $NaHCO_3$ and measured by spectroscopy.

Exchangeable forms of potassium were extracted with 1 mol L^{-1} CH_3COONH_4 and measured by flame Photometer (Essex, UK).

Available forms of Mn, Zn, and Cu were extracted with DTPA (diethylene triamine pentaacetic acid 0.005 mol L^{-1} + $CaCl_2$ 0.01 mol L^{-1} + triethanolamine 0.1 mol L^{-1}) and measured by atomic absorption (Spectroscopy Varian Spectra AA 10 plus, Victoria, Australia), with the use of flame and air-acetylene mixture, according to the method described by Varian (1989).

Data analysis was made using the MINITAB (Ryan et al. 2005) statistical package. Analysis of variance was used to assess treatment effects. Mean separation was made using Tukey's test when significant differences (P=0.05) between treatments were found.

RESULTS AND DISCUSSIONS

Figures 1 and 2 show the chemical properties of the soil of each treatment for the depths of (0-15) cm and (15-30) cm, before the application of the *Sorghum Bicolor* cultivation and after the harvest of the mixture of *Pisum Sativum* with *Triticale*; given data are preliminary, concerning 1 year of experiment. The experiment will be continued for further three years with successive crops, in order to obtain more reliable conclusions, concerning the effect of these five treatments on soil and namely in the evolution of organic matter.

For the soil depth (0-15) cm, in the conventional tillage the soil organic matter after harvesting the winter crops in relation to the soil organic matter before the sowing of the spring crops, was reduced from 2.54% to 2.04% ($p>0.05$). Similarly in the disc harrow treatment soil organic matter was reduced from 2.65% to 2.16% ($p>0.05$). While the tillage methods applied with the use of a rotary cultivator, a heavy cultivator and no-till, the soil organic matter after the harvest of the winter crops in relation to the soil organic matter before the sowing of the spring crops, did not show statistically significant differences ($p>0.05$), for the corresponding treatment. However, for depth (15-30) cm in the treatment of no-till, the soil organic matter presented an increase from 1.66 (%) to 1.82(%) ($p<0.05$), while with the use of conventional tillage, of rotary cultivator, of heavy cultivator and disc harrow, the soil organic matter did not present statistically significant differences ($p>0.05$).

The available P in each treatment, before the start and after harvesting of the crops, showed no statistically significant differences, regardless of the treatment and the soil depth ($p>0.05$). On the contrary, the available forms of K, Cu, Zn and Mn in each treatment, increased after the harvest of the second crop, compared to the initial values of the corresponding treatments ($p<0.05$), due to the bio mineralization of the organic matter and then addition of fertilizers with potassium.

Regarding the crop yield of *Sorghum bicolor* in dry biomass (Fig.3), the results showed that higher yields were observed in the conventional soil treatment, and the disc harrow treatment, which probably is linked to the biodegradation of organic matter, enriching the soil with nutrients, useful for the growth of *Sorghum bicolor* crop. On the contrary, lower yields in dry biomass, were discovered after the use of rotary and heavy cultivator.

The yield of the mixture *Triticale* with *Pisum Sativum* in dry biomass, showed no statistically significant differences, in relation to soil treatments (conventional tillage, disc harrow, heavy cultivator and no-till). Only plots with rotary cultivator gave the lowest dry biomass yield. Furthermore, it is important to note that, there is no reduced soil treatment, with higher dry biomass yield, than conventional for both crops.

CONCLUSIONS

The obtained data show, after two consecutive crops with five different soil cultivation practices, that soil organic matter in (0-15) cm, at the beginning and at the end of the cropping year was reduced when the conventional treatment and the disc harrow treatment were applied, while with the application of rotary cultivators and heavy cultivator, no statistically significant differences were observed; the lower organic matter could be correlated to more efficient incorporation and mineralization of organic amounts. For the soil depth (15-30) cm, the organic matter didn't show statistically significant differences for all soil treatments, with the exception of no-till, where a slight increase was observed. As far as it concerns yields of dry biomass, crops with *Sorghum bicolor* and mixture of *Triticale* with *Pisum sativum,* showed that the use of rotary cultivator, yielded lower dry biomass/ha, for both crops. The conventional tillage and the disc harrow tillage gave higher yield of Sorghum in comparison to the rotary and heavy cultivator.

The experiment will continue for three years more, in order to obtain reliable conclusions, of the effects of treatments of the soil, on the evolution of organic matter and of the efficiency of used energy crops.

ACKNOWLEDGMENT

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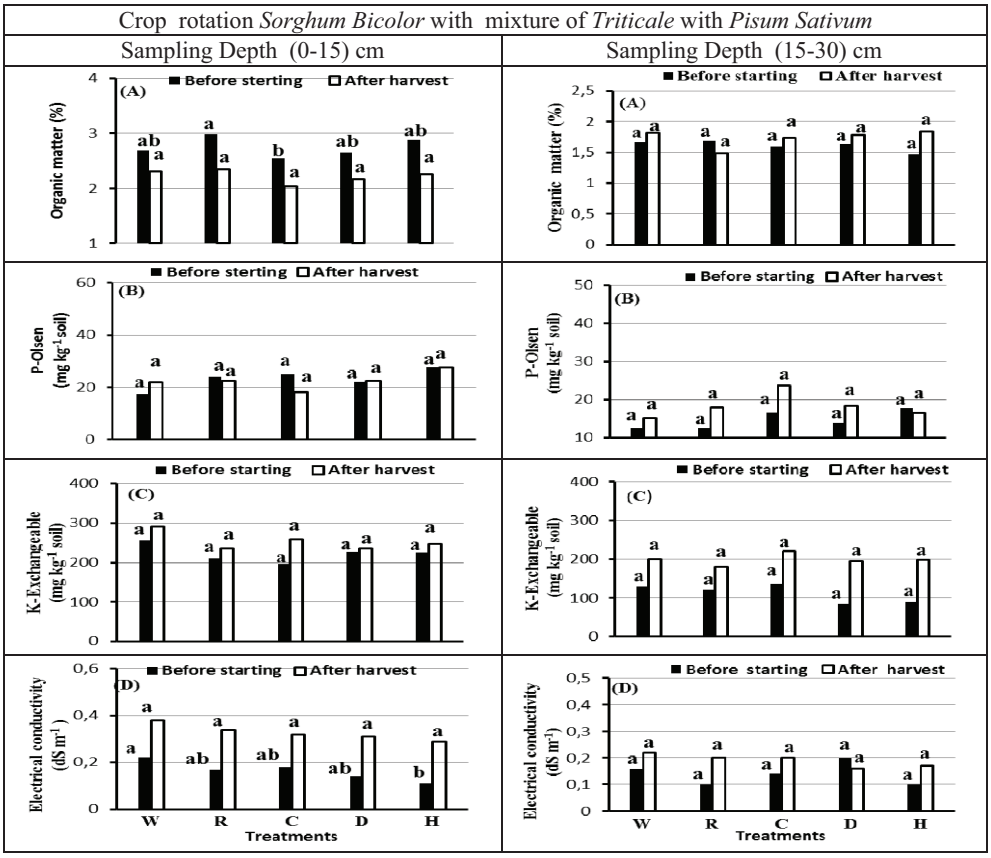

Figure 1. Soil chemical properties depth sampling (0-15) cm and (15-30) cm before the start crop and after harvest on (A) soil organic matter; (B) soil P-Olsen; (C) soil K-exchangeable; (D) extract electrical conductivity (1 soil + 5 H_2O). Columns in each graph with the same letter do not differ significantly according to the Tukey's test (P=0.05). W, without cultivation (no-till); R, Rotary cultivators; C, conventional tillage; D, Disc harrow; or H, heavy cultivator.

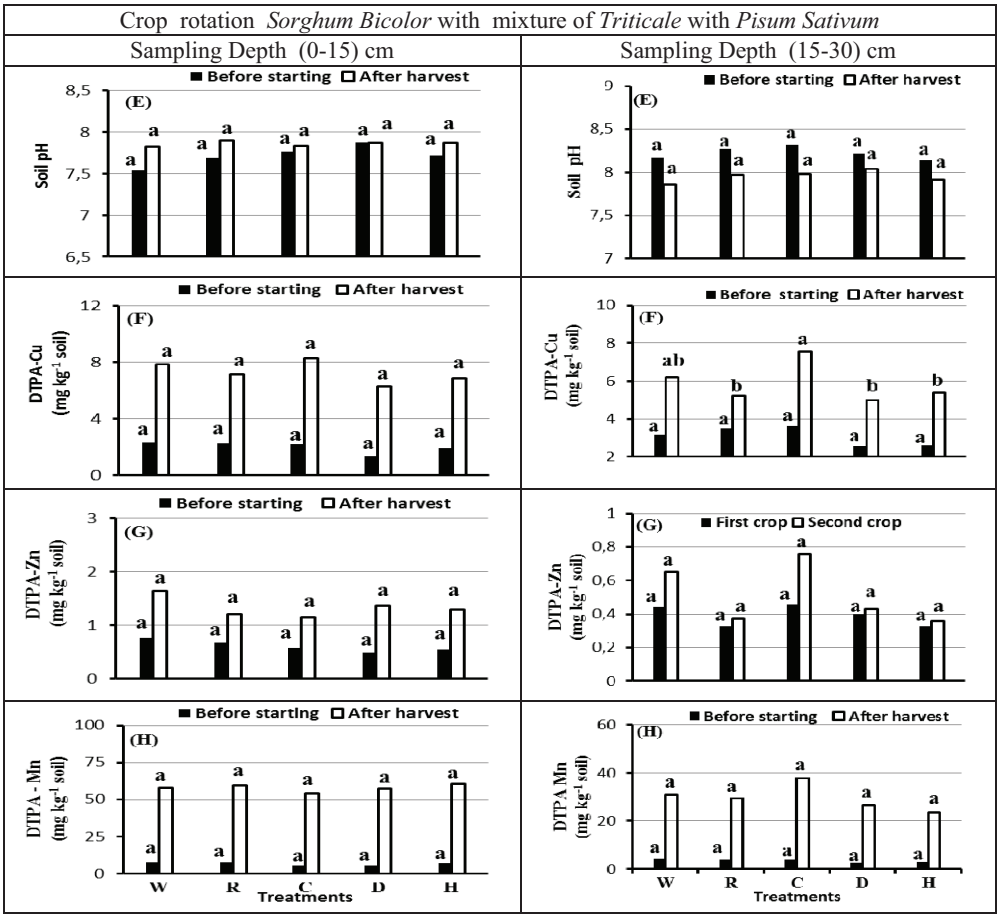

Figure 2. Soil chemical properties depth sampling (0-15) cm and (15-30) cm before the start crop and after harvest on (E) soil pH; (F) soil Cu-DTPA; (G) soil Zn-DTPA; (H) soil Cu-DTPA. Columns in each graph with the same letter do not differ significantly according to the Tukey's test (P=0.05). W, without cultivation (no-till); R, Rotary cultivators; C, conventional tillage; D, Disc harrow; or H, heavy cultivator.

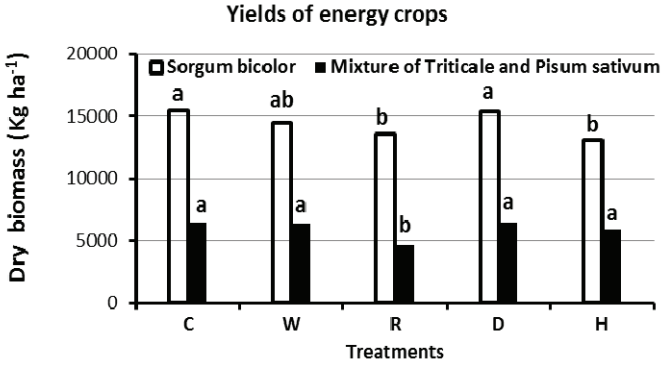

Figure 3. Effect of different treatment methods on yield dry biomass of the energy crops (*Sorghum bicolor* and mixture of *Triticale* with *Pisum Sativum*). Columns in each graph with the same letter do not differ significantly according to the Fisher's test (P=0.05). C,conventional tillage; W, without cultivation (no-till); R, Rotary cultivators; D, Disc harrow; or H, heavy cultivator.

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PRODUCTIVITY OF NON-IRRIGATED ENERGY CULTIVATION OF *PISUM SATIVUM,* WITH RESPECT TO THE SOIL CHEMICAL PROPERTIES AND TREATMENT, UNDER ENVIRONMENTAL CONDITIONS OF THESSALY (PRELIMINARY DATA)

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Keywords: *non-irrigated crop; nutrient elements uptake; pisum sativum; chemical properties; soil tillage*

ABSTRACT

In the present work five soil tillage methods were compared. Yield of non-irrigated cultivation Pisum Sativum and the effect to the chemical properties of soil are reported. Conventional tillage was compared to, no-till, reduced treatment with heavy cultivator, rotary cultivator and disc harrow. The dry biomass yield of Pisum Sativum was not affected by the tillage method. Soil analyses indicated that Pisum Sativum crop under non-irrigated conditions, for all types of soil tillage tested, had high demands in available K and low demands in available P for its nutrition; the amounts of Potassium up taken range from (172.1 to 286.0) kg/ha and for P from (8.1 to 49.8) kg/ha for soil depth (0-15) cm.

INTRODUCTION

In order to deal with the global warming the use of renewable energy sources is needed. Biomass is a form of renewable energy that is widely used (Fontaras et al. 2012, Gissén et al. 2014). Of the total energy produced from biomass, energy crops at the moment account for a relatively small rate. The form of energy that is required determines the type of biomass used.

It is of great importance the right choice of cropping practices of different energy crops as regards their efficiency and adaptability to soil and climatic conditions, and the appropriate decisions, such as the period of sowing and the harvest, the fertilization rates, the quantity of the irrigation water and the planting distances. The energy crops produce biomass, with minimal risk of negative (adverse) environmental effects (González-García et al. 2013; Gissén et al. 2014).

An energy crop in order to be efficient, needs low energy inputs during the production process, high net energy output and the lowest possible inputs of fertilizers and agrochemicals (pesticides). Reduced tillage and no-till are low energy input practices

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(Hernanz et al. 2014), reduce soil erosion and increase soil fertility (Küstermann et al. 2013). Deep soil disturbance increases soil erosion, reduces soil organic matter and alleviates soil compaction.

This study aims to evaluate the performance of non-irrigated annual energy crop *Pisum Sativum*, and the effects to the chemical properties of soil under five tillage treatments in the environmental conditions of Thessaly.

MATERIAL AND METHODS

The experiment took place in Central Greece, at the University of Thessaly Farm. The non-irrigated energy crop Peas (*Pisum Sativum*) variety Dodoni, in an area of 2520 m^2, in a Sandy clay loam soil (SCL). Sowing took place on 01-09-2013 with 140 kg *Pisum Sativum* seed /ha. Harvesting took place on 05-03-2014. 64.6 kg phosphorus (P_2O_5) and 64.6 kg potassium (K_2O) per hectare were added.

Five different soil treatments were applied in the experiment held. Conventional tillage (C) using plowing at depth (25-30) cm and preparation of the seed bed with disc harrow. Reduced tillage using a heavy cultivator (H) at depth (20-25) cm, Reduced tillage with the use of rotary cultivator (R) at depth (12-15) cm, Reduced tillage with the use of harrow (shallow treatment) (D) and no-till (W) by direct seeding in the sod soil surface. Sowing was carried out by conventional seeders and no till by a no till drilling machine. In all plots all plant residues were removed from the field. In the no till plots, the germinated weeds were destroyed by the application of glyphosate just before the seeding process. In the previous year, before the cultivation of *Pisum Sativum*, was cultivated with *Brassica napus*, following the same cultivation practices at the same experimental plots.

The experimental design was completely randomized blocks with five treatments and four replications. Each experimental block had an area of 126 m^2. Data analysis was made using the MINITAB (Ryan et al. 2005) statistical package. Mean separation was made using Tukey's test when significant differences (P=0.05) between treatments were found.

Soil samples from each plot were taken before the sowing of the crop and immediately after the harvest. The chemical analyses were performed, in the Soil Science Laboratory to the Technological Educational Institute of Thessaly. Samples were analyzed using the following methods which are referred by Hesse et al., (1972) and Page et al., (1982):

Organic matter was analyzed by chemical oxidation with 1 mol L^{-1} $K_2Cr_2O_7$ and titration of the remaining reagent with 0.5 mol L^{-1} $FeSO_4$. Available P forms (Olsen P) was extracted with 0.5 mol L^{-1} $NaHCO_3$ and measured by spectroscopy. Exchangeable forms of potassium ware extracted with 1 mol L^{-1} CH_3COONH_4 and measured by flame Photometer (Essex, UK). Available forms of Mn, Zn, and Cu were extracted with DTPA (diethylene triamine pentaacetic acid 0.005 mol L^{-1} + $CaCl_2$ 0.01 mol L^{-1} + triethanolamine 0.1 mol L^{-1}) and measured by atomic absorption (Spectroscopy Varian Spectra AA 10 plus, Victoria, Australia), with the use of flame and air-acetylene mixture, according to the method described by Varian (1989).

RESULTS AND DISCUSSIONS

Figures 1 and 2 show the chemical properties of the soil prior the sowing of *Pisum Sativum* and after harvesting for the two depths, and for the different soil tillage treatments; the concentrations of soil organic matter and the available forms of P, K, Cu, Zn and Mn before the crop establishment for each type of soil treatments, did not show statistically

significant differences, for soil depth of (0-15) cm; the concentrations of each element and soil organic matter after the harvest of the crop for each type of soil treatments, did not show statistically significant differences, also for soil depth of (0-15) cm; the same conclusion applies for the soil depth of (15-30) cm.

Comparing the organic matter of every soil treatment before the sowing of the crop, with the organic matter of the same soil treatment after the harvest of the crop, for the depth (0-15) cm, it arises that with the use of the rotary cultivator, the soil organic matter decreased from 2.74% to 1.80%, while with the use of the heavy cultivator, the soil organic matter decreased from 2.53% to 1.71% ($p<0.05$). The reduction of soil organic matter for the depth (0-15) cm, in the treatments where the rotary cultivator and the heavy cultivator were used, is due to the creation of conditions increased biodegradation, resulting the biodegradation to prevail compared to the incorporation of plant residues in the soil.

For soil depth (15-30) cm, the soil organic matter with the use of the disc harrow decreased from 1.67% to 1.11%, with the use of the heavy cultivator decreased from 1.59% to 1.32%, while with the use of conventional tillage decreased from 1.77 % to 1.33% ($p<0.05$). The reduction of soil organic matter for the depth (15-30) cm, in the treatment where the disc harrow was used is due to the degradation caused by the influence of the soil microorganisms, while where the heavy cultivator was applied and the conventional tillage, it is due to the creation of conditions of high biodegradation, resulting the biodegradation to prevails compared to the incorporation of plant residues in the soil.

For the other soil treatments, the soil organic matter does not show statistically significant differences ($p>0.05$). The same experiment will be continued for three more years, in order to obtain safer and more reliable conclusions, for the evolution of soil organic matter.

For the soil depth (0-15) cm, the content of exchangeable K after the harvest of the crop for the same soil treatment, relative to the content of exchangeable K before sowing, decreased only in the soil treatment where heavy cultivator was used, from 352.3 mg/kg to 264.8 mg/kg ($p<0.05$). Also, the available Cu in soil treatments, where heavy cultivator and disc harrow were used, decreased from (2.37 and 2.80) mg/kg respectively, to (1.6 and 1.81) mg/kg respectively ($p<0.05$). The available Zn in the soil treatments, where the rotary cultivator, the disc harrow and the conventional tillage were used, decreased from (1.03, 0.82, 0.91) mg/kg respectively, to (0.54, 0.44, 0.43) mg/kg respectively; the content of available Mn forms, after the harvest crop relative to the content of available Mn before sowing for the same soil treatment, decreased with the use of all soil treatments ($p<0.05$). The available forms of P on the same soil treatment, before the sowing and after the harvest of the crop, do not show statistically significant differences ($p>0.05$).

Regarding the soil depth (15-30) cm, the available forms of P, Zn and Mn showed no statistical differences, before the start of the cultivation and after the harvest, for the same soil treatments ($p>0.05$). The available Cu increased in the treatments, where rotary cultivator and heavy cultivator were used, from (1.07 and 1.07) mg/kg respectively, to (2.22 and 2.01) mg/kg respectively ($p<0.05$), while in the other soil treatments, no statistically significant differences were observed ($p>0.05$). Finally, the exchangeable K decreased in all treatments of the soil, no-till, rotary cultivator, disc harrow, heavy cultivator and conventional tillage, from (260.0, 258.7, 263.9, 263.9, 296,4) mg/kg respectively, to (175.9, 153.5, 156.7, 159.9, 223.9) mg/kg respectively ($p<0.05$).

From the concentrations of the assimilable forms of P and K of Table 1, for the soil depth (0-15) cm with bulk density ($d=1.4$ g/cm^3), arises clearly the availability of the soil inorganic elements (Table 2).

Table 2 shows the balance of the available elements P and K in the soil, during a growing season with the effect of the five different cultivation practices. The availability of nutrient elements is attributed to the fertilizer residues from previous crops and the nutrients applied through fertilization in the current harvest. These data confirm the amounts of soil nutrients used from *Pisum Sativum*. The requirements of the non-irrigated crop *Pisum sativum*, were high in available K for all five treatments of the soil, with values ranging from 172.1 kg/ha for conventional tillage to 286.0 kg/ha for the treatment where heavy cultivator was applied. In contrast, the requirements of *Pisum Sativum* in available P were low for all soil treatments, with values ranging from 8.1 kg/ha for conventional tillage to 49.8 kg/ha for the heavy cultivator treatment.

Table 1

Content of soil inorganic elements for soil depth (0-15) cm

P-Olsen (mg/kg soil)					
	Conventional tillage	Heavy cultivator	Rotary cultivator	Disc harrow	No-till
Soil content at the beginning of the growing season	12.80	13.09	13.23	13.09	13.38
Soil content after crop harvest	24.57	16.17	22.04	18.39	17.60
K-Exchangeable (mg/kg soil)					
Soil content at the beginning of the growing season	334.1	352.3	352.3	312	352.3
Soil content after crop harvest	291.6	264.8	278.2	254.8	284.9

Table 2

Availability of soil inorganic elements for soil depth (0-15) cm

P_2O_5 (kg/ha)- P-Olsen					
	Conventional tillage	Heavy cultivator	Rotary cultivator	Disc harrow	No-till
Soil content at the beginning of the growing season	61.6	63.0	63.6	63.0	64.4
Surface fertilizer application	64.6	64.6	64.6	64.6	64.6
Soil content after crop harvest	118.1	77.8	106.5	88.5	84.7
Amounts of soil phosphorus used from *Pisum Sativum*	8.1	49.8	21.7	39.1	44.3
K_2O (kg/ha)- Exchangeable					
Soil content at the beginning of the growing season	845.5	891.6	891.6	789.6	891.6
Surface fertilizer application	64.6	64.6	64.6	64.6	64.6
Soil content after crop harvest	738.0	670.2	704.1	619.5	721.0
Amounts of soil potassium used from *Pisum Sativum*	172.1	286.0	252.1	234.7	235.2

The results showed us (Fig.3) that the yield of dry biomass of the non-irrigated cultivation *Pisum Sativum* in relation to the various soil treatments, do not show statistically significant differences.

CONCLUSIONS

The results showed that, in the *Pisum Sativum* crop under non-irrigated conditions and with application of different soil cultivation practices, the soil organic matter in soil depth (0-15) cm after the end of the cultivation period, decreased by 34% where there was applied the rotary cultivator and 32% where the heavy cultivator was applied; while for the

soil depth (15-30) cm, the soil organic matter in those soil treatments where disc harrow, heavy cultivator and conventional tillage were applied, decreased by (33.5, 17 and 25) % respectively. The reduction of the soil organic matter in the above soil cultivation practices is due to the creation of high biodegradation conditions, resulting the biodegradation to prevails compared to the incorporation of plant residues in the soil. The use of other soil treatments, does not affect significantly the soil organic matter. The experiment will be followed by various non-irrigated crops with the same soil cultivation treatments, in order to obtain firm conclusions for the evolution of soil organic matter.

The cultivation of *Pisum sativum* shows high demands in available K, and low demands in available P, regardless the use of the soil treatment. Furthermore, the yield of dry biomass of *Pisum sativum* in relation to the soil treatment applied, showed no statistically significant differences.

ACKNOWLEDGMENT

The present project presents the results of the project "Frendly to the environment biomass production" that was founded by the Greek Ministry of Education and EU, by the programme of Life Long Learning through the THALIS programme.

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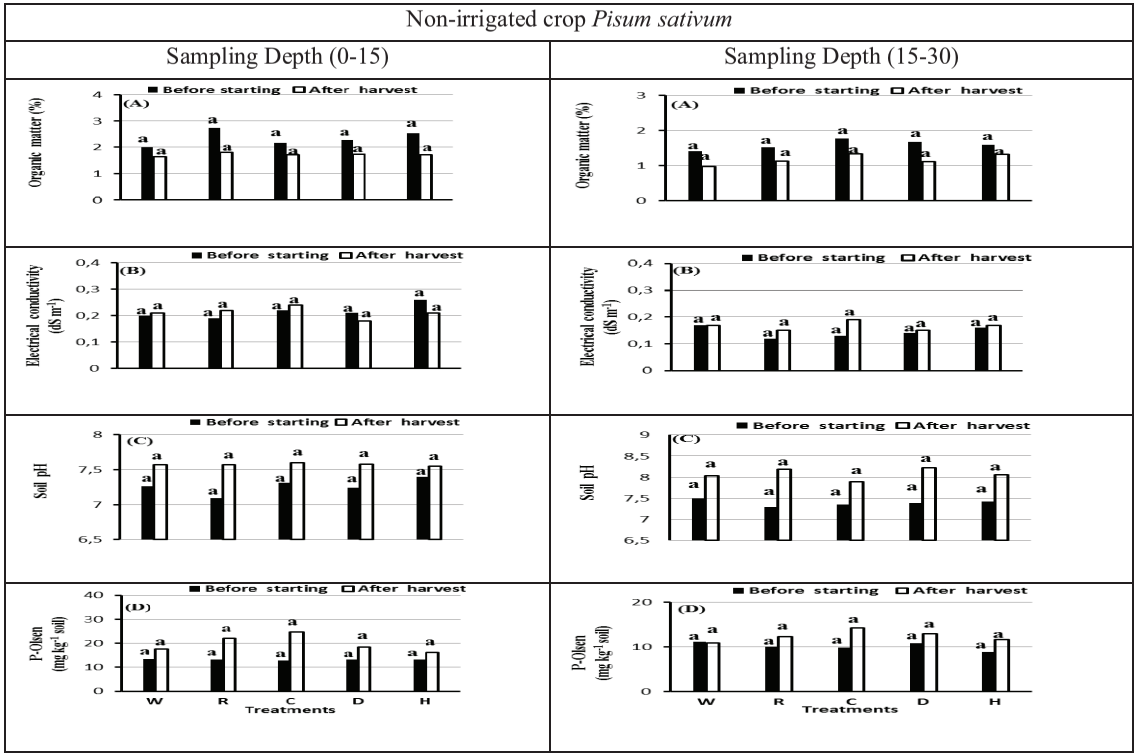

Figure 1. Chemical properties of soil depth (0-15) cm and (15-30) cm, before the start and after the harvest of a non-irrigated crop *Pisum sativum*. (A) soil organic matter; (B) extract electrical conductivity (1 soil + 5 H_2O); (C) soil pH and (D) soil P-Olsen. Columns in each graph with the same letter do not differ significantly according to the Tukey's test (P=0.05).W, without cultivation (no-till); R, Rotary cultivators; C, conventional tillage; D, Disc harrow; or H, heavy cultivator.

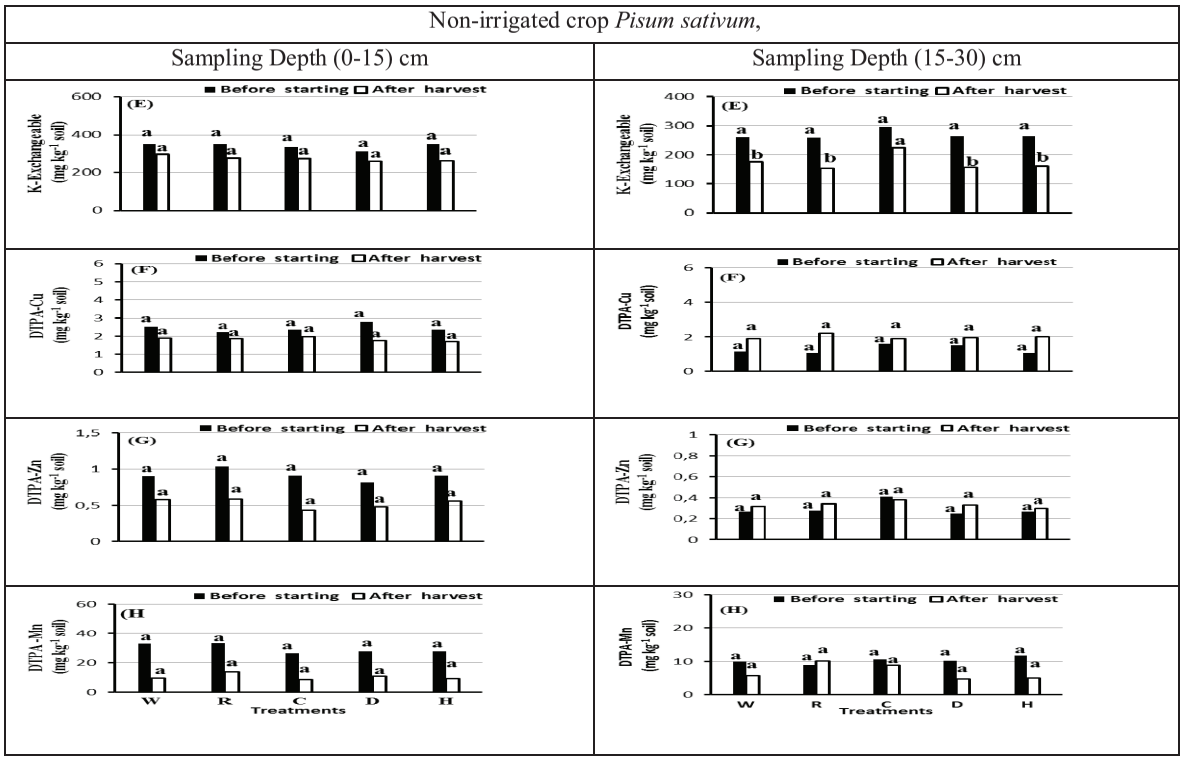

Figure 2. Chemical properties of soil depth (0-15) cm and (15-30) cm, before the start and after the harvest of a non-irrigated crop *Pisum sativum*. (E) soil K-exchangeable; (F) soil Cu-DTPA; (G) soil Zn-DTPA and (H) soil Mn-DTPA. Columns in each graph with the same letter do not differ significantly according to the Tukey's test (P=0.05). W, without cultivation (no-till); R, rotary cultivators; C, conventional tillage; D, disc harrow; or H, heavy cultivator.

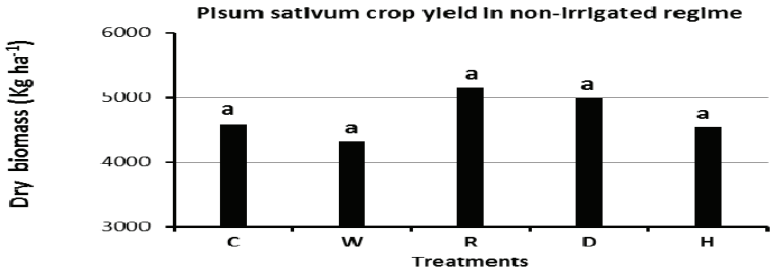

Figure 3. Yield of dry biomass of non-irrigated cultivation *Pisum sativum* in relation to the different soil cultivation practices. Columns in each graph with the same letter do not differ significantly according to the Fisher's test (P=0.05). C, conventional tillage; W, without cultivation (no-till); R, Rotary cultivators; D, Disc harrow; or H, heavy cultivator.

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VARIABILITY OF *MATRICARIA INODORA* L. FLOWERS AND FRUITS

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Penescu A.[2], Ionescu S. G.[2]

KEYWORDS*: Matricaria inodora, flowers, fruits, variability*

ABSTRACT

*A common weed species that cause serious damages to crop plants (Budoi 1987) is scentless chamomile- Matricaria inodora L. (Ionescu 1998). Variability studies may help in reducing the degree of infestation of land: apparently there is a correlation between levels of weed control and variability. Variability becomes more evident by researching different ecotypes of weed (Ionescu & Ionescu 2012). Modal values (higher frequencies) of these characters were: corolla diameter 3.1-3.5 cm (36%), the number of ligulae petals 18-19 (37%), head height 6.6-7.0 mm and thickness of 7.6-8.0 mm, number of fruits per head 251-350, fruit length 1.2-1.3 mm and fruit width 0.4-0.5 mm. Clear correlations were obtained between the diameter and the number of ligulae flower corolla (r = 0.357***), between heads height and thickness (r = 0.633***), and between the length and width of the fruit (r = 0.447***). These correlations of M. inodora weed demonstrated wide adaptation possibilities to adapt (Schlichting 1986).*

INTRODUCTION

Odorless (scentless) chamomile (*Matricaria inodora* L, MATIN in Bayer code) is one of the most common weeds in agricultural lands (Ciocârlan & Chirilă 1982). It is considered that in the highlands of the South is the highest infestation of weeds from us (Ionescu & Ionescu 2013). It is possible that plant to prefer living conditions here and namely: diet rich in rainfall, clay soils, moderately acidic soil reaction (pH: 5.01-5.43), organic matter (OM) relatively low (tC: 1.3-1.5 %). The weeding levels are high in all crop plants (Thompson et al. 1990), but the highest degree of infestation is in winter cereals: wheat, barley, triticosecale (Chirilă 1998). Weed preferred winter crops because its vegetation follows them so: rising in the same time, relatively easily pass over the winter period, blooms in May and June and mature in July. From previous research on weed biology (Blackshaw & Harker 1997) and degrees of infestation and maturation of cereals (Chirilă & Pintilie 1986). A field infested with *M.inodora* becomes golden- white color (from the flowers) at the time when the plants have before flowering (there is occurrence of ears). From now until maturity infestation is very obvious, because weed exceeds crops in height. Given the spread and the damage they cause *M.inodora* autumn cereals (Chirilă

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2001), have conducted a series of studies. Biological and physiological characteristics of *M.inodora* species were found to be in continuous evolution (Anghel et al. 1975). To find such an existence of specific biotype of white luvicsoil conditions, we performed the present study. Variability studies (Ionescu & Ionescu 2013) could help in developing specific management (IWM- integrated weed management). Variability is evident through the study of different ecotypes. Ecotype weed of resort area is considered an important and representative. Thus, in recent years there has been a quantitative analysis on morphological characteristics of the reproductive organs of the plant *M.inodora* from the winter wheat crop. Flowering heads were measured like diameter and number of *ligulae* petals, and mature heads like size (height and width), the number of fruits and the size of fruits. The literature are few (Chirilă 2001). Thus, the heads has two kinds of flowers, some marginal white *ligulae* type, and some tubular yellow centrally located. Mature fruits are 2.3 mm long and 1.0 mm wide, with three specific rib (pleura) (Blackshaw & Harker 1997).

MATERIAL AND METHODS

Measurements were conducted during summer (Prodan & Buia 1958), 2012- 2014 period. *M.inodora* plants analyzed were found in different areas of wheat (Bianco 2001), with natural weeding (private farmers). The flowering heads of *M.inodora* (months May-June) were measured with a ruler for specific diameter, and total petals were marginal *ligulae* type (Sokal & Rolf 1981). In July, after maturing scentless chamomille plants, the heads were analyzed. The dimensions were measured surrendered (height and width dimensions differ from other plant species of the genus *Matricaria*), number of fruits (achenes) and fruit dimensions: length and width. Plants were chosen by taking the zigzag and of every two steps. Over year were analyzed flowering 100 plants and 100 of heads at maturity. The data shown represents the average of three years of measurements. Morphological characters measured were then analyzed by drawing frequency polygons (%), or histograms. Thus, if all 7 morphological characteristics were used class intervals specific to each one. With this statistical method succeeded ecotype character expression analyzed by: i) modal values with the high frequency, ii) extremes morphological characters analyzed, iii) the specific of each character expressed. Between characters analyzed were established some correlations with which they could observe their trends in the studied ecotype. The expression values using Excel along with analysis of variance: the ranges of variation (Ceapoiu 1968). The statistical parameters were calculated using the formulas:

$$\bar{a} = \frac{\sum x}{n},$$ where ā = media, x = values,

$$S^2(\text{variance}) = \frac{1}{n-1}\left[\sum x^2 - \frac{\left(\sum x\right)^2}{n}\right]$$

$$\text{S (standard error)} = \sqrt{S^2},$$

$$\text{S \% (variation coefficient)} = \frac{S}{a}\ 100.$$

RESULTS AND DISCUSSIONS

The variability of flower heads characters. The first character analyzed was corolla diameter. Absolute values that varied between flower diameter was between 2.0 and 4.5 cm - fig. 1. The lower limit of between 2.0-2.5 cm accounted for 2 % of the total, and the upper 4.5 cm were more than just 3 %. Modal value was 3.1 - 3.5 cm, 36 % expressed as percentage. 95 % of the diameter was between 2.6 and 4.5 cm. The ligulae petals of the *M.inodora* corolla included between 12 and 21 pieces. Modal value stood at 18 to 19 pieces/ head (37 %). Flower heads with 12 - 13, 14 - 15 and over 21 ligulae petals were together 16 %. Most petals (84) were enrolled between 16 and 21 ligulae petals.

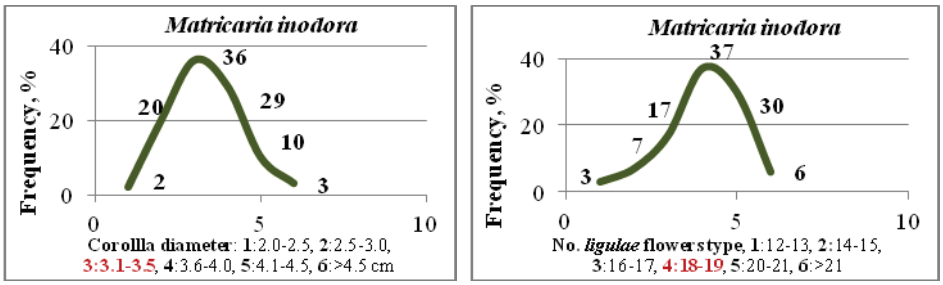


Figure 1. The frequency of corolla diameter (left) and frequency of number of *ligulae* flowers type (corolla: 1:2.0-2.5, 2:2.5-3.0, **3:3.1-3.5**, 4:3.6-4.0, 5:4.1-4.5, 6>4.5 cm) (no. of petals: 1:12-13, 2:14-15, 3:16-17, **4:18-19**, 5:20-21, 6:>21)

Between corolla diameter and number of petals in the heads established a positive correlation, very significant (r = 0.357***) - fig. 2. This shows that the higher the corollas were higher (range), so the number of *ligulae* petals were more. Confidence is high in repetition of the phenomenon.

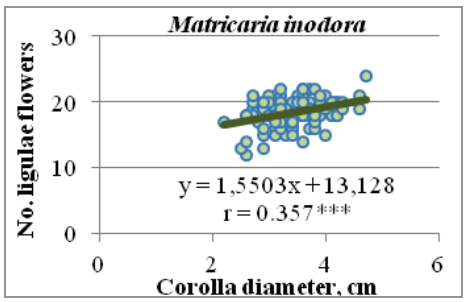


Figure 2. Correlation between corolla diameter and no. of *ligulae* flowers type
Photo 1: MATIN infestation in winter wheat crop

The variability of the mature heads characters**.** Each head was investigated from stem to the peak height and width in the widest part. The surrender of *M.inodora* height ranges between 4.1 and 8.0 mm - fig. 3. Modal value stood at 6.6 - 7.0 mm (34 %). The distribution of the values of the class was a sinuous expression on the right side of the histogram. This variability could exacerbate the existing character of ecotype. Mature heads with heights 4.1 - 4.5 mm were 2 % and 3 % of 7.6 - 8.0 mm. 70 % of the heads have height between 5.6 and 7.5 mm.

Thickness of heads surrendered experienced a more normal distribution of values - fig. 4. Modal value was 29 % in size between 7.6-8.0 mm. The heads with a thickness of 6.0-6.5 were 4 &, and 9.6-10.0 mm to 3 %. 86 % of heads were between 7.1 and 9.5 mm. Of the two graphs are found *M.inodora* head has a greater width than height. Between the two characters of mature heads surrendered to set a positive correlation, highly significant (r = 0.633***) - fig. 5. And when mature head dimensions can say that with the formation of head higher, they will be thicker.

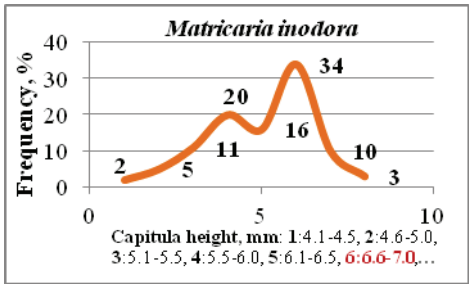


Figure 3. The frequency of heads height, *M.inodora* weed (**1**:4.1-4.5, **2**:4.6-5.0, **3**:5.1-5.5, **4**:5.6-6.0, **5**:6.1-6.5, **6:6.6-7.0**, **7**:7.1-7.5, **8**:7.6-8.0 mm). Photo 2: mature heads of MATIN

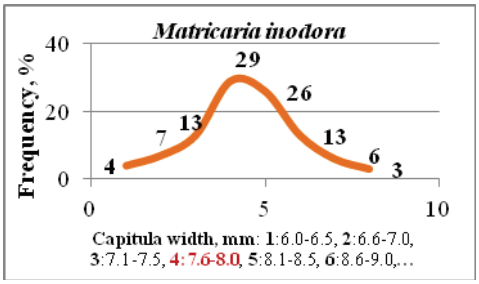


Figure 4. The frecvency of capitula width, *M.inodora* weed (**1**:6.0-6.5, **2**:6.6-7.0, **3**:7.1-7.5, **4:7.6-8.0**, **5**:8.1-8.5, **6**:8.6-9.0, **7**:9.1-9.5, **8**:9.6-10.0, mm). Photo 3: the MATIN with width character of heads

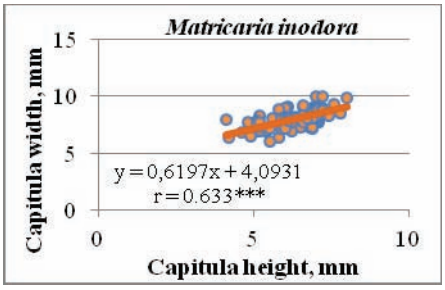


Figure 5. Correlation between height and width of *M.inodora* capitula. Photo 4: MATIN corolla head, blooming period

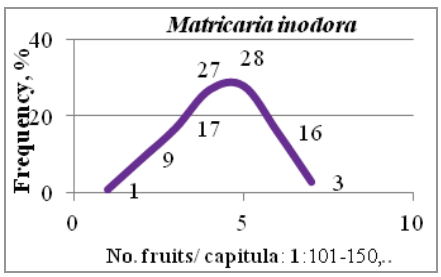
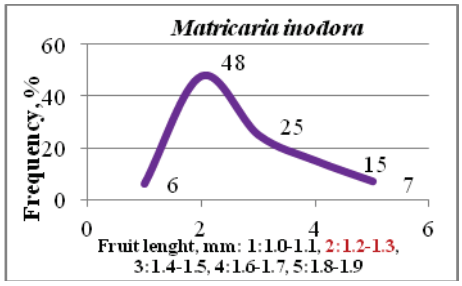


Figure 6. The frequency of fruits number from *M.inodora* heads (**1**:101-150, **2**:151-200, **3**:201-250, **4:251-300, 5:301-350**, **6**:351-400, **7**: over 450). Picture 5: mature heads and fruits

The variability of fruits**.** The first was the number of fruit character of heads. The values obtained showed a variability rather large - fig. 6. Modal value was between 27-28 %, with fruit number between 251 and 350/ head. Heads with fruit 101-150 was only 1 %, while those with more than 450 fruits, 3 %. 97 % of the flower heads contained between 201 and 400 fruits/head.

Length fruits was between 1.0 and 1.9 mm. Modal value (48 %) was 1.2-1.3 mm - fig. 7. Fruits with 1.0-1.1 mm lengths were 6 % and 1.8 - 1.9 mm by 7 %. 97 % were between 1.2 and 1.7 mm. Width (thickness) of fruits had values between 0.2 and 1.0 mm.



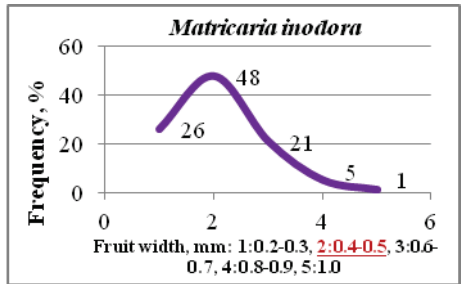


Figure 7. The frecvency of fruit lenght (left) and the frecvency of fruit width in *M.inodora* weed (Lenght: **1**:1.0-1.1, **2:1.2-1.3**, **3**:1.4-1.5, **4**:1.6-1.7, **5**:1.8-1.9, mm), (Width: **1**:0.2-0.3, **2: 0.4-0.5**, **3**:0.6-0.7, **4**:0.8-0.9, **5**:1.0, mm)

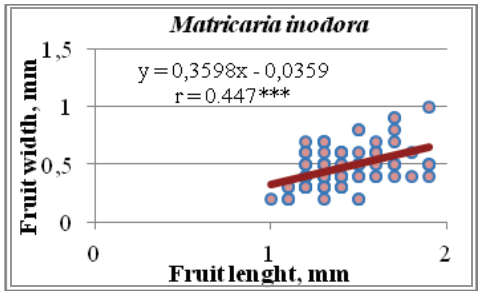


Figure 8. Correlation between lenght and width of *M.inodora* fruits. Photo 6: fruits with a large variability in lenght and width

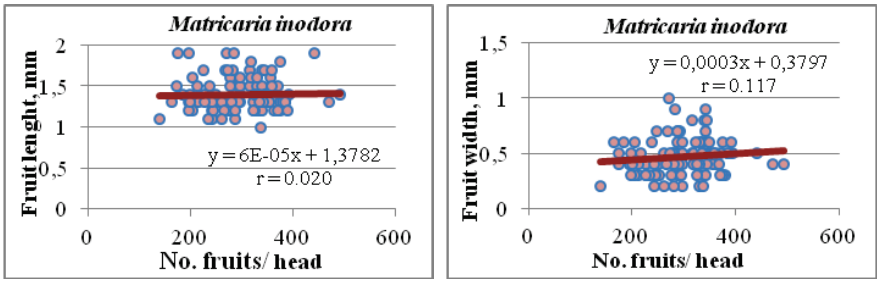


Figure 9. Correlations between the fruits number of heads and its length and width

Modal value was 0.4 - 0.5 mm (48 %). Higher thickness of 0.8 - 1.0 mm were 6 %, and 94 % difference was between 0.2 - 0.7 mm. Between length and thickness of fruits established a positive correlation, increasing and highly statistically (r = 0.447***) - fig. 8.

The fruits were longer, and so their thickness was greater. From these data it appears that there *M.inodora* weed fruit and a wide range of adaptation to any existing condition in winter wheat. Two correlations were established between fruit number and fruit sizes - fig. 9. From the number of fruits of head and the length of their very low correlation was r = 0.020. Being close to 0 might say that the two characters no causal link. So *M.inodora* fruit length does not depend on their number of head. Between the number of fruits and their thickness, the correlation is positive, but not significant (r = 0.117). Although this is slightly increasing causation, even if the thickness of the fruit, they do not depend on their number of heads.

Table 1

Statistic indices of *Matricaria inodora* heads and fruits variability

Indices	Corolla		Heads		Fruits		
	Diameter, cm	No. of *ligulae*	Lenght, mm	Width, mm	No/ capitula	Lenght, mm	Width, mm
Media, ā	**3**.44	**18**.46	**6**.31	**8**.00	**297**.6	**1.40**	**0.47**
Variance, s^2	0.26	4.84	0.66	0.64	4282	0.046	0.028
Standard deviation, s	0.51	2.20	0.81	0.80	65.4	0.21	0.17
Coef. Of variation, s%	**14**.73	**11**.91	**12**.90	**10**.02	**21**.99	**15**.37	**35**.78

Statistical analysis of the character of flowers and fruits**.** To characterize like statistically morphological parameters of *M.inodora* species, were calculated some indices-table 1. Regarding the average on observe the following: corolla diameter was 3.44 cm, 18 *ligulae* petals, mature heads height 6 mm and 8 mm thick, 298 fruits were formed on heads, and fruits length was 1.40 mm and 0.47 mm thickness. Coefficients of variation (%) were middle.

CONCLUSIONS

A common species that cause significant damage of winter cereals is *M.inodora* L. The weed is widespread in the southern territory, especially on white stagnic luvicsoil. Ecotype is very well adapted to this soil characteristic. In order to control through proper management is good to know as many characters. Morphological variability, especially reproductive, being less known, could express eco-existing type here. In addition, it was

found that a species expressing widest variability, may find it easier means of control and stop eventually.

Morphological characters were analyzed on the flower: the diameter and number of ligulae petals, mature heads by dimensions: height and thickness, fruits by their number of head, and their dimensions: length and thickness. Data of variability revealed that the frequency (%) most had a corolla with 3.1-3.5 cm diameter (36 %) and 18-19 (37 %) number of *ligulae* petals - table 2. The mature head had a height of 6.6 - 7.0 mm (34 %) and thickness of 7.6 - 8.0 mm (29 %). The mature heads produced 301 - 350 fruits (28 %) and fruits were 1.2 - 1.3 mm length (48 %) and 0.4 - 0.5 mm width (48 %).

Table 2

The structure and distribution of analysis values from *M.inodora* heads and fruits

Corolla		Heads (capitula)				Fruits (achenes)			
Diameter,		No. ligulae,		Lenght		Width,		No./capitula		Lenght,		Width,	
cm	%	no.	%	mm	%	mm	%	no.	%	mm	%	mm	%
2.0-2.5	2%	12-13	3%	4.1-4.5	2 %	6.0-6.5	4 %	101-150	1 %	1.0-1.1	6 %	0.2-0.3	26 %
2.6-3.0	20%	14-15	7%	4.6-5.0	5 %	6.6-7.0	7 %	151-200	9 %	**1.2-1.3**	**48 %**	**0.4-0.5**	**48 %**
3.1-3.5	**36%**	16-17	17%	5.1-5.5	11 %	7.1-7.5	13 %	201-250	17 %	1.4-1.5	25 %	0.6-0.7	21 %
3.6-4.0	29%	**18-19**	**37%**	5.6-6.0	20 %	**7.6-8.0**	**29 %**	**251-300**	**27 %**	1.6-1.7	15 %	0.8-0.9	5 %
4.1-4.5	10%	20-21	30%	6.1-6.5	16 %	**8.1-8.5**	**26 %**	**301-350**	**28 %**	1.8-1.9	7 %	1.0	1 %
>4.5	3%	>21	6%	**6.6-7.0**	**34 %**	8.6-9.0	13 %	351-400	16 %				
				7.1-7.5	10 %	9.1-9.5	6 %	> 450	3 %				
				7.6-8.0	3 %	9.6-10.0	3 %						

The statistics showed that the average of 3.4 cm diameter was corolla, 18.5 l*igulae* white petals number, 6.3 mm high of mature head and 8.0 mm thick. Fruits were 297.6 number in a head, with a length of 1.4 mm and a width of 0.5 mm. All data presented have highlighted specific ecotype of the data analyzed and may be useful for completes the morphology of this very danger weed- MATIN.

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BROILERS BLOOD METABOLIC PROFILE CHANGES INDUCED BY A FEED ADDITIVE

Ionita Carmen[1*], Gajaila Iuliana, Gajaila G.

Keywords*: synthetic immunomodulator, phagocytosis, neutrophils, reactive oxygen species.*

ABSTRACT

This study was conducted to evaluate the effects of a feed additive - Rovabio™Excel - on some blood parameters of ROSS 308 broiler chicks. A total of 160 ROSS 308 broilers one day old were divided into four treatments with 2 replicates: control diet - conventional feedstuffs, based on corn and soybean meal - and experimental diets - conventional feedstuffs with feed additive. The experimental period continued for six continuous weeks. At the end of the trial for investigating the effect of using feed additive Rovabio® were taken blood samples for blood parameters determination. The results demonstrated that using of feed additive Rovabio not exert adverse effects on broiler chickens, between treatment groups there is significant differences on blood parameters analyzed (p>0.05).

INTRODUCTION

The main constituents of raw materials in compound feed intended for broilers (maize, wheat, barley, soy grits) are polysaccharides starch, cellulose, hemicellulose, pectins and oligosaccharides (Mathlouthi et al. 2011). The hydrolytic enzymes of the enzymatic equipment of the birds - amylase, protease and lipase - do not have the ability to hydrolyze β-glycoside bonds in the polysaccharide starch polysaccharides existing. This enzyme deficiency is the cause of an anti-nutritional effect of the β-glycoside linked polysaccharides, since remaining undigested dietary fiber content resulting leads to increased intestinal viscosity. This triggers a physical barrier effect to hydrolytic enzymes that decreases the effectiveness of digestion. The presence of undigested food fibers favor the development of a microbial activities in the ileum, accompanied by the release of volatile fatty acids unfavorable for birds. Adverse effects due a reduced enzymatic equipment for birds can be mitigated by using exogenous enzymes (Giraldo et al. 2008).

The objective of this experiment was to highlight the advantage of incorporating feed additive Rovabio to basic nutrition of broilers (Lee et al. 2010). Rovabio™Excel is a multienzymatic product which combines seventeen enzymatic activities of one single organism, *Penicillium funiculosum*, a fungus genetically unaltered.

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MATERIAL AND METHODS

The experiments were carried out on 120 one day-old Ross 308 chicks. The chicks were divided at random into three groups and 2 replications, 20 chicks in each. The chicks were reared on permanent litter, observing specific hybrids breeding technologies Ross 308, ensuring technological and environmental conditions. The chicks were fed standard starter (from 1 to 21 days), grower (from 22 to 32 days) and finisher (from 33 to 42 days) diets. Compared with the control group (C) in the experimental groups were added different doses of multienzymatic product Rovabio^{TM}Excel: 0.1ml / kg fodder for experimental group (E1) and 0.2 ml / kg fodder for experimental group (E2). Each experimental group was fed ad-libitum with its own diet for 42 days. Biochemical Parameters: serum concentrations of total protein, triglycerides, cholesterol, glucose and activities of alanine amino transferase (ALT) and aspartate amino transferase (AST) were determined by autoanalyser using their accompanying commercial kits. Statistical analysis were done using SPSS programme (IBM SPSS Statistics 20). One-way ANOVA was performed to examine differences among groups. The significance of mean differences between groups was measured by the Duncan test. Values were given as means ± standard errors. Level of significance was taken as $P < 0.05$.

RESULTS AND DISCUSSIONS

Result on the dietary effects of Rovabio^{TM}Excel on blood parameters in broiler chickens are shown in Table 1.

Table 1

Effects of ROVABIO^{TM}Excel on the blood metabolic profile for Ross 308 chickens

Parameters	Control group	Experimental group	
		E1	E2
Total Protein (g%)	3.47±0.28	3.66±0.43	3.88±0.24
Glucose (mg/%)	211.43±6.26	213.26±4.28	213.19±5.81
Triglyceride (mg%)	86.41±4.12	78.63±5.46	81.28±7.19
Total cholesterol (mg/%)	3.18±0.62	2.96±0.23	2.65±0.46
ALT (IU/L)	8.16±0.28	7.94±0.74	7.88±0.62
AST (IU/L)	163.64±2.37	167.82±3.26	165.16±2.41

Analyzing the results (Fig. 1 (a) and 1 (b)) is seen as concentrations of glucose, total protein, cholesterol and triglyceride in serum were not influenced by the dietary treatments - insignificant differences reported between treatment groups ($p>0.05$). Also, has not been indicated of liver damage in broiler chicks, because there were no significant differences ($p>0.05$) in the activities of serum ALT and AST among treatment groups. Previous studies showed that dietary enzymes do not have a large impact on biochemical parameters of treated broilers, in particular on AST and ALT unless the enzymes are associated with a probiotic (Rahman et al. 2013).

As regards other biochemical parameters, Goli & Shahryar 2015, suggest that multi enzyme supplementation can improve broiler performance, pointing out that adding Rovabio^{TM}Excel in chickens' diet significantly increases concentration of blood HDL and decreases triglyceride, cholesterol and LDL.

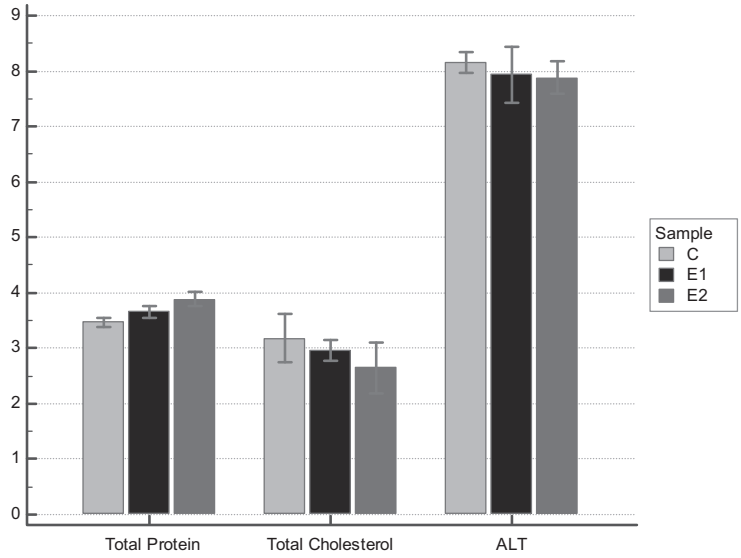

Figure 1 (a). Effects of ROVABIO^{TM}Excel on the biochemical parameters

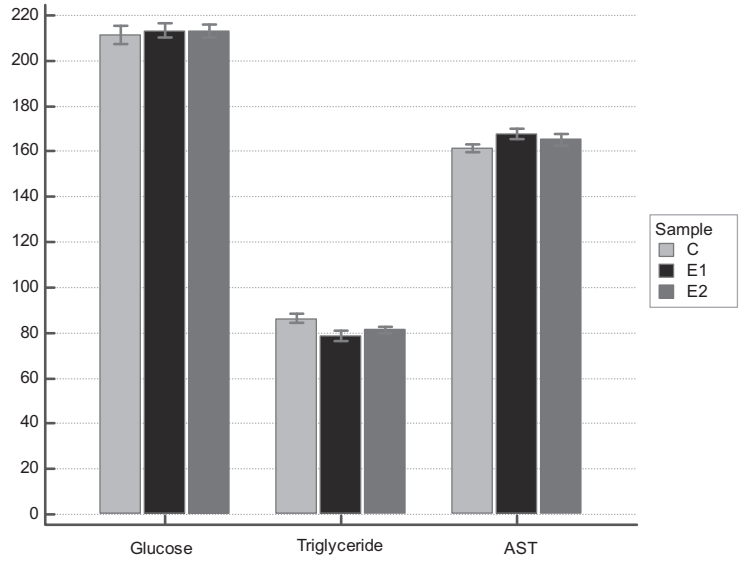

Figure 1 (b). Effects of ROVABIO^{TM}Excel on the biochemical parameters

CONCLUSIONS

Based on the results obtained, Rovabio® Max administered at the levels evaluated in this study may not exert adverse effects on broiler chickens.

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CHANGES OF ERYTHROCYTES PARAMETERS IN TURKEYS IN DIFFERENT FARMING SYSTEMS

Ionita Carmen[1], Bogdan Cristina[1], Gajaila Iuliana[1], Gajaila G.[1], Grigore Alice[2]

Keywords*: turkey, farming, hematologic profile*

ABSTRACT

Recently, the public being interested in a healthy diet aspect, particularly increased consumption of turkey meat. This study aimed at comparing hematologic status between turkeys reared intensively and household extensively. Hematological profile is an important indicator of physiological or pathophysiological status, because red blood cell parameters vary by age, sex, growth conditions, stress, infection, blood counts. The results showed that erythremia and hemoglobin in turkeys reared in different farming systems were normal. Increased hematocrit in both cases was due to dehydration; in turkeys, the need for clean water and air is imperative. It can be concluded that there are no differences regarding hematologic profile in turkeys reared intensively and extensively and are appropriate for obtaining turkey meat of high quality.

INTRODUCTION

Recently, the public being interested in a healthy diet aspect, particularly increased consumption of turkey meat. Turkey meat is low in fat compared to other animal species, it is considered a refined meat rich in protein, tasty and tender (Prabakaran 2003, Julian 2005). Turkey is a source of zinc needed for a healthy immune system; an average portion of turkey provides 20% of the daily dose of zinc of a man; it also contains P, K, Mg, Fe and vitamin B complex, especially niacin (vitamin PP) which is involved in the conversion of carbohydrates into energy, nerve function and digestion and production of red blood cells and vitamin B12 necessary for preventing anemia; serving an average portion daily ensures entirely vitamin B12 requirement.

Hematological profile is an important indicator of physiological or pathophysiological status. Red blood cell parameters vary by age, sex, growth conditions, stress, infection, blood counts etc.

Blood screening is the first step in a diagnosis and for establishing hematologic status in various conditions. The erythropoietic system from bone marrow along with the

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mass of circulating erythrocytes and other red blood cells that left vascular lumen is a complex named Erythron; this system is affected by diet, infections, stress (climate vaccine, immunological etc).

Most reports of avian blood ranges do not state age or gender distinctions and limited hematologic data are available for domestic turkeys (Schmidt et al., 2011).

This study aimed at comparing hematologic status between turkeys reared intensively and household extensively.

MATERIAL AND METHODS

The study was conducted at SC "Peneş Curcanul" - Codlea, Brasov county and in households from Ialomita county. We collected each 5 blood samples from turkeys reared intensively and household extensively.

After Manolescu et al., 1978 and further established by Căprărin, 1971, erythrocyte constants values in turkey hens are MCV- 140 (116.0 to 150.0) cubic micron; MCHC 27 (25.0 to 30.0). pg /dl E. Table 1 shows the reference values set by Parvu, 1992.

Table 1

Blood reference values in turkey hens (after Pârvu, 1992)

Hematological constants	Measurement units	Reference range
Erythremia	mil/mm^3	3.0+/- 0.5
Hematocrit	%	35.0+/- 3.0
Hemoglobin	g/dl	9.0+/- 2.0
MCV	μ^3	116+/- 4
MCHC	pg/dl E	30.0+/- 2.0
Leucocytes	thousands/mm^3	34.0+/- 2.0
Lymphocytes	%	32+/- 8
Eozinophils	%	1+/- 1
Neutrophils	%	40 +/- 5
Bazophils	%	2 +/- 1
Monocytes	%	5 +/- 2

RESULTS AND DISCUSSIONS

In the case of fattened turkey hens reared intensive, average values obtained are: erythremia- 3.0 mil/dl blood; hemoglobin- 11.1 g/dl blood; hematocrit- 43.4%; MCV 146.3 cubic micron; MCH- 37.5 pgHB/E; MCHC- 25.6 pgHb/dl E (table 2).

In the turkey hens reared intensively we noticed: normal erythremia and hemoglobin, increased hematocrit; normal VEM after Manolescu and low after Pārvu, 1992; CHEM is low comparing to both reference values given by the two authors.

As hematocrit is increased it is possible that bird were dehydrated; either did not get to the water source and then could be invoked locomotor disorders or was either a fault in that drinking equipments; low MCV and MCHC generally indicate a hypochromic microcytic anemia without clinical manifestations but also could be a problem in dyeing load. We cannot make a diagnosis for anemia with certainty because erythremia and hemoglobin are normal.

Table 2

Changes in erythrocyte series in fattened turkey hens, aged 17 weeks, intensive

No	E (mil/mm^3)	Hemoglobin (g/dl)	Hematocrit (%)	MCV (μ^3)	MCH (pg)	MCHC (g/ dl E)
1	2.69	11.0	43	159.8	40.8	25.5
2	3.39	11.8	45	132.7	34.8	26.2
3	2.67	10.8	41	153.5	40.4	26.3
4	2.78	11.2	45	161.8	40.2	24.8
5	3.47	10.9	43	123.9	31.4	25.3

Table 3

Changes in erythrocyte series in fattened turkeys, aged 20 weeks, intensive

No.	E (mil/mm^3)	Hemoglobin (g/dl)	Hematocrit (%)	MCV (μ^3)	MCH (pg)	MCHC (g/dl E)
1	3.24	10.2	35.78	110.4	31.48	28.50
2	3.25	12.0	37.00	113.8	36.92	32.40
3	3.26	10.0	35.56	109.0	30.67	28.10
4	2.96	10.3	36.70	123.9	34.79	28.06
5	3.11	10.7	37.45	120.4	34.40	28.50

Average values obtained are: erythremia-3.11 mil / dl blood; hemoglobin- 10.64 g / dl blood; hematocrit- 36.4%; MCV 115.5 cubic micron; MCH- 33.6 pgHB / E; MCHC- pgHB 29.11 / dl E (table 3).

Regarding the interpretation of results, the literature above mentioned does not specify that the values are valid also in turkey or the term "turkey hen" means both sexes. When referring to the above figures, direct erythrocyte constants in turkeys (eythremia, hemoglobin, hematocrit) and indirect (MCV, MCH, MCHC) are close to normal.

Sample blood analysis from turkeys and turkey hens reared household extensively are presented in tables 4 and 5.

Table 4

Changes in erythrocyte series in turkey hens - aged 17 weeks, extensively

No	E (mil/mm^3)	Hemoglobin (g/dl)	Hematocrit (%)	MCV (μ^3)	MCH (pg)	MCHC (g/dl E)
1	2.56	12.5	47	183.5	48.8	26.5
2	2.43	10.6	41	168.7	43.6	24.3
3	3.12	9.8	43	137.8	21.7	22.7
4	3.68	11.3	45	122.2	30.7	25.1
5	3.17	10.0	49	154.5	31.5	20.4

Average values obtained are: erythremia- 2.99 mil/mm^3; hemoglobin- 10.8 g/dl; hematocrit- 45 %; MCV- 153.3 cubic microns; MCH- 35.2 pgHb/E; MCHC- 23.8 pgHb/dl E.

Table 5

Changes in erythrocyte series in turkeys - aged 20 weeks, extensively

No.	E (mil/mm^3)	Hemoglobin (g/dl)	Hematocrit (%)	MCV (μ^3)	MCH (pg)	MCHC (g/dl E)
1	3.24	11.8	45	138.8	36.4	26.2
2	3.67	11.0	48	130.7	29.9	22.9
3	3.45	10.6	40	115.9	30.7	26.5
4	2.19	11.8	42	191.7	53.8	28.0
5	3.23	10.5	44	136.2	32.5	23.8

Average values are: erythremia- 3,15 mil/mm^3; hemoglobin- 11.1 g Hb/dl; hematocrit- 43.8; MCV – 142.6 cubic microns; MCH- 36.6 pgHb/E; MCHC- 25.4 g/dl E.

CONCLUSIONS

Erythremia and hemoglobin in turkeys reared in different farming systems were normal. Increased hematocrit in both cases is due to dehydration; in turkeys, the need for clean water and air is imperative. Indirect red cell constants have values close to normal, with the exception of MCHC which was low.

It can be concluded that there are no differences regarding hematologic profile in turkeys reared intensively and extensively and are appropriate for obtaining turkey meat of high quality.

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EFFECT OF A SYNTHETIC IMMUNOMODULATOR ON PHAGOCYTOSIS IN SHEEP NEUTROPHILS

Ionita L.[1], Gajaila G.[1], Gajaila Iuliana[1], Ionita Carmen[1], Tanase A.[1]

Keywords: *synthetic immunomodulator, phagocytosis, neutrophils, sheep*

ABSTRACT

The purpose of this paper was to prove the immunomodulatory activity of a derivative of ethanolamine. Was estimated the ability of the phagocytic cells (neutrophils) to generate of reactive oxygen species. The neutrophils isolated from sheep peripheral blood have been obtained after separation in density gradient with the Percoll medium. The stimulation of the phagocytes function was made using two different methods: with concanavalin A and with synthetic immunomodulator represented from the derivative of ethanolamine. We compared reactive oxygen species production, determined by chemiluminescence technique. This study demonstrated that synthetic immunomodulator tested has a significantly higher effect ($p<0.05$) in stimulating neutrophils compared with concanavalin A.

INTRODUCTION

Neutrophils are important cells of the innate immune system and play a crucial role in protection against several bacterial pathogens (Tateda et al. 2001) because arrive quickly at sites of infection and form the first line of defence against invading microorganisms (Lysenko et al. 2005). The stimulation of the phagocytic cells (neutrophils) can be achieved by biological or synthetic substances that are capable of altering the immune response by augmenting or reducing immune system components. These substances are called immunomodulators.

The use of vaccinal adjuvants represents a method to amplify the immune response, and ethanolamine derivates, known as "AVR products", are considered possible stimulators of the immune response in animals. Ethanolamine is a compound readily derived from cell membranes that certain bacteria can utilize as a source of carbon and/or nitrogen (Garsin 2010). The swine is the species chosen for testing the modification induced by the AVR product to the immune system (Gajaila et al. 2001, Dawson et al. 2004). Previously, Bordea et al. 1998 reported signs of a more intense activity in tissue formations involved in cell proliferation in the lymphoid organs collected from diethylaminoethanol treated rabbits. Moreover, Vrabiescu et al. 1998 put forward the hypothesis that diethylaminoethanol could have also antiinflammatory properties due to the

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fact that in Freund adjuvant arthritis induced in female Lewis rats, the histo-pathological examination showed that the intensity and the extension area of the joint lesions (granulation tissue with fibrous change, cartilage invasion and dilaceration, bone atrophy) were much more reduced in the treated rats.

The immunomodulating effect of ethanolamine derivative proposed on neutrophils was studied by estimating the ability of neutrophils to generate reactive oxygen species.

MATERIAL AND METHODS

The release of reactive oxygen species was measured using an isoluminol/luminol amplified chemiluminescence system (Granfeldt & Dahlgren 2001). Isoluminolul (iso-luminol, 3-aminoftalhidrazida) is a substance that emits light when they oxygenation.

The compound has the ability to detects in the presence of neutrophils, only reactive oxygen species, extracellular. The main materials used for to perform the determinations were final suspension of neutrophils obtained from the peripheral blood ($5x10^6$ cells/mL), Percoll medium, solutions from stimulation of the phagocytes function - concanavalin A and the derivate of ethanolamine - chemiluminometric equipment with the appropriate reagents. The polymorphonuclear leukocytes are incubated with concanavalin A and ethanolamine derivative. The distribution of the solutions in incubation stage of the polymorphonuclear leukocytes was according to Table 1. Chemiluminescence was measured sequentially in a group of samples and registered for 30 minutes, every 3 minutes. Statistical analysis were done using SPSS programme (IBM SPSS Statistics 20). One-way ANOVA was performed to examine differences between groups. Values were given as means ± standard errors. Level of significance was taken as $P < 0.01$.

Table 1

The repartition of the solutions for the incubation of neutrophils

Sample	PMN suspension	TPS	Luminol	Stimulating agent*
Unstimulated	500 µL	450 µL	50 µL	0
ConA stimulated*	500 µL	350 µL	50 µL	100 µL
DEA stimulated*	500 µL	350 µL	50 µL	100 µL

* ConA - Concanavalin A; DEA - derivate of ethanolamine

RESULTS AND DISCUSSIONS

Chemiluminescence was measured sequentially in a group of samples and registered for 30 minutes, every 3 minutes. The stimulation index was calculated after the formula:

$$IS = \frac{maximum\ value\ registered\ at\ the\ stimulated\ sample}{maximum\ value\ registered\ at\ the\ unstimulated\ sample}$$

Based on data obtained from measurements by chemiluminescence was evaluated dynamics of the stimulation index according to liberation of reactive oxygen species (Figure 1).

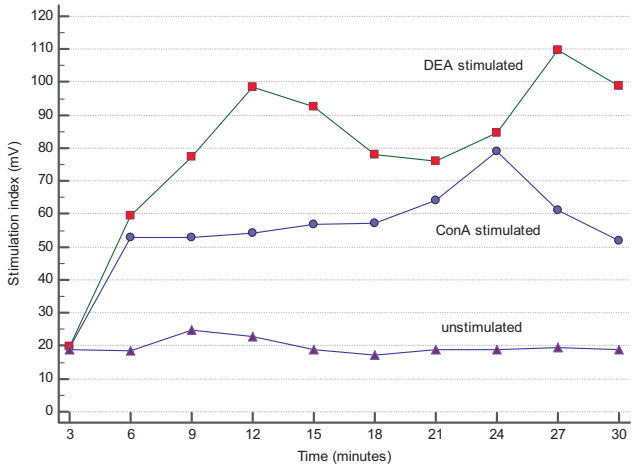

Figure 1. Dynamic of the stimulation index according to liberation of reactive oxygen species

Statistical analysis demonstrated that the mean stimulation index for samples incubated with derivate of ethanolamin (79.322±25.441) is significantly higher than the mean for samples incubated with concanavalin A (54.675±14.648). Level of significance, p = 0.002.

CONCLUSIONS

This study demonstrated that synthetic immunomodulator represented from the derivative of ethanolamine could reestablish the neutrophil functions.

Chemiluminescence technique allows the evaluation of the phagocytic capacity of the neutrophils in sheep.

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TRACEABILITY OF SELENIUM IN ANTHROPOGENIC ECOSYSTEMS IN RELATION TO AIR-WATER-SOIL-PLANTS-ANIMALS-FOOD-MAN

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Keywords*: traceability, selenium, eco-sanogenesis*

ABSTRACT

This study aimed at reviewing the selenium traceability in anthropogenic ecosystems, contributing to understanding the role of this trace element in environment and to developing regional ecosystem maps for selenium deficiency.

Selenium is an essential trace element for human and animal health found in all the food chain: air-water-soil-plants-animals-food-human. Since its discovery, selenium has been a nutritional enigma due to its dual condition of chemical element with toxic potential and essential microelement. In our country the determination of selenium from the soil are scarce, but those conducted so far indicate a serious deficiency of selenium. Recent studies were conducted in Ardeal, Bucharest and a sub-mountainous area and showed the selenium deficiency in feed and animal and human samples, especially due to competitive inhibition exerted by heavy metal or chemical antagonists.

INTRODUCTION

Selenium biodiversity and traceability in anthropic ecosystems

Since its discovery in the early 1900's, selenium (figure 1) represented a nutritional enigma due to its dual condition as a chemical component with toxic potential, but also as an essential micro-element. For a long time it was considered a toxic compound, but scientific research in the last decades have demonstrated that selenium is an essential element for nutrition, optimizing the health of the organism, being present in all environments.

Selenium can be found in air, soil, water, plants in different concentrations and it reaches animal and human organism where it exercises one of the most important roles as antioxidant (along with vitamin E); also, it has an important role in the metabolism of thyroid hormones, in the formation of the immune system cells, it plays an important part at the level of enzymatic systems controlling cellular breathing, in antistress protection and increasing resistance to various diseases (Deélstra 1982; Gissel -Nielsen et al. 1984).

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Selenium is an integral part of glutathione peroxides (GSH –PX), the first level of the antioxidant defense system of cells responsible for preventing the formation of free radicals (Reilly 2006).

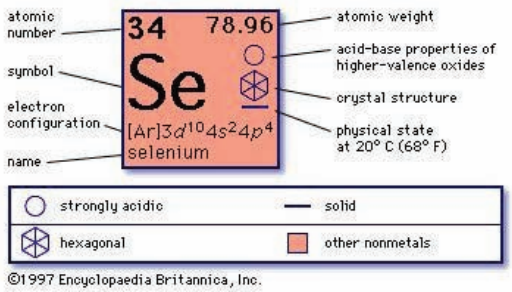

Figure. 1 Selenium (http://www.britannica.com/science/selenium)

Selenium slows down aging tissues, neutralizing the effect of carcinogens, thus protecting the body from malignant diseases. It is very useful for maintaining secretor function of the pancreas and maintaining tissue elasticity. Approximately 50% of the selenium circulates the blood as selenoproteins with many important roles, including the participation in thyroid hormones metabolism and in forming immune system cells.

In 1979, scientists from Kehan Disease Reasearch Group demonstrated that administering selenium controls endemic congestive cardiomyopathy affecting small children and women (an example is represented by the situation in some areas of China where the land is poor in selenium), causing considerable damages.

In the last years, studies confirmed the antidiabetic effects of selenate supplements which regulate glycolysis, glucogenesis and fatty acids metabolism, metabolic paths disturbed in patients with diabetus-like diseases.

Selenium deficiency is a global problem and it is correlated with negative effects in breeding, growth, immunity, defense mechanisms both in animals and humans.

Selenium deficiency may occur across the whole chain of biodiversity: air - water - soil - plant - animal - foods - human. The abundance of selenium is low. The average content varies between 50 - 90μg • kg^{-1} in lithosphere less than 100 g and 2,000 mg • kg^{-1} in ground sphere from less than 50-15000 mg • kg^{-1}, in biosphere and hydrosphere about 0.2μg •kg^{-1}(Kabata – Pendias & Mukherjee 2007, Kabata – Pendias & Pendias 2001).

Physiological and biochemical roles have also been shown to plant nutrition (Läuchli 1993, Turakainen et al. 2005) and increases of the yield were recorded for the administration of selenium in the seed, in the soil or on the plant (Lăcătuşu et al. 2002).

The concentration of selenium in the soil depends on many chemical and physical factors, such as the reaction of the soil, the nature of the organic matter content of soil in the macro- and trace elements. Worldwide soil selenium content is between 5 and 3500μg • kg^{-1}, with a mean of 383 ± 255μg • kg^{-1} (Kabata-Pendias & Pendias 2001).

MATERIAL AND METHODS

Selenium deficit is a world problem and is related to reproduction, growth, immunity, cancer, protection mechanisms of animal and human health issues.

Selenium deficiency in humans is involved in a number of cardiovascular diseases and digestive tumors. It is known that large areas stretched from northern Europe: Finland, Sweden, Norway (Vartikeinen 2005), the Central European countries: Germany, countries

in South-East Serbia (Maksimović et al. 1992) and Russia (Ermakov 1992) are affected by selenium deficiency.

In animals, selenium deficit conducts to an imbalance in glutathione peroxidase synthesis; if the animals also present vitamin E deficits, nutritional muscular dystrophy is formed due to deterioration of cellular membranes of skeletal and heart muscles.

In animals, selenium acts starting with 40 mg/kg in food ratio. It seems selenium plays an important biochemical role through intermediation of glutathione, indirectly protecting hemoglobin against the risk of oxidation of the peroxides. Peroxidase glutathione, with the European code E.C. 1.11.1.9., has selenium as coenzyme. Even if the action mechanisms are distinct, it raises the question if a global nutritional necessary „vitamin E – selenium" has to be considered. For obtaining organic selenium yeasts, with a high level of mineral salts are used. If the culture medium is poor in sulphur, yeasts can incorporate selenium as methinione and selenocysteine, in higher quantities than nutritional necessary. These yeast strains are capable to supply about 97% selenomethionine. Such a strain of *Saccharomyces cerevisiae* is used in obtaining the product Sel-plex.

White muscle disease occurs in all farm animals, including rapid growth younglings (lambs, chicken). New-borns are usually not affected because selenium crosses the placenta rapidly and is deposited in the fetal liver and kidneys (Ionita 2008).

Milk is, in general, low in selenium, thus the new-born beneficiates from this deposit until it is capable to start feeding on selenium containing foods. If the mother is poor in selenium, new-born will have a selenium deficit, being feeble, incapable to stand up and to suckle (lambs). The cardiac frequency respiratory movements are elevated, and the cardiac noises will be strong as a result of cardiac muscle degeneration (myopathy-dyspnoea syndrome in calves).

In over 40 countries and regions in the world, the soil lacks selenium, including Europe, USA, Canada, Asia and South East Asia.

Figure 2. Avian influenza epidemic situation and selenium distribution map of Europe in 2005 (http://www.369.com.cn/En/qinliugan.htm)

China has a serious soil selenium deficiency, hence the assumption emergence and evolution of avian influenza in these areas. Chen Junshi, a nutritionist from China stressed that "Selenium is the only nutrient that is directly related to viral infection" in relation to the role of selenium indirectly on viruses in the cell (Figure 2).

In Romania have been several studies that have sought to determine the concentration of selenium in the various links in the chain of biodiversity. Romania also is

in an area with selenium deficiency recorded in animals and humans thus Salanţiu even in 1970 highlighted selenium deficiency in calves, lambs, piglets and young buffalo, in large areas of the Transylvanian Basin. More recently, Serdaru & Giurgiu 2007: 1548 feed samples were analyzed, sample 1175 of bovine blood serum, blood sera from sheep in 1030, and 600 serum samples from blood collected from the human from Ardeal Region: it was concluded that only 3.7% of the fodder, 5% of serum samples from bovine blood, none of the sheep blood serum samples, and only 3.3% of human blood serum samples are normal Selenium content, while what differences domain deficit.

In 2011 Ionita C. in postdoctoral thesis determines the level is in an area of the Danube Delta on samples of soil, water, plants and sera from birds, finding only low levels of soil and water samples.

Serdaru et al. 2003 analyzed 185 feed samples from 41 localities in Dobrogea and concluded that only 6.5% of them within the scope of normal concentration and the remaining 93.5% belongs to the domain deficit (between 211 and 585 micrograms of selenium kg^{-1}, with an average value of 314). The level of deficit occurs mainly due to low content of selenium in the soil.

Among the first data on the total content of selenium in soils in Romania are the soils on the Eastern Carpathians and some river sediments (Ababi & Dumitrescu 1973, Lăcătuşu & Ghelase 1992). The authors found average values of 640 pg kg^{-1}, respectively 380 pg kg^{-1}, the latter value in areas with enzootic hematuria incidence in cattle.

Ionita L. et al. (2010, 2011, 2012) determined the concentrations of selenium in feed, in hair and blood serum of cattle in Bucharest area and notes that these average value is about 10 times lower than normal, other causes were discovered the presence of some heavy metals and ferrous (lead, cadmium, etc.) who blocked selenium competitive.

In a sub-mountainous area, Ionita L. (2004) also described a severe deficiency of selenium in the blood and hair in dairy, among the causes being discovered large amounts of sulfates in water selenium competitive blocked.

RESULTS AND DISCUSSIONS

Introduction in human diet of food supplements with high content of selenium and with a high bioavailability will neutralize free radicals, offering great protection. This will allow us to remain energetic and healthy during life. Modern life faces us with pollution (chemical fertilizers, pesticides etc.), refined foods, poor in active biological factors (including antioxidants), depleted soil that cannot pass all its useful components to foods, unhealthy feeding behavior, poor in vitamins and minerals. The above stated factors, specific to modern life, do nothing more than underline and increase the need of antioxidants in the organism. Many antioxidants, especially selenium, are in low quantities in the foods we eat, the daily nourishment of the human being containing less and less vitamins and minerals with high bioavailability.

Experimental results conducted by scientists from prestigious research institutions have demonstrated that selenium linked to organic components has an optimum bioavailability, being better used by the organism than the inorganic forms.

Also, it was demonstrated that the beneficial effects of selenium are amplified when it is associated with L-methionine (L-selenomethionine) and other antioxidants as vitamins A, B_6, C, E and zinc. On the other hand, the daily ratio of selenium varies from country to country and depending on its abundance in soil and food from that country.

The integration of organic selenium in the food chain facilitates a better transfer of it in a form which can be used at the highest level in the organism. In organic form, selenium is bind to a chelator or ligand agent, represented by aminoacids or peptides

constituting proteinated trace minerals (Sara et al. 2004). In organic form, selenium can be administered efficiently in smaller doses in comparison with inorganic selenium. In organic form, selenium is more stable in adverse reactions induced by the digestive tract in case of other food nutrients. It is deposited in larger quantities than the inorganic forms in the liver, muscles or other important produce from human nutrition (meat, eggs, milk), representing, in the same time, reserves for the animal organism, but, also, being an important source of selenium for human nutrition.

CONCLUSIONS

Selenium is an important trace mineral within the ecosystem, being present in all links of the food chain: air – water – soil – plants – animals – food - human.

Since its discovery, selenium has been a nutritional enigma due to its dual condition of chemical element with toxic potential and essential microelement.

In air and water, selenium concentrations are influenced by the quality of the natural or anthropic ecosystems. Also, selenium concentrations in plants and food are influenced, especially, by water, soil and atmosphere quality.

In soil, selenium concentrations vary. Worldwide there are existing areas in which this element can be found in normal concentrations, but also areas where this element is in lower quantities. Selenium deficiency in soil is reflected in the existence of specific diseases in animals.

Generally, selenium traceability in the food chain is close related to the relation with other mineral or toxic elements and also with the health status of the animals and humans as end users.

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RESEARCH ON VARIATION IN HEMATOLOGICAL PARAMETERS IN SHEEP METIS (TSIGAIE X AWASI) FROM BACAU ECOZONE FOLLOWING TREATMENT WITH AN IMMUNOMODULATORY PHYTOEXTRACT

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Keywords*: immunomodulator, sheep, vegetal extract*

ABSTRACT

The economic consequences of the presence of parasitosis in sheep are well known and proven - morbidity and mortality, lower production, the inefficient use of feed, decreased body resistance, etc. The necessity of combating parasitosis in sheep is therefore mandatory and it must include concrete actions on animals, grazing, the relationship between animals and pasture (farming system). In the study area, we found the existence of endoparasitical biodiversity in sheep, difficult to control clinically and paraclinically and caused by failure in prevention programs for parasitic disease, sometimes lack of hygiene and other related factors that lead to decreased immunity of the animals. We proposed an alternative to standard long-term and expensive therapy with vitamins, minerals, proteins produced by chemical synthesis, the administration of a single dose of a phytotherapeutic extract that can improve the health of animals.

INTRODUCTION

Sheep parasitic pathology is dominated by two factors: "herd life" and the high degree of parasitosis, which exceeds 70% of cases of illness in this species, after some studies. These two factors are interrelated and supported by the fact that sheep live in crowd facilitating the transmission and proliferation of pests (Trambitas 2014).

The correct diagnosis is based on coprological examination performed once/year, in the spring of 2013. Individual samples were collected directly from the rectum from susceptible animals (abattoirs, wool rough dull, cough, the back was dirty, etc.). Samples were sent to LCSVSA and the results were expressed as number of eggs/gram of feces; these results are interesting but of limited value because it is impossible to set a limit at which treatment would be appropriate, given that a certain number of eggs existing in crotin corresponds to highly variable adult worms in the tube tract. One must not forget the situation where a negative coprological result has violent clinical expressions due to

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parasitic youth who do not yet have the ability to produce eggs. With these clarifications, the coprological diagnosis has great value allowing to detecting periodically the main types of parasites in a herd. Note that in such situations the treatment should be done to all the herd, not to isolated cases; in the present study, the treatment was applied when the health of a number of 27 sheep had already been affected (Mitrea 2002).

It is known that regardless of age, sheep can be infected with various parasites and therefore, before sending them to pasture (spring) and before entering the stalls (fall), they should be disinfected both internally and externally (Aitken 2007). This action is particularly important because it avoids contamination of the pasture with parasites in animals and consequently, the infestation to other flocks. By deworming animals, are avoided both economic loss and the risk of human illness due to parasites that can be transmitted from animals to humans (Hindson & Winter 2002, Ionita 2008).

In the study area, we found the existence of endoparasitical biodiversity in sheep; the most common parasitic diseases were fasciolosis, dicroceliosis, dictiocaulosis, etc.

Deworming is practiced but the owner did not follow closely this action; it was made by shepherds who probably did not respect Rombendazol dose, aqueous 2.5%. In 2013 deworming was done only once in the spring, and diseases occurred in November to December. Note that autumn 2013 was rainy and cold and in late November was the first snowfall.

MATERIAL AND METHODS

We have taken blood samples from the sheep presenting clinically weakness, apathy, loss of wool, frequent respiratory infections, swelling of the eyelids, fatigue with exertion etc. We administrated therapeutically a vegetal extract and after a week we noticed increased appetite, animals became active and their wool regained structure.

For the interpretation of red blood cell parameters we used reference values of the device used for analysis; for interpretation of erythrocyte indices we used Parvu 1992 as benchmarks (Table 1).

Table 1

Haematological reference values in sheep (after Pârvu, 1992)

Haematological parameters	Measurement units	Mean and standard deviation		
		Adult sheep	Sucking lambs	Youth
Erythrocytes	mil /mm^3	12 +/- 4	13 +/- 2	12 +/- 4
Hematocrit	%	16 +/- 4	4 +/- 5	36 +/- 4
Hemoglobin	g/dL	11 +/- 2	11 +/- 3	12 +/- 2
MCV		33 +/- 5	44 +/- 4	34 +/- 6
MCHC	gHb/dL E	32 +/- 2	31 +/- 2	32 +/- 3
Leukocytes	thousands/ mm^3	8 +/- 4	9.5 +/- 1	9 +/- 3
Lymphocytes	%	60 +/- 10	55 +/- 10	58 +/- 10
Neutrophils (segmented)	%	30+/- 15	35 +/- 15	32 +/- 14
Neutrophils (young)	%	2+/- 2	3 +/- 2	3 +/- 3
Eozinophils	%	5 +/- 5	1.2 +/- 1.2	2 +/- 2
Monocytes	%	3 +/- 3	3 +/- 3	3 +/- 3
Bazophils	%	1.5 +/- 1.5	1.5 +/- 1.5	1.5 +/- 1.5

Table 2

Normal haematological parameters in sheep

No.	Parameters	Value	Measurement units
1	Hematocrit	24-45	%
2	Hemoglobin	8-16	g/dL
3	Erythrocytes		mil/mm^3
4	Mean erythrocyte volume	23-48	fL-fentoliters
5	Mean erythrocyte hemoglobin concentration	31-38	gHb/dL E
6	Leukocytes	4-12	thousands/mm^3
7	Neutrophils (segmented)	20-40	%
8	Neutrophils (young)	0-2	%
9	Monocytes	0-6	%
10	Bazophils	0-3	%
11	Eozinophils	0-4	%
12	Lymphocytes	35-40	%

RESULTS AND DISCUSSIONS

Table 3 analysis showed leukopenia, erythropenia, decreased hemoglobin, decreased Ht, MCV normal, normal Hem; thrombocytopenia.

Anemia is a consequence of the toxic action of the adult *Fasciola* but also young ones could produce hemorrhages, abnormal hemoglobin synthesis that correlate with Hb decline since *Fasciola hepatica* eliminates 4 times more proline.

Thrombocytopenia can be associated with trombocytopoiesis and could be cyclical; due to low temperatures or toxic effect caused by endoparasites toxins.

Table 3

Changes in haematological parameters in sheep with endo-parasitosis

No.	Hematological parameters							
	WBC thousands/dL	RBC mil/dL	HGB g/dL	HCT %	MCV fL	MCH pg	MCHC Pg/dLE	PLT mil/dL
1	5.1	7.10	54.8	25.1	35.3	7.7	21.8	174
2	4.9	6.11	65.0	24.2	39.6	10.6	26.8	185
3	5.3	7.10	67.3	25.0	35.2	9.4	26.9	165
4	4.5	6.85	59.3	24.7	36.0	8.6	24.0	169
5	5.3	6.78	66.7	29.5	43.5	9.8	22.6	176
6	5.2	7.40	69.2	22.3	30.1	9.3	31.0	198
7	5.4	7.45	71.0	24.8	33.2	9.5	28.6	184
8	4.8	6.58	70.3	23.9	36.3	10.6	29.4	163
9	5.0	6.45	68.5	22.4	35.0	10.6	30.5	189
10	5.5	7.00	73.1	25.6	36.5	10.4	28.5	152
M	4.5	6.88	66.5	24.7	36.0	9.65	27.0	175
Normal values	5.0-14.0	7.80-13.80	90-155	26.0-45.0	25.0-38.0	8.0-13.0	32.0-38.0	180-680

As for the values of derived erythrocyte indices and for establishing the chromic and morphological type of anemia we have calculated the globular amount (Vg) or color index showing the degree of relative load with Hb of erythrocytes comparing to the reference value for the species. It is calculated using Gowers formula, being equal to the

ratio of hemoglobin in grams of blood sample and the number of erythrocytes found in a mm^3 of the same blood sample (N) multiplied by the ratio of normal erythrocytes number of the species (n) and normal quantity of Hb of the species (ht).

The interpretation is as follows: normal globular value =1 (0,85- 1,15); globular value under 0,85= hypochromia; globular value over 1,15= hyperchromia; globular value (compared to average) = 1,03 = normal

Table 4

Changes in leukocyte indices (%) in parasitized sheep

No	Leukocyte indices				
	Lymphocytes	Neutrofils	Eozinophils	Bazophils	Monocytes
1	49.0	34.0	9.0	3.5	4.5
2	52.0	30.5	8.0	4.5	5.0
3	47.0	34.5	10.0	3.0	5.5
4	50.0	33.5	7.0	4.8	4.7
5	49.4	37.6	7.0	3.0	3.0
6	51.0	33.2	9.0	3.2	3.6
7	54.0	31.2	8.5	4.0	3.3
8	47.6	36.0	9.7	4.5	4.2
9	52.8	28.8	9.8	3.7	5.0
10	55.0	27.3	8.6	4.8	4.3
M	50.7	32.6	8.6	3.9	4.6

The results presented in table 4 showed: lymphocytopenia, normal neutrophil count, eosinophilia, basophilia, monocytosis.

Because animal health and is one of the most important challenges in EU member states and candidate countries, adoption of solutions that improve the health of animals using organic farming (using supplements of probiotics and organic minerals) is one of the topical issues in the sheep, trying as much as possible to remove antibiotics and antiparasitics with persistence in time, and replace them with various natural products that stimulate native immunity. In this study we used a phytopreparation (patent request pending). It must be noted that the extract used has no antiparasitic action but immunostimulatory and immunomodulatory.

The results presented in table 5 showed leukocytosis, normal erythrocyte count; decreased hemoglobin; lower Ht; MCV normal; MCH normal; Low MCHC; normal number of platelets. MCV is a useful indicator for classification of anemia and may suggest the pathophysiological mechanism of erythrocyte damage. Together with other red cell indices may allow early detection of processes that will cause anemia. MCV depends on the number of erythrocyte divisions and plasma osmolarity.

Normal MCV found may suggest the existence of a macrocytic anemia only if associated with a distribution of more than 15 red blood cells (RDW <15).

The mean red blood cell hemoglobin concentration (MCHC) - measuring the average concentration of hemoglobin in a given volume of red blood cells (or the ratio between mass and volume of RBC Hb). MCV is an extremely valuable parameter that indicates anemia, but MCH and MCHC usually are no associated with other clinically relevant information. High MCHC is close to the solubility level of Hb and further increase

of the concentration of hemoglobin can lead to its crystallization. MCHC determination accuracy depends on the factors affecting the measurements of either Hct or Hb.

Table 5

Changes in haematological parameters in sheep, aged 1.2 years
(after treatment with herbal extract)

No	Hematologic parameters							
	WBC thousands/dL	RBC mil/dL	Hb g/dL	HCT %	MCV fL	MCH pg	MCHC g/dL E	PLT
1	15.6	8.13	76.0	25.1	30.9	9.30	30.2	639
2	15.4	9.10	74.0	24.2	26.6	8.13	30.5	654
3	14.9	8.10	70.4	25.0	30.8	8.70	28.1	645
4	13.7	7.58	73.3	24.7	32.5	9.67	29.6	659
5	16.8	7.89	81.9	29.5	37.3	10.38	27.7	678
6	16.5	8.39	84.6	22.3	26.5	10.08	37.9	702
7	15.8	7.45	74.4	24.8	33.2	9.98	30.0	695
8	16.9	7.30	78.9	23.9	32.7	10.80	33.0	710
9	14.6	7.23	78.0	22.4	31.0	10.78	34.8	644
10	13.5	8.02	80.2	25.6	31.9	10.00	31.3	712
M	15.37	7.91	77.1	24.7	31.3	9.78	31.3	673
Reference value	5.0-14.0	7.80-13.80	90-155	26.0-45.0	25.0-38.0	8.0-13.0	32.0-38.0	180-680

The table 6 showed the largest variations in the series of white blood cells (from initial leucopenia, we noticed leukocytosis after administering the natural treatment that helped to improve the overall condition); thrombocytopenia in parasitized sheep, erythropenia and hemoglobin decrease could be the effect of the toxic local action of *Dicrocelium, Paramphistomum, Cestodoze etc.*

Table 6

Comparative values of hematological parameters

Subject	Hematological parameters							
	WBC	RBC	Hb	Ht	MCV	MCH	MCHC	PLT
Parasitized sheep	4.5	6.88	66.5	24.7	36.0	9.65	27.0	175
Sheep after the treatment with phytotherapeutic product	15.37	7.91	77.1	24.7	31.3	9.78	31.3	673

Leukocytes count revealed the following values presented in table 7:

Table showed: lymphocytopenia, neutrophilia**,** eozinopenia, bazocytopenia, normal monocytes.

Following the economic losses suffered, following decisions were taken on the improvement of the activity: fences were repaired to prevent ingress of dogs that are intermediate hosts for a variety of parasitic agents; the dogs were vaccinated; water sources were fixed to prevent leaks around gutters, where the concentration of sheep feces is higher because the combination of humidity and high concentration of faecal has resulted in a

luxuriant growth of vegetation and proliferation of larval parasite, which in turn will be ingested by sheep; overcrowding of pastures were avoided.

Table 7

Changes in leukocyte index (%) in sheep treated with the phytoextract

No	Leukocyte index				
	Lymphocytes	Neutrophils	Eozinophils	Bazophils	Monocytes
1	38.1	52.0	6.2	1.2	2.5
2	47.4	45.3	4.3	1.0	2.0
3	44.0	47.3	4.0	1.6	3.1
4	46.0	45.5	4.0	1.5	3.0
5	39.6	51.2	5.2	1.3	2.7
6	34.6	45.3	5.5	1.1	3.5
7	49.0	42.0	4.7	1.0	3.3
8	47.0	44.6	3.9	1.5	3.0
9	51.2	40.0	4.0	1.0	3.8
10	50.4	41.4	4.1	1.0	3.1
M	44.7	45.4	4.1	1.2	3.3

CONCLUSIONS

North-Eastern-country area (Bacau and surroundings) has a great parasitic biodiversity, difficult to control clinically and paraclinically.

This situation is caused by failure in prevention programs for parasitic disease, sometimes lack of hygiene and animal related factors that lead to their decreased immunity;

Preventive therapeutic program of internal and external antiparasitic is one of the most important actions of an efficient economic management of the farm;

The phytotherapeutic extract used in a single dose improved the health of sick animals. If we used vitamins, minerals, proteins produced by chemical synthesis, the treatment would have been on long-term and required additional effort and costs.

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MODIFICATION OF SOME ENVIRONMENTAL FACTORS UNDER THE INFLUENCE OF VEGETABLE CROPS USED FOR ORNAMENTAL GREEN WALLS IN BUCHAREST

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Keywords*: temperature, humidity, ecological contribution, vegetable species*

ABSTRACT

In the urbanized area of Bucharest, characterized by high population density and a large built area, environmental factors have a great importance for the life quality of city residents. Influencing them by installing the vertical surfaces of the housing with green walls planted with vegetable species has resulted in substantial changes on temperature and humidity in close proximity. Lowering the temperature has reached the thresholds between 2 and 31 degrees Celsius and the increase in humidity was 27 to 49 percent (apart from the periods of rain). These results support the initial hypothesis that, besides the ornamental effect given by the resulting image and the practical one, given by the consumption of the vegetables harvested, green walls can have an important ecological contribution.

INTRODUCTION

The urban heat island is a metropolitan area that due to human interactions is a lot warmer then rural areas which are surrounding it, with major differences also in humidity and air movements. In an intense urbanized location in Bucharest the urban heat island is caused by the storage of solar radiance by city structures and aggravated by reduced transfer of heat from within the paved areas mainly due the lack of green spaces and bigger surfaces of water. Aside the usual mitigation of the urban heat island (thermal insulation of the buildings, use of lighter colored surfaces) there are other more ecological ways to accomplish a greater comfort for the residents like using green roofs and green walls on buildings (Dunnett & Kingsbury 2004).

This paper presents an experimental approach to determine the hygrothermal impact of green walls on the built environment in urban settings in a matter that also provides food production as an option for fast growing communities (McLaughlin 2012) and maximizes wild life biodiversity by offering foraging sources and habitat opportunities. These qualities can add value to certain microclimates, by improving comfort and living conditions for the people living in these areas, who account for over 55% of the Romanian population, and the percentage is constantly rising.

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MATERIAL AND METHODS

The experimental green wall was set up in Bucharest, on a west oriented exterior wall of a building, which presented no windows (see Figure 1). Due to the urban design of the area, the wall is shadowed by another building and is receiving a limited amount of direct solar radiation, between 6 and 7 hours in the middle of the summer season. The support wall has high reflecting qualities due to white painting and thermal insulation consisting in 10 cm of EPS polystyrene. The green wall consists in 6 rows of 6 felt pockets, filled with growing medium and planted with vegetable species which have ornamental value. The wall was irrigated twice a day.

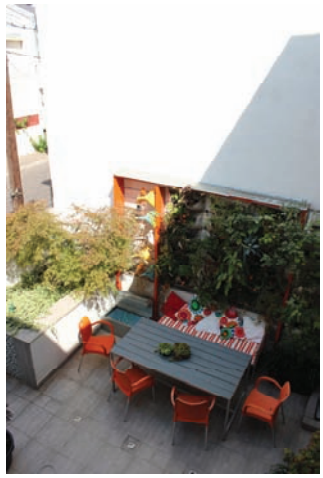

Figure 1. The urban setting of the building wall and the green wall attached to it.

The temperature and humidity were measured with the sensors of EWS-702 Electronic Weather Station (see Figure 2), each day (with no rain or significant cloud presence) after 3 hours of direct sunlight on the researched surface.

Figure 2. The EWS-702 Electronic Weather Station.

Experimental monitoring of the green wall consisted in measuring and recording the thermal and hydric variations at different depths and heights in the growing medium and at different heights in the air layer above the green wall, and thus, the thermal and hydrological behaviors of the green wall are assessed and the drip is optimized.

RESULTS AND DISCUSSIONS

The analyzed measurements were performed during June, July and August 2015. The main meteorological data during this period are characterized by an extreme summer temperature with very little rain. After measuring the values of the temperature and humidity over a period of 3 months, the obtained values could be observed as very different due to the mass of vegetables present on the wall at the time (see Figures 3 and 4).

Figure 3. The green wall with the undeveloped vegetables.

Figure 4. The green wall with the fully developed vegetables.

One important factor was the depth of the green wall which functioned as an insulating factor as well as a cooling one. Further experiments may be conducted to establish the optimal size of the felt pockets which can combine both best growing conditions for plants and obtaining optimal insulation.

As it was very important to determine if the variations that appeared are mainly due to evaporation of water within growing medium or if the foliage mass has an importance by retaining solar radiation and evaporation at the surface of leaves, air temperature and humidity were analysed in the green wall presenting both situations – with undeveloped and fully developed vegetables (see Tables 1 and 2).

Table 1

Temperature variation

No.	Month	Maximum temperature bare wall	Maximum temperature inside the green wall (undeveloped/fully developed vegetables)	Temperature variation (minimum/maximum in Celsius degrees)
1	June	54	52/35	2/19
2	July	69	47/38	22/31
3	August	62	43/37	21/25

Table 2

Humidity variation

No.	Month	Humidity of the air near bare wall	Humidity of the air in the green wall with undeveloped/fully developed vegetables (in percentage)	Humidity variation (minimum/maximum in percentage)
1	June	51	78/87	27/36
2	July	46	84/95	38/49
3	August	42	82/92	40/50

Analysing the results we can see that there is a simultaneous decrease in temperature and increase in humidity of the air and the green wall reduces not only the air temperature, but also the facade surface temperature, the reflected solar radiation from the concerned facade. All these positive effects contribute majorly to improvement of the urban local microclimate.

CONCLUSIONS

This paper presents a part of an experiment based on a small-scale green wall. The results highlight the thermal and hygrometric effects of the use of vegetated facades on the microclimate in urban areas. There is an evident localized effect on outdoor microclimate and probably this also has an impact on temperature and humidity inside the building that has a green wall, especially if this is south or west oriented. It was found that the green wall can reduce by 31 degrees Celsius the main radiant temperature, which directly affects the thermal comfort. The effect of evapotranspiration besides lowering the temperature is that of rising humidity in the nearby area by 49% which can improve outdoor comfort indicators.

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CONSIDERATION ON CLIMATIC EVOLUTIONS IN THE SOUTH-WEST OF ROMANIA DURING THE SPRING OF 2015

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Keywords*: precipitation excess, drought, warm weather.*

ABSTRACT

In the spring of 2015, in Oltenia, weather evolution has been marked by an exceptional variability with fast transitions from a warm weather to a cold and even extremely cold in some intervals and from an excessively rainy weather to a droughty weather. The high air temperature in April and May caused gradual enforcements, and in the last decade of May, there was a pedospheric drought in the South-East of the region. The spring of 2015 has marked, for the South-West of Romania, a significant climatic oscillation: the end of a long extremely rainy period, which started in September 2013 and lasted until March 2015 and the beginning of a warmish and droughty period. The analysis of the climatic conditions in the South-West of Romania during the spring of 2015 is a continuation of some extended studies on climatic variability. The paper is useful to specialists, PhD candidates, master graduates and to all people interested in climate evolution.

INTRODUCTION

In the spring of 2015, in Oltenia, weather evolution has been marked by an exceptional variability with fast transitions from an exceedingly rainy to a pluviometric normal weather and from a warm weather to a cold weather. These fast transitions from one extreme to another of weather aspect are due to the increase of climatic variability, an aspect which is directly connected to climatic global warming. March 2015 ended the rainy period which started in September 2013, and was excessively rainy and marked by two periods of abundant rainfalls (5-6 March and 27-28 March). We will further analyze this climatic variability and its causes. The analysis of the climatic conditions of the spring 2015 in the South-West of Romania is a continuation of the extended studies on the regional climate variability (Bogdan et al. 2015, Marinică & Marinică 2015).

RESULTS AND DISCUSSIONS

Indexes of spring arrival in 2015. ***The indexes of spring arrival*** in 2015 were comprised between 193.7°C in Voineasa in Intramountainous Depression and 385.1°C in Dr. Tr. Severin in the extreme West. The deviations from multiannual means of this index were comprised between 14.7°C in Calafat (4.3% from the normal) and 88.8°C in Drăgășani (34.4% from the normal), leading to classifications of these types of spring

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arrival in Oltenia meteorological stations from normal (N) in South and extreme West of Oltenia in Dr. Tr. Severin, Calafat and Bechet and early (Ea) in Drăgășani in the East of the region. *The average index of spring arrival* calculated for the entire region was 302.9°C, and its percentage deviation from the normal mean was 22.6% confirming a little early spring arrival (LE) for this region.

Climatic conditions in March 2015. *Thermal regime in March. Monthly temperature means* were comprised between 4.1°C in Voineasa and 7.2°C in Dr. Tr. Severin, and their deviations from the multiannual means were comprised between 0.9°C in Bechet, Craiova and Bâcleș and 2.0°C in Polovragi, which lead to classifications of pluviometric time type from normal (N) in Bechet, Craiova and Bâcleș to warm (C) in Polovragi. *The monthly thermal mean in March*, calculated for the entire region was 5.5°C, and its deviation from the normal mean was 1.3°C, which confirms the general classification of warmish month (WS). These high deviations of the monthly temperature means in March cumulated with the means in May have led to the classification of warm spring, because April was a normal thermal month, as we shall see further on. *The lowest daily temperature means* were registered on 6 March and were comprised between 0.7°C in Bâcleș and 3.3°C in Râmnicu Vâlcea, and the daily general mean for the entire region was 1.4°C. Most of the *monthly minimum air temperatures* were registered on 20 March and were comprised between -5.9°C in Polovragi and -1.3°C in Caracal, and their mean for the entire region was -3.4°C. 11 days of negative minimum temperatures were registered in the intervals 8 - 11 March, 14 March and 18 - 22 March. *Monthly maximum air temperatures* were registered on 26 March and were comprised between 18.2°C in Bâcleș and 20.7°C in Dr. Tr. Severin, and their mean for the entire region was 18.8°C. *Monthly minimum temperature values on ground surface* were registered in the interval 20 - 22 March and were comprised between -10.4°C in Polovragi (on 20 March) and 0.5°C in Slatina (on 21 March). *Monthly maximum temperature values on ground surface* were registered on 26 March and were comprised between 25.0°C in Calafat and 39.8°C in Băilești. The highest temperature values on ground surface and in the air were registered in the same day. The extremely warm weather with high temperatures on ground surface led to the continuation of the vegetation phases of plants from agricultural crops and especially those which were highly reactive to temperature increase (rape, wheat, almond trees, apricot tree, peach tree, etc.). *Trees blossomed extremely early,* beginning with 19 March 2015, when the first almond and apricot trees blossomed.

Pluviometric regime in March 2015. The monthly quantities of precipitation were comprised between 47.0 l/m^2 in Tg. Jiu and 100.3 l/m^2 in Craiova, and the percentage deviations from the multiannual means were comprised between 7.3% in Tg. Jiu and 218.8% in Craiova, and in the mountainous area they were negative. Consequently, the classifications of pluviometric time type in March were comprised between normal (N) in Tg. Jiu and exceedingly rainy (ER) in most part of the region. *The mean of monthly quantities of precipitation* calculated for the entire region was 59.7 l/m^2, and its percentage deviation from the multiannual mean was 42.3%, leading to the classification of very rainy month for the entire region. There have been two very rainy intervals 5-6 March and 27-28 March, and 27-28 March 2015 was the rainiest interval, when the daily means of precipitation calculated for the entire region were 13.0 l/m^2 on 27 March and 8.6 l/m^2 on 28 March, thus ***registering the last wave of abundant rainfalls of the long rainy period of 19 months (September 2013 - March 2015)***. Meteorological reports were issued for significant quantities of precipitation as well as hydrological warnings of yellow code for flooding in some counties in the country. Consequently, *the water reserve in the ground, in autumn wheat crop,* in Oltenia in the end of March was comprised between almost

satisfactory and almost optimum. In the ground layer of 0-100 cm in the autumn wheat crop, water reserve in Oltenia was comprised between almost satisfactory (AS) and optimum (O).

Climatic conditions in April 2015. *Thermal air and ground regime in April. Monthly temperature means* were comprised between 7.4°C in Voineasa in the intramountainous depression and 12.7°C in Calafat in the South-West of the region, and their deviations from the multiannual means were positive in all the region with four exceptions -0.5°C in Tg. Logreşti, -0.9°C in Polovragi Subcarpathian Depression, -0.3°C in Voineasa and -0.6°C in Parâng in the mountainous area. These values fell within -0.9°C in Polovragi and 0.9°C in Calafat and Drăgăşani leading to classifications of thermal normal time type in all the region. Temperature *monthly mean* for the entire region was 10.5°C, and its deviation from the normal was 0.1°C, which leads to the classification of thermal normal month for the entire Oltenia. Most of the *monthly minimum values of air temperature* were registered on 4 April and were comprised between -4.3°C in Drăgăşani registered on 4 April and 1.8°C in Calafat registered on the same date, and their mean for the entire region was -1.7°C. Most of the *monthly maximum temperature values* were registered on 27 April and were comprised between 23.3°C in Polovragi and 28.7°C in Bechet, and the mean of maximum temperature values for the entire region was 25.4°C. *On ground surface most of the minimum temperature values* were registered on 4 April and were comprised between -5.5°C in Tg. Logreşti registered on 4 April and 2.1°C in Caracal on the same date, and their mean for the entire region was -1.7°C. Most of the monthly maximum temperatures on ground surface were registered on 25 and 27 April and were comprised between 27.7°C in Caracal and 53.2°C in Dr. Tr. Severin, and their mean for the entire region was 41.2°C, higher with 8.9°C than the mean of March. We observe the *cooling* in the intervals: 2-8 April, 18-23 April and 28-30 April and *weather warming* in the intervals: 9-19 April and 24-28 April.

Pluviometric regime in April. The monthly quantities of precipitation were comprised between 15.6 l/m^2 in Bechet and 45.6 in Rm. Vâlcea, and their percentage deviations from the multiannual means were comprised between -67.9% in Bechet and 4.2% in Drăgăşani which lead to classifications of pluviometric time type from exceedingly droughty (ED) in Oltenia Plain and most part of the hilly area to normal in Drăgăşani, and very droughty (VD) in the mountainous area in Parâng (table no. 1). *The quantity of precipitation mean for the entire region of* Oltenia was 32.9 l/m^2, and its percentage deviation from the normal was -42.0%, which confirms the classification of very droughty month (VD) for the entire region. In April 2015 *two intervals of rainy weather* were registered: 5-6 April and 27-29 April (only 5 days) and 25 droughty days. *Ground water reserve, at autumn wheat and corn crop,* in Oltenia on 29 April 2015, and the humidity reserve accessible to plants in the ground layer of 0-100 cm, fell within satisfactory limits (SA).

Climatic conditions in May 2015. *Thermal regime of air and ground in May. Monthly air temperature means* were comprised between 13.9°C in Voineasa and 19.4°C in Calafat, and their deviations from the multiannual means were comprised between 1.3°C in Craiova, Slatina and Tg. Logreşti and 2.6°C in Rm. Vâlcea, leading to classifications of pluviometric time type comprised between warmish (WS) in most part of Oltenia and warm (W) in Calafat, Drăgăşani, Tg. Jiu, Rm. Vâlcea and Parâng. *Air temperature mean for the entire region of Oltenia was* 17.2°C, and its deviation from the multiannual mean was 1.8°C thus confirming the classification of warmish month (WS). Most of the *monthly minimum temperatures* in the air were registered on 28 and 30 May and were comprised between 3.2°C registered in Voineasa on 12 May and 9.6°C registered in Calafat on 13 May.

Table 1.

Quantities of precipitation registered in the spring of 2015 (Σ), compared to normal values (N during the period 1901-1990), the deviation (%) and pluviometric time type according to Hellmann criterion (CH).

Meteorological Station	Hm	March 2015				April 2015			
		ΣIII	**N**	**Δ%**	**CH**	**ΣIV**	**N**	**Δ%**	**CH**
Dr. Tr. Severin	77	53.4	49.3	8.3	**N**	28.4	56.5	-49.7	**FS**
Calafat	66	64.3	38.1	**68.8**	**EP**	32.0	47.3	-32.3	**FS**
Bechet	65	75.7	36.3	**108.5**	**EP**	***15.6***	48.6	***-67.9***	**ES**
Băileşti	56	67.8	38.3	**77.0**	**EP**	20.9	49.4	-57.7	**ES**
Caracal	112	65.1	35.7	**82.4**	**EP**	33.0	45.1	-26.8	**S**
Craiova	190	**100.3**	31.5	**218.4**	**EP**	34.0	43.1	-21.1	**S**
Slatina	165	72.3	37.5	**92.8**	**EP**	40.2	47.4	-15.2	**PS**
Bâcleş	309	21.3	**43.1**	-50.6	**ES?**	23.8	54.5	-56.3	**ES?**
Tg. Logreşti	262	58.5	37.9	**54.4**	**EP**	23.0	49.9	-53.9	**ES**
Drăgăşani	280	69.3	37.4	**85.3**	**EP**	41.8	40.1	**4.2**	**N**
Apa Neagră	250	73.8	63.6	16.0	**PP**	26.4	76.4	-65.4	**ES**
Tg. Jiu	210	***47.0***	43.8	7.3	**N**	21.2	64.0	-66.9	**ES**
Polovragi	546	63.8	50.9	25.3	**P**	31.0	70.4	-56.0	**ES**
Rm. Vâlcea	243	59.4	36.8	**61.4**	**EP**	**45.6**	58.5	-22.1	**S**
Voineasa[3]	573	11.8	37.9	-68.9	**ES?**	34.2	67.2	-49.1	**FS?**
Parâng	1585	51.1	53.0	-3.6	**N**	75.2	86.3	-12.9	**FS**
Mean Oltenia	-	59.7	41.9	42.3	**FP**	32.9	56.5	-42.0	**FS**
		May 2015				The spring 2015			
Weather station	Hm	**ΣV**	**N**	**Δ%**	**CH**	**ΣP**	**N**	**Δ%**	**CH**
Dr. Tr. Severin	77	59.8	80.7	-25.9	**S**	141.6	186.5	-24.1	**S**
Calafat	66	***22.0***	60.8	-63.8	**ES**	118.3	146.2	-19.1	**S**
Bechet	65	73.6	58.6	25.6	**P**	164.9	143.5	14.9	**PS**
Băileşti	56	32.8	70.1	-53.2	**ES**	121.5	157.8	-23.0	**S**
Caracal	112	22.4	61.4	-63.5	**ES**	120.5	142.2	-15.3	**PS**
Craiova	190	**85.2**	60.6	**40.6**	**FP**	**219.5**	135.2	**62.4**	**EP**
Slatina	165	29.2	64.8	-54.9	**ES**	141.7	149.7	-5.3	**N**
Bâcleş	309	62.5	74.9	-16.6	**PS?**	107.6	172.5	-37.6	**FS?**
Tg. Logreşti	262	68.8	73.4	-6.3	**N**	150.3	161.2	-6.8	**N**
Drăgăşani	280	47.6	69.7	-31.7	**FS**	158.7	147.2	7.8	**N**
Apa Neagră	250	76.4	108.8	-29.8	**S**	176.6	248.8	-29.0	**FS**
Tg. Jiu	210	45.3	85.3	-46.9	**FS**	***113.5***	193.1	***-41.2***	**FS**
Polovragi	546	71.9	103.9	-30.8	**FS**	166.7	225.2	-26.0	**S**
Rm. Vâlcea	243	34.6	97.3	***-64.4***	**ES**	139.6	192.6	-27.5	**FS**
Voineasa	573	45.8	95.5	-52.0	**ES?**	91.8	200.6	-54.2	**ES?**
Parâng	1585	93.9	114.8	-18.2	**PS**	**220.2**	254.1	-13.3	**PS**
Mean Oltenia	-	54.5	80.0	-31.9	**FS**	147.1	178.4	-17.5	**PS**

(Source: processed data, from Oltenia MRC Archive).

[3]Precipitation data from Voineasa, are uncertain, since the station is automatic, and in the cold season the precipitation sensor is covered, therefore the classification of excessively droughty pluviometric time is uncertain for the month of March 2015.

Most of the *air monthly maximum temperatures* were registered on 19 May and were comprised between 26.3°C in Polovragi on 19 May and 31.8°C registered on 6 May in Bechet. 6 May is ***the earliest date in which*** heatwaves can occur ***in Oltenia***, thus on 6 May 1968, in Oltenia thermal maximum values were registered in the South of the region which came close to the threshold for scorching weather: 34.4°C in Bechet, 34.3°C in Băileşti, 33.7°C in Calafat, 33.0°C in Caracal, 32.8°C in Dr. Tr. Severin. Most of the *ground surface minimum temperatures* were registered in an atypical calendar interval for May, as well as air temperatures registered in the interval 28-30 April and were comprised between 3.2°C in Apa Neagră and Polovragi and 10.9°C in Caracal, and their mean for the entire region was 8.3°C. Most of the *ground surface maximum temperatures* were registered in the interval 18-21 April and were comprised between 32.3°C in Slatina on 31 April and 58.0°C in Băileşti on 19 April, and their mean for the entire region was 45.0°C. *The warmest day of May* was registered on 6 May with the mean for the entire region of 21.0°C. Days with average values closed to this one were registered on 19 May with the mean 20.7°C, on 20 April with the mean 20.2°C and on 24 May with the mean 20.1°C. *The coldest day of May* was registered on 28 May with the mean 13.3°C. Days with average values close to this one were registered on 1 May with the mean of 14.0°C and 2 May with the mean of 13.8°C. *Weather gradual warming in May* has a benefic aspect because it leads to plants progressive development, therefore in the beginning of June plants reach a stage close to the normal of this specific calendar period. Significant thermal variations which occur in summer lead to and finalize their development. *6.2. Pluviometric regime in May. Monthly quantities of precipitation* registered in May were comprised between 22.0 mm in Calafat and 85.2 mm in Craiova, and their percentage deviations from the multiannual means were comprised between -64.4% and 40.6% in Craiova leading to classifications of pluviometric time type in Oltenia meteorological stations comprised between exceedingly droughty (ED) in most part of Oltenia Plain in Calafat, Băileşti, Caracal, Slatina and Rm. Vâlcea and very rainy (VR) on a restricted area in the central part of Oltenia in Craiova (table no.1). *The mean of monthly values of precipitation* calculated for the entire region was 54.5 mm, and its percentage deviation from the multiannual mean was -31.9% leading to an average classification of very droughty month (VD) for the entire region. Two intervals with abundant rainfalls were registered for agriculture: 9-11 May and 23-26 May, the latter had the highest quantities of precipitation on 24 May, and the maximum quantity of precipitation registered in 24 hours was 48.2 mm in Celei (Gorj County). *Water ground reserve* in the end of May in autumn wheat crop (ground layer of 0-100 cm) was almost satisfactory in most part of the region, almost optimum in the central part of the region, and there was a moderate drought in most part of Olt County and South-East of Vâlcea County. *In corn crop, the water reserve in the ground layer 0-50 cm,* was almost satisfactory in most part of the region, almost optimum in the central part of the region, and there was a moderate drought in most part of Olt County and the South-East of Vâlcea County.

Overall climatic conditions of the spring of 2015. *Temperature seasonal means* were comprised between 8.5ºC in Voineasa and 12.9 ºC in Calafat, and the deviations from the normal values were comprised between 0.8 ºC in Craiova and 1.6ºC la Rm. Vâlcea, leading to a classification in meteorological stations of spring from warmish (WS) to warm (W). The seasonal mean of the spring of 2015 calculated for the entire region was 11.1 ºC, and its deviation from the multiannual mean was 1.1ºC which leads to the classification of warm spring for the entire region. *Seasonal quantities of precipitation* were comprised between 113.5 mm in Tg. Jiu and 219.5 mm in Craiova, and their deviations from the normal values were comprised between -54.2% in Voineasa and 62.4% in Craiova leading to the classification of pluviometric time type in meteorological stations in Oltenia from

excessively droughty (ED) spring in Voineasa to excessively rainy (ER) on a restricted area in Craiova. We observe only two restricted areas with low positive deviations (Drăgăşani with 7.8% and Bechet with 14.9%), and the area around Craiova is the only one with a positive deviation of over 15.0%. *The mean of seasonal quantities of precipitation* calculated for the entire region was 147.1 mm, and its percentage deviation from the normal was -17.5% which leads to an average classification of little droughty spring (LD) for this region.

CONCLUSIONS

In the spring of 2015, spring arrival was little early (LE), and warm weather predominated within an interval of 61 days during winter (67.8% of time) and all spring. Indexes of spring arrival were higher than normal values, with positive deviations comprised between 14.3ºC in Calafat and 88.8 ºC in Drăgăşani. The general characteristic of warm spring was especially due to the high deviations of air temperature registered in March. The warm weather during winter and March led to an early start of vegetation phases, and on 19 March 2015 the first apricot tree blossomed. The almond tree is species even more reactive to heat, and its blooming began one week earlier than the apricot tree. In March 20 days with minimum positive temperatures were registered in most part of the region and 4 days with late spring hoarfrosts (20, 21, 22 and 24 March). In April 11 mornings with hoarfrosts were registered locally or sparsely in the hilly area and Subcarpathians, which damaged the fruit trees (especially stone fruits: almond tree, apricot tree, peach tree, plum tree, wax cherry tree, etc.), and the coldest morning was on 4 April 2015, when the phenomenon of hoarfrost was general and the mean of minimum temperature values for the entire region was -1.2ºC. On ground surface, in April 14 days were registered in which the minimum temperatures of Earth surface were ≤ 0 ºC, thus being registered a frosted ground, and the coldest morning for this level was on 4 April with the mean of minimum temperature values for the entire region of -1.7 ºC. Series of diseases and pests specific to warm and moist weather damaged agricultural and vegetable crops, fruit trees and vineyard, which needed repeated treatments, thus increasing the production costs. The excessively rainy weather has a spatial temporal extension of 66.7%. Compared to the annual normal values, the precipitation registered in the spring of 2015 are percentage reports comprised between 24.5% in Drăgăşani and 27.9% in Bâcleş, and the general mean for the entire region represents 26.4% of the normal annual mean, which means a percentage of almost ¼ of the normal annual values. The rainiest spring month was March, then weather climatic oscillation began by fast transitions from a long term rainy weather registered in the interval September 2013 – March 2015, to the droughty weather in April, May, June and July 2015. Due to the late spring hoarfrosts, the early spring arrival is a significant climatic risk. The early heat wave in May announced an exceedingly warm summer in 2015. This heat wave is one of the earliest and long term heat waves registered in the Northern Hemisphere, not only in Romania. Doughty period is correlated at the level of global teleconnexions with the positive phase of North-Atlantic Oscillation.

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PARTIAL DATA REGARDING THE INVENTORY OF HARMFUL AGENTS FROM OTASAU RIVER BASIN (I)

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Keywords*: harmful agents, Otăsău, Vâlcea, Romania.*

ABSTRACT

This work belongs to a complex study which represents the doctoral thesis of the co-author of this writing. It refers to the interaction between wild/spontaneous and grown/cultivated plants and injury agents as a source of dispersion from Otasau River Basin.

The research done so far, led to the identification of a number of 42 species. They were found both on spontaneous and cultivated plants.

From all the taxa identified up till now, we can say that those from Chrysomelidae family have the biggest frequency.

INTRODUCTION

The investigated area is situated in the centre of Valcea district, in the Subcarphatian region of Oltenia. Barbatesti represents the northern limit and Babeni represents the southern limit where the river Otasau flows into the river Bistrita.

The stepped relief layout, the subcarpathian peaks orientation, generally from west to east, the appearance of the valleys and depressions, the meadows presence along the river Otasau, the geomorphological particularities of all landforms etc., indicate a pronounced/strong relief diversity.

After consulting the specialized literature, we noticed that the information related to the entomofauna of this area is absent. Only floristic and vegetation studies are found in several works (Popescu 1974; Răduţoiu et al. 2005).

Important contribution regarding the entomofauna from Oltenia were done by different authours such as: Bobîrnac & Matei; 1985, Costescu & Mitrea; 1989, Mitrea et al. 2002; Mitrea, 2013 etc.

MATERIALS AND METHODS

The collection of entomological material was performed every two weeks from April to October, with an entomological net, to a number equal to 50 harvests for each step in correlation with the stage of plants' growth, in order to identify the damaging periods of harmful species.

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Traps with specific pheromone were used for the collection of some species of microlepidoptera and light traps were used for the nocturnal lepidoptera.

The determination of entomological material was realised using different specialized determinators: Panin 1951, 1957; Bobîrnac & al., 1994; Stănoiu & Năstase 1994; Stănoiu et al. 1995; Balachowschy & al. 1966 etc.

RESULTS AND DISCUSSIONS

From the data analysis on the entomofauna structure from Otăsău River Basin, 42 species belonging to different families have been identified (Table 1).

Table 1

The taxonomic conspect of identified species in Otăsău River Basin

Crt. no.	SPECIES NAME	FAMILY	ORDER
1	*Cetonia aurata* L.	Scarabaeidae	Coleoptera
2	*Potosia eruginosa* Drury	Scarabaeidae	
3	*Potosia s*. str. *affinis* Andresch	Scarabaeidae	
4	*Melolontha melolontha* L.	Scarabaeidae	
5	*Copris lunaris* L.	Scarabaeidae	
6	*Harpalus affinis* Schrank	Carabidae	
7	*Carabus violaceus* L.	Carabidae	
8	*Carabus ulrichii* L.	Carabidae	
9	*Carabus (Procrustes) coriaceus* L.	Carabidae	
10	*Harpalus distinguendus* Dufn	Carabidae	
11	*Pterostichus oblongopunctatus* L.	Carabidae	
12	*Blaps lethifera* Marsham	Tenebrionidae	
13	*Chrysomela menthastri* L.	Chrysomelidae	
14	*Leptinotarsa decemliniata* Say	Chrysomelidae	
15	*Chrysomela vigintipunctata* L.	Chrysomelidae	
16	*Coccinella septem-punctata* L.	Coccinelidae	
17	*Exochomus quadripustulatus* L.	Coccinelidae	
18	*Cantharis fusca* L.	Cantharidae	
19	*Cantharis flavilabris* Fabr.	Cantharidae	
20	*Calidium violaceum* L.	Cerambycidae	
21	*Morimus funereus mulsant*	Cerambycidae	
22	*Plagionotus arcuatus* L.	Cerambycidae	
23	*Hydrophilus piceus* L.	Hydrophilidae	
24	*Hyster quadrinotatus* L.	Histeroideae	
25	*Agriotes lineatus* L.	Elateridae	
26	*Ampedus sanguinolentus* Schrank	Elateridae	
27	*Xilocopa violaceae* L.	Apidae	Hymenoptera
28	*Bombus terrestris*	Apidae	
29	*Apis melifera* L.	Apidae	
30	*Vespa* spp.	Vespidae	
31	*Vespa crabro* L.	Vespidae	

32	*Eurydema ornate* L.	Pentatomidae	Heteroptera
33	*Pentatoma rufipes* L.	Pentatomidae	
34	*Graphosoma lineatum* L.	Pentatomidae	
35	*Lygus pratensis* L.	Miridae	
36	*Pyrrocoris apterus* L.	Pyrrhocoridae	
37	*Tettigonia viridissima* L.	Tetigoniidae	Orthoptera
38	*Gryllotalpa gryllotalpa* L.	Gryllotalpidae	
39	*Tetris tenuicornis* Sach	Tetrigidae	
40	*Cercopis sanguinolenta* Scopoli	Cercopidae	
41	*Musca domestica* L.	Muscidae	Diptera
42	*Panorpa communis* L.	Panorpidae	Mecoptera

From the analysis, we find out that in the investigated region, the Coleoptera species are very well represented with 62 % (Fig. 1). At a big distance, there are the Hymenoptera and Heteroptera species each with 12 % and Orthoptera with 10%. The rest have an insignificant amount.

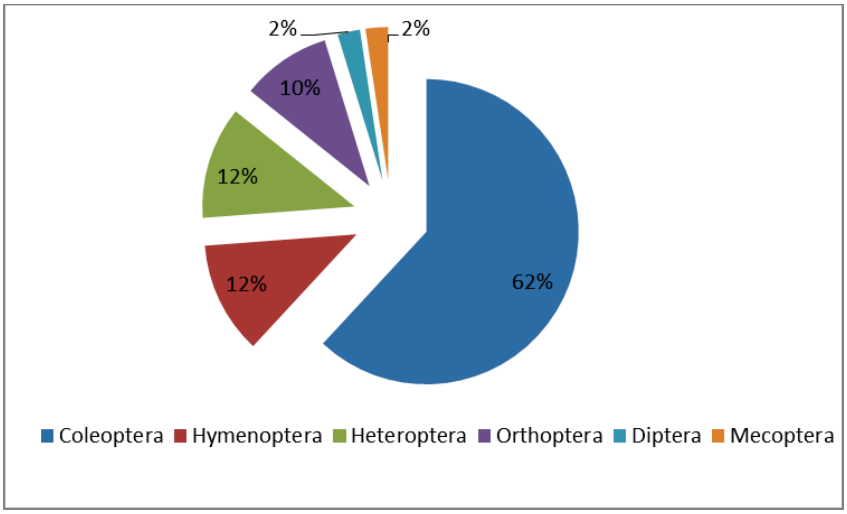

Figure 1. Entomofauna structure identified in the Otăsău River Basin (orig.)

CONCLUSIONS

The entomofauna identified up till now from the Otasau River Basin belongs to 21 families and 6 orders. Families with the most numerous representatives are Carabidae with 6 species and Scarabeidae with 5 species. These are followed by Apidae, Chrysomelidae, Cerambycidae and Pentatomidae, with 3 species each, and Coccinelidae, Cantharidae, Elateridae and Vespidae, with 2 species each. The rest of the families have just one single species.

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RESEARCHES ON THE BEHAVIOR OF SOME TRITICALE CULTIVARS IN RELATION TO DISEASES AND PESTS IN DÂMBOVIŢA'S ECOSYSTEMS

Neagu Frăsin Loredana Beatrice[1], Niculae Dincă[2]

Keywords: *triticale, cultivars, resistence, diseases, pests*

ABSTRACT

Triticale represents an alternative to the cultures of cereals, because it can turn to good value the soils that are poor in nutrients. At the Testing Field for Cultivars of Târgovişte, triticale presented 6 diseases and a pest which attacked the plant to different degrees, depending on the cultivar. From the analysis of the behavior of 10 cultivars, during three years of observations, the most resistent appeared to be: to Mycosphaerella graminicola - Titan, MT 04-09, MT 08-09; to Puccinia recondita - Oda, Paltin, Titan, Stil; to Pyrenophora graminea - Paltin, Titan, MT 04-09 and MT 08-09, to Eurygaster sp. -Paltin, Stil, Titan, MT 04-09 and MT 08-10. Corelating the yield of each cultivar with the resistance to diseases and pests, we recommend the cultivation of the following triticale cultivars under the pedoclimatic conditions of Dâmboviţa County: Titan, Paltin, Stil, MT 04-09, MT 08-09.

INTRODUCTION

Triticale (X Triticosecale Wittmack), the product of wheat and rye hybridization, has demonstrated high yield potential even under marginal growing conditions and could be a very attractive alternative for raising cereal production globally (Peña 2004).

Triticale, now a well-established crop internationally, is used for food, feed (monogastrics and ruminants), grazed or stored forage and fodder, silage, green-feed and hay. In recent years, triticale has received attention as a potential energy crop and researches have been conducted on the use of the crop biomass in bioethanol production (Mergoum et al. 2009).

Some modern high-yielding triticale cultivars have nutritional advantages over wheat in terms of UP content in the grain, the production of energy and UP per hectare (Heger & Eggum 1991).

Initially, biotic stresses did not appear to be a serious constraint to triticale production; however, as triticale acreage increased, most wheat, and rye diseases started to infect triticale (Singh & Saari, 1991). By comparison with wheat, triticale appears to have

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good resistance to several common wheat diseases and pests including rusts (*Puccinia* sp.), *Septoria complex*, smuts (*Ustilago and Urocystis* sp.), brunts (*Tilletia* sp.), powdery mildew (*Blumeria graminis*), cereal cyst nematode (*Heterodera avenae*), and Hessuan fly (*Mayetiola destructor*) (Mergoum et al. 2009).

MATERIAL AND METHODS

The researches have been carried out in the experimental fields of C.T.S. Târgoviște, during the period of the years 2011-2013, on 10 triticale cultivars, and the attack of the diseases and pests was assessed by estimating the frequency of attack (F%), the intensity of attack (I%) and the degree of attack (G.A%).

The frequency of attack (F%) was calculated using the formula:

$$F = N \times 100 / Nt,$$

where:

N = number of plants (organs) attacked;
Nt = total number of plants (organs) observed (controlled).

The intensity of attack (I%) was calculated using the formula:

$$I (\%) = \Sigma(ixf) / n,$$

where:

i = percentage of the mark awarded;
f = number of plants (organs) marked by the respective mark;
n = total number of plants (organs) attacked analyzed.

We used a grading scale from 0 to 6, as one can observe from Table 1.

Table 1

Scale marking the intensity of the attack

Attacked area (%)	Mark for the intensity of the attack
0	0
1 - 3	1
4 - 10	2
11 - 25	3
26 - 50	4
51 - 75	5
76 - 100	6

The degree of attack was calculated according to the relation:

$$G.A. (\%) = F(\%) \times I(\%) / 100,$$

where:

F = frequency of attack;
I = intensity of attack.

RESULTS AND DISCUSSIONS

Under the climatic conditions of the agricultural year 2010- 2011 (Table 2), all the cultivars had a good resistance both to rust, septoria, helmintosporiose and the attack of *Eurygaster spp.*. More affected by rusts compared to the average of the cultivars were: MT 08-10, MT 08-09, Pisc and Negoiu, while very resistent to rusts were the cultivars Oda and Paltin and the witness Stil.

Regarding the behavior of the cultivars tested to septoria, more affected were the cultivars MT 08-09 and Paltin and more resilient the witness Titan.

Septoria, which limits the wheat yield, during the last few years increasingly frequently, has been signaled in triticale as well, with a lower level of attack.

Affected by helmintosporose were the cultivars MT 08-10, Rotric, Oda, Pisc and MT 04-09 but also the witness Stil and resistent to this disease were the cultivar Paltin and the witness Titan. Resistant to the attack of *Eurygaster spp.* were the cultivar Paltin and the witness Stil, while the most attacked by *Eurygaster spp.* were Rotric and MT 08-09 (Table 2).

Table 2

Cultivar behavior in relation to diseases and pests – 2011

Crt. no.	Name of cultivar	Name of fungus and pests											
		Mycosphaerella graminicola			*Puccinia recondita*			*Pyrenophora graminea*			*Eurygaster spp.*		
		F %	I %	GA %	F %	I %	GA %	F %	I %	GA %	F %	I %	GA %
1	TITAN Mt.	60	30	18	50	30	15	60	30	18	30	10	3
2	STIL Mt.	50	40	20	50	40	20	60	40	24	50	15	7,5
3	NEGOIU	60	35	21	65	45	29,3	65	35	22,8	50	20	10
4	ODA	70	25	17,5	50	40	20	70	40	28	40	15	6
5	PALTIN	65	30	19,5	50	40	20	60	30	18	40	15	6
6	PISC	60	40	24	60	40	24	60	30	18	30	15	4,5
7	ROTRIC	50	45	22,5	65	40	26	50	30	15	60	30	18
8	MT 04-09	60	20	12	70	50	35	40	20	8	40	10	4
9	MT 08-09	60	30	18	70	30	31	40	30	12	50	10	5
10	MT 08-10	65	45	29,3	70	40	28	50	30	15	45	9	4

Under the conditions of the agricultural year 2011-2012 (Table 3), an unfavorable year for the cultivation of cereals, the degree of attack by all the diseases was high, the yields being therefore much lower compared to the previous year. Thus, we consider as not

resistent to *Septoria* the cultivars MT 08-10 and Rotric, while resistent were the cultivars MT 04-09, MT 08-09 and the witness Titan.

A strong attack by rusts was observed, which led to the qualitative and quantitative decline of the crop. The quantitative depreciation occurred through the reduction of the number of grains per straw, but also through the decrease of the 1000 - grains weight. The qualitative depreciation occurred through the decrease of the protein content in the grains. Compared to the previous year, the degree of attack by rusts increased even up to 10-15 times.

This year, highly affected by rusts were the cultivars MT 04-09, MT 08-09 and Negoiu, and resistent to the attack by rusts were the cultivars Oda and Paltin, but also the witnesses Titan and Stil.

Regarding the attack by helmintosporiose, resistent to this strong attack were the cultivars MT 04-09 and MT 08-09, while affected by it were the cultivars Oda, Stil (witness) and Negoiu.

This year, *Eurygaster spp.* caused higher damage to the triticale culture, the worst attacked being the cultivars Rotric and Negoiu, while the least attacked were Titan, MT 04-09 and MT 08-10.

Some *septoria* symptoms were met this year with the cultivars MT 08-09 and MT 08-10, while the rest of the cultivars resisted extremely well to septoria.

Table 3

Cultivar behavior in relation to diseases and pests – 2012

Crt. no.	Name of cultivar	Name of disease and pests											
		Mycosphaerella graminicola			*Puccinia recondita*			*Pyrenophora graminea*			*Eurygaster spp.*		
		F %	I %	GA %	F %	I %	GA %	F %	I %	GA %	F %	I %	GA %
1	TITAN Mt.	60	30	18	50	30	15	60	30	18	30	10	3
2	STIL Mt.	50	40	20	50	40	20	60	40	24	50	15	7.5
3	NEGOIU	60	35	21	65	45	29.3	65	35	22.8	50	20	10
4	ODA	70	25	17.5	50	40	20	70	40	28	40	15	6
5	PALTIN	65	30	19.5	50	40	20	60	30	18	40	15	6
6	PISC	60	40	24	60	40	24	60	30	18	30	15	4.5
7	ROTRIC	50	45	22.5	65	40	26	50	30	15	60	30	18
8	MT 04-09	60	20	12	70	50	35	40	20	8	40	10	4
9	MT 08-09	60	30	18	70	30	31	40	30	12	50	10	5
10	MT 08-10	65	45	29.3	70	40	28	50	30	15	45	9	4

Under the climatic conditions of the agricultural year 2012-2013 (Table 4) the average crops significantly increased compared to the previous years (by 1,200 kg/ha compared to 2011 and 2,500 compared to 2012), and the unfavorable action of the diseases and pests was minimal.

Some symptoms of septoria were met this year with the cultivars MT 08-09 and MT 08-10, while the rest of them behaved very well regarding septoria.

Table 4

Cultivar behavior in relation to diseases and pests – 2013

Crt. no.	Name of cultivar	Name of disease and pests											
		Mycosphaerella graminicola			*Puccinia recondite*			*Pyrenophora graminea*			*Eurygaster spp.*		
		F %	I %	GA %	F %	I %	GA %	F %	I %	GA %	F %	I %	GA %
1	TITAN Mt.	0	0	0	10	5	0.5	15	5	0.8	10	5	0.5
2	STIL Mt.	0	0	0	5	5	0.1	10	5	0.5	10	5	0.5
3	NEGOIU	10	4	0.4	5	5	0.1	10	5	0.5	15	5	0.8
4	ODA	5	5	0.3	5	5	0.1	5	5	0.1	10	5	0.5
5	PALTIN	0	0	0	0	0	0	0	0	0	5	5	0.3
6	PISC	0	0	0	0	0	0	0	0	0	5	5	0.3
7	ROTRIC	5	5	0.1	10	5	0.5	15	5	0.8	10	5	0.5
8	MT 04-09	0	0	0	0	0	0	0	0	0	15	5	0.8
9	MT 08-09	10	5	0.5	10	5	0.5	15	5	0.8	15	5	0.8
10	MT 08-10	10	5	0.5	10	5	0.5	15	5	0.8	10	5	0.5

The same cultivars mentioned above plus the witness Titan and the cultivar Rotric also presented some symptoms of rust, the rest of the cultivars being unaffected by this disease. MT 08-09, MT 08-10, Rotric and the witness Titan, at the end of the month of April and the beginning of the month of May, on the basic leaves presented a few brown circular spots and dots (helmintorporium symptoms) but which did not evolve. The rest of the cultivars were very resistent to helmintosporium this year.

During this year, the *Eurygaster spp.* population was significantly diminished by the extreme temperatures of the winter of the year 2012; by the diminution of this population, the damage was also significantly reduced.

CONCLUSIONS

In order to assure an optimal production of triticale per hectare, with a maximum economic efficiency, it is obligatory to respect the cultivation technologies for this plant, which can profitably use the soils poor in nutrients, even during the dry years.

In the tests carried out at of the Testing Center for Cultivars from Târgovişte, triticale presented the following diseases and pests:

- Septoria tritici blotch produced by the fungus *Mycosphaerella graminicola* (asexual stage *Septoria tritici*);
- Helminthosporium leaf blight produced by the fungus *Pyrenophora graminea* (asexual stage *Drechslera graminea*);
- Wheat leaf rust produced by the fungus *Puccinia recondita;*
- Wheat bug – *Eurygaster* sp.

By correlating the crop of every cultivar to the resistance to diseases and pests, we recommend the cultivation of the following triticale cultivars in the pedoclimatic conditions of Dâmboviţa County: Titan, Paltin, Stil, MT 04-09, MT 08-09.

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OBSERVATIONS REGARDING THE AGRONOMICAL VALUE AND THE USE OF WINTER WHEAT CULTIVARS IN SOUTHERN MUNTENIA'S ECOSYSTEMS

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Keywords*: winter wheat, cultivar, production, 1,000 - grains weight, hectoliter weight.*

ABSTRACT

The cultivar is known as the most important technological link from the perspective of the production stability, but its quantity and quality are influenced by the climatic conditions. The identification of some cultivars or hybrids having genetic characteristics which should offer a better adaptability is particularly important.

The observations were carried out in the experimental field of the Testing Field for Cultivars from Targoviste, during the period 2011-2013 and their objective was to evaluate the capacity of adaptation of some winter wheat genotypes and to identify genotypes with large productions and low production variations under different climatic conditions. All the cultivars that we tested managed to adapt to the climatic production in our area, the average yields in all the years of testing went beyond the average productions of our country. The cultivars NSA 04-2210A, SO 1006, Lovrin 67 and PG 101 maintained the best stability of their crop during all the three years of testing.

INTRODUCTION

Wheat is the dominant crop in temperate countries being used for human food and livestock feed. Its success depends partly on its adaptability and high yield potential (Shewry 2009).

From the analysis of the behavior of 9 winter wheat cultivars, during the period 2008-2010, in the south-eastern area of Bărăgan it resulted that the cultivars Glosa and Şimnic 50 manifested higher yield stability under contrasting environmental conditions (Voinea 2011).

At the Agricultural Research and Development Station of Teleorman the reaction of 16 varieties of winter wheat under 2008-2010 specific conditions has been studied. The highest yields were obtained by Dor, Gruia, Izvor and Ciprian varieties (6927-7067 kg/ha), which exceeded significantly and substantially the control variety Flamura 85 to 934-1074 kg/ha, namely by 15.6 to 17.9%, demonstrating a high capacity of adaptability to biotic and abiotic conditions manifested during the experiment (Melucă et al. 2011).

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Analyzing 14 romanian autumn wheat cultivars along with the control cultivar Bezostaia 1, known for its good adaptability to varying environmental conditions (Izvor, Delabrad), to favorable environmental conditions (Alex, Dor, Boema, Crina, Romulus, Fundulea 4), but also cultivars with a large adaptability to contrasting environmental conditions (Glosa, Gruia, Faur), the cultivars Izvor, Delabrad, Glosa, Gruia and Faur manifested a more constant yield under contrasting environmental conditions (Mustăţea et al. 2008).

Given the behaviour of 11 winter wheat cultivars at A.R.D.S. Pitesti, during 2002-2009, the cultivars under analysis had a different reaction to environmental conditions. Cultivars with adaptability to unfavourable environmental conditions - Delabrad and Glosa, adaptability to favourable ones - Alex, Albota, Boema, Faur, Gruia -, and large adaptability to contrasting environmental conditions - Trivale, were identified. The cultivars Delabrad, Trivale and Glosa manifested a higher yield stability under contrasting environmental conditions, but the new entries are better adapted to those, leading to obtainment of yields superior to former cultivars Flamura 85 and Dropia (Voica 2010).

Referring to the yield performances of 9 winter wheat varieties, based on the data obtained in four years of yield trials (2005-2008) performed at A.R.D.S. Secuieni, the results obtained in this study suggested that, in this region, the new winter wheat varieties Boema, Glosa and Delabrad will be a good choice to be spread into production (Negru 2009).

MATERIAL AND METHODS

The experiments on wheat were realized in the experimental fields of the Testing Center for Cultivars from Târgovişte, in the years 2011 - 2013, for 15 wheat cultivars, the experimental lot having the following parameters:

- the setting method: randomized blocks;
- altitude: 262 m;
- soil type: luvic brown;
- number of repetitions: 4 + 1,
- 4 repetitions for production calculation;
- seeded area – 12 m^2;
- previous culture: pea, during the years 2011, 2012 and 2013;
- cultivation conditions: non-irrigated;
- fertilizers – in autumn – 110 kg N a.i./ ha, 80 kg P_2O_5 a.i./ha.

Seeds were treated during the three years at the Testing Center using Amiral Proffy 6FS in a dose of 0.5 l/t of seeds. Seeding was carried out in the fall, on 13 October 2010 for the year 2011, on 18 October 2011 for the year 2012, and on 05 October 2012 for the year 2013, dates which are included in the optimal seeding period for the south-eastern region of Romania. The seeding depth was 2-5 cm. Herbicides were used every year, namely the product RIVAL SUPER STAR 75 GD in a dose of 20 g/ha.

The 1000 - grains weight (M.M.B.) was determined as follows:

- seeds were counted randomly and grouped into groups of 10, then groups of 100 and then groups of 500 grains
- the two 500-grain samples were weighed separately, and the results were summarized.

The final result is the 1,000 - grains weight (M.M.B.).

The hectoliter weight (M.H.L.) is determined immediately after harvesting for each hybrid. We weighed a quantity of seeds filling a cylindrical vase having a volume of 1 liter. We used the hectoliter measure. For each sample, two determinations were made.

RESULTS AND DISCUSSIONS

Under the climatic conditions of the agricultural year 2010-2011 (Table 1), the average yield for the 15 wheat cultivars under analysis varied around the value of 4.7 kg/lot, namely 4,700 kg/ha; the minimum recorded being that of the Aramis cultivar, with a yield of 4,200 kg/ha and the maximum registered being the Lovrin 67 cultivar, whose yield was 6,300 kg/ha. The three witness cultivars (Boema 1, Dropia, Flamura 85) yielded on average 4,800 kg/ha just as the cultivars Pitar and PG 102.

Table 1

Production data in the year 2011

Crt. no.	Winter wheat cultivars	Parcel area (m^2)				Production/parcel (kg)				MMB (g)	MHL (kg/hl)
		R1	R2	R3	R4	R1	R2	R3	R4		
1	BOEMA 1 (witness control)	10	10	10	10	4.7	4.6	5.1	4.9	44	73
2	DROPIA (witness control)	10	10	10	10	4.6	4.9	5.3	5.2	44	74
3	FLAMURA 85 (witness control)	10	10	10	10	4.7	4.8	4.8	5.0	46	74
4	PITAR	10	10	10	10	5.2	4.5	4.9	4.6	40	72
5	PARTENER	10	10	10	10	5.6	5.9	5.5	5.7	38	74
6	ARAMIS	10	10	10	10	4.2	5.2	4.3	4.7	36	67
7	NSA 04-2210A	10	10	10	10	5.9	5.5	5.7	5.6	38	68
8	SO 1006	10	10	10	10	4.9	4.4	5.0	4.6	39	68
9	SO 1042	10	10	10	10	4.8	4.3	4.5	4.7	36	63
10	PG 101	10	10	10	10	5.7	6.1	5.9	5.5	41	67
11	PG 102	10	10	10	10	5.4	4.7	4.9	4.5	36	67
12	OSK 29/05	10	10	10	10	4.6	4.9	4.7	4.8	40	70
13	SEKA	10	10	10	10	5.4	5.3	5.2	5.0	36	69
14	ALKA	10	10	10	10	4.9	4.6	4.7	4.8	37	69
15	LOVRIN 67	10	10	10	10	6.2	6.2	6.3	6.1	41	70

From the perspective of the 1,000 - grains weight, the 15 cultivars recorded values ranging between 36 and 46 g, the highest value being recorded by the witness FUNDULEA 85, and the lowest one for the following cultivars: ARAMIS, PG 102 and SO 1042.

The hectoliter weight ranged between 63 and 74 kg, the minimum being recorded for the cultivar SO 1042, and the maximum for two witnesses (DROPIA, FLAMURA 85) and a cultivar under testing (PARTENER).

Under the climatic conditions of the year 2011-2012 (Table 2), the average yield of the 15 cultivars oscillated quite significantly between 3.4 kg/lot, i.e. 3,400 kg/ha in the case of two cultivars (Lovrin 67 and Seka) and the value of 6.2 kg/lot, a value recorded for

two cultivars (NSA 04-2210A and SO 1006). The average yield of all the 15 cultivars was 4,200 kg/ha, a value that was quite close to the yield recorded during the previous year. The 3 witnesses recorded average yields of 3,700 kg/ha.

The 1,000 - grains weight (M.M.B.) of the 15 cultivars oscillated between 34 g, a value recorded in the case of the cultivars Seka and Alka and 43 g, a value encountered in the case of two of the witnesses, namely Dropia and Flamura 85. This parameter also had lower values compared to the previous year due to the environmental conditions.

Table 2

Production data in the year 2012

Crt. no.	Winter wheat cultivars	Parcel area (m^2)				Production/parcel (kg)				MMB (g)	MHL (kg/hl)
		R1	R2	R3	R4	R1	R2	R3	R4		
1	BOEMA 1 (witness control)	10	10	10	10	4.1	3.5	3.6	3.1	40	72
2	DROPIA (witness control)	10	10	10	10	4.2	3.6	3.8	3.1	43	74
3	FLAMURA 85 (witness control)	10	10	10	10	3.8	3.9	3.8	3.6	43	73
4	PITAR	10	10	10	10	3.6	4.0	3.5	3.3	40	71
5	PARTENER	10	10	10	10	4.3	3.6	3.4	3.1	39	73
6	ARAMIS	10	10	10	10	5.5	4.7	4.6	4.1	38	68
7	NSA 04-2210A	10	10	10	10	6.7	6.3	6.1	5.8	39	69
8	SO 1006	10	10	10	10	6.1	6.4	6.3	5.9	40	69
9	SO 1042	10	10	10	10	5.2	5.1	5.0	4.3	37	64
10	PG 101	10	10	10	10	5.3	4.8	5.1	4.4	42	68
11	PG 102	10	10	10	10	5.7	4.9	5.2	4.2	37	67
12	OSK 29/05	10	10	10	10	3.5	3.7	3.6	3.3	36	70
13	SEKA	10	10	10	10	3.1	3.4	3.8	3.3	34	68
14	ALKA	10	10	10	10	3.5	3.8	3.6	3.2	34	68
15	LOVRIN 67	10	10	10	10	4.0	3.1	3.2	3,3	40	65

The hectoliter weight for this year varied between 64 kg for the cultivar SO 1042 and 74 kg, a value recorded for the witness cultivar Dropia.

In the agricultural year 2012-2013 (Table 3) the average yield of the 15 oscillated between 5.8 kg/lot, i.e. 5,800 kg/ha in the case of 2 cultivars (Boema 1 and Flamura 85) and the value of 8.2 kg/lot, a value recorded by NSA 04-2210A. The average yield of all the 15 cultivars was 6,700 kg/ha, a value exceeding by about 2,000 kg/ha the average yields of the previous two years. We can notice that the year 2013 was an exceptional year regarding the wheat production for the cultivars that we tested. The cultivar NSA 04-2210A stands out with an average crop of 8,200 kg/ha

The 1,000 - grains weight of the 15 cultivars oscillated between 36 g, a value recorded in the case of the cultivars Seka and Alka and 47 g, a value recorded for the cultivar Aramis. This parameter had significantly higher values compared to the previous year due to the environmental conditions.

The hectoliter weight for this year ranged between 68 kg for the cultivars SO 1042 and PG 102 and 73 kg, a value registered with the witnesses Dropia and Flamura 85 and with the cultivar Partener, values clearly higher compared to the previous year due to the extremely favorable meteorological conditions.

Table 3

Production data in the year 2013

Crt. no.	Winter wheat cultivars	Parcel area (m^2)				Production/parcel (kg)				MMB (g)	MHL (kg/hl)
		R1	R2	R3	R4	R1	R2	R3	R4		
1	BOEMA 1 (witness control)	10	10	10	10	5.6	5.9	5.7	6.2	40	72
2	DROPIA (witness control)	10	10	10	10	6.6	6.0	6.3	6.4	42	73
3	FLAMURA 85 (witness control)	10	10	10	10	5.7	6.1	6.1	5.3	43	73
4	PITAR	10	10	10	10	5.8	6.2	6.4	5.7	40	72
5	PARTENER	10	10	10	10	7.3	7.5	7.6	7.0	38	73
6	ARAMIS	10	10	10	10	6.7	6.4	6.8	6.5	47	69
7	NSA 04-2210A	10	10	10	10	8.4	8.5	8.2	7.8	44	70
8	SO 1006	10	10	10	10	7.7	7.6	7.0	7.1	42	70
9	SO 1042	10	10	10	10	6.2	5.8	5.6	6.0	39	68
10	PG 101	10	10	10	10	7.7	7.5	7.1	6.8	41	69
11	PG 102	10	10	10	10	7.2	7.7	6.8	6.7	38	68
12	OSK 29/05	10	10	10	10	7.0	7.3	7.1	6.8	37	71
13	SEKA	10	10	10	10	7.0	6.8	7.2	6.9	36	69
14	ALKA	10	10	10	10	6.8	6.2	6.5	6.3	36	69
15	LOVRIN 67	10	10	10	10	6.4	6.9	6.2	6,8	41	69

CONCLUSIONS

Although coming from different countries of Europe, all the cultivars that we tested managed to adapt to the conditions of our area.

In the year 2011, the average yields were almost equal and oscillated around the value of 5.0 kg/lot.

In the year 2012 the average yield went down to around 3.0 kg/lot for most of the cultivars, because of the unfavorable environmental conditions; only NSA 04-2210A and SO 1006 stand out by average yields going over the value of 6.0 kg/lot.

In 2013, the yields increased significantly also because of the exceptional conditions for wheat cultivation, and the cultivar NSA 04-2210A stands out by an average yield of more than 8.0 kg/lot, that is 8,000 kg/ha.

The climatic conditions of the experimentation period were quite variable, a fact that has been reflected in the level of the crops obtained from one year to the next. The lowest yields were obtained in the year 2012, and the highest in the year 2013.

The cultivars NSA 04-2210A, SO 1006, Lovrin 67 and PG 101 manifested the highest yield stability during all the three years of testing.

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PHYSIOLOGICAL CHANGES IN *VITIS VINIFERA* L. DUE TO THE ATTACK PRODUCED BY *PLASMOPARA VITICOLA* (BERK. & CURT.) BERL. & DE TONI

Nicolae I.[1*], Buşe Dragomir Luminiţa[1]

Keywords*: attacked leaves, grapevine, pathogen, photosynthesis, transpiration.*

ABSTRACT

Research regarding physiological changes produced in grapevine due to the attack produced by Plasmopara viticola (Berk. & Curt.) Berl. & De Toni were performed on variety Fetească Albă cultivated in the climatic conditions in Oltenia region.

In the leaves of the grapevine (Fetească Albă variety) attacked by the pathogen it is observed that the physiological processes intensity presents specific variations due the damaging action of the pathogen. The photosynthesis and transpiration's intensity in the attacked leaves by the Plasmopara viticola (Berk. & Curt.) Berl. & De Toni is similar to that in the healthy leaves, but the recorded values are lower due to the reduction of the assimilation surface of the leaf due to the appearance of yellow circular spots or necrosis of the tissue corresponding to these spots.

The attacked leaves present a decrease of chlorophyll content and of the water content manifested by the decrease of the cellular turgor and drying of the leaves.

INTRODUCTION

Vitis vinifera (grapevine) is a plant native to the Mediterranean region, Central and South-West Asia and is cultivated for its fruit, grape, nutritional and medicinal properties. This plant has alternate leaves, palmately lobed, small flowers, the fruits are large at cultivated plants and can have different colors: white, white-green, red or purple.

The high point in the photosynthesis for the grapevine is achieved at its base leaves in the period preceding the ripening phase and during this phase, around 1 o'clock p.m. During the ripeness phase the photosynthesis intensity came before 1 o'clock p.m. and the greatest intensity was established at the apical leaves (Hunter et al. 1994).

The young leaves have the highest intensity of the transpiration process and as they get older, the transpiration intensity decreases, the lower values being recorded at senescent leaves (Burzo et al. 1999).

At the grapevine - *Italian Riesling* variety, according to the climatic conditions, was established a good positive correlations between the physiological process and photosynthetic active, leaf temperature and stomatal conductance (Nicolae & Camen 2012).

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Plasmopara viticola is endemic on wild *Vitis* species of North America. It was first observed in Europe in 1878. It was probably introduced into Europe with American grape cuttings used to replant French vineyards destroyed by phylloxera (Gessler et al. 2011).

MATERIALS AND METHODS

The research regarding the physiological changes produced by the *Plasmopara viticola* (Berk. & Curt.) Berl. & De Toni was performed in the grapevine - *Fetească Albă* variety cultivated in climatic conditions in Oltenia region.

The variety *Fetească Albă* is an old Romanian variety well adapted to the climate in our country. It produces cylindrical-conical grapes, for small, spherical grains and small, uniformly arranged, greenish-yellow, juicy pulp with characteristic pleasant taste.

The photosynthesis and transpiration were made by using the photosynthesis analyzer LCi, system which enables automatic recording and other parameters (photosynthetic active radiations, leaf temperature, stomatal conductance etc.). The results obtained were graphically represented and statistically interpreted.

The water contents and that of dry substance were determined by the gravimetric method. The chlorophyll content was estimated by Minolta SPAD 502 chlorophyll meter.

For the estimate of the attack was made using the calculation formulae by Săvescu & Rafailă (Săvescu & Rafailă 1978).

RESULTS AND DISCUSSIONS

Plasmopara viticola (Berk & Curt.) Berl. & De Toni, the causative agent of downy mildew, is one of the most widely distributed fungal diseases of grapevines worldwide (Alonso-Villaverde et al. 2011).

Foliar symptoms appear as yellow circular spots with an oily appearance (oilspots). Young oilspots on young leaves are surrounded by a brownish-yellow halo. This halo fades as the oilspot matures. Under favorable weather conditions, large numbers of oilspots may develop and coalesce to cover most of the leaf surface (Figure 1).

After suitably warm, humid nights, a white downy fungal growth (sporangia) will appear on the underside of the leaves and other infected plant parts (Ash 2000)-Figure 2.

Figure 1. The leaf of *Vitis vinifera* L. - *Fetească Albă* variety attacked by *Plasmopara viticola* (Original).

Figure 2. *Plasmopara viticola* - sporangiospores and sporangia (Original).

Gradually the foliate spots get bigger, join together and turn into a reddish colour, having a burnt appearance, due to the mortification of the tissue.

In autumn, the mellow leaves present themselves with small, brown, unevenly spots, which contrasted with the green tissues confer the leaf a mosaic aspect. Within the mosaic spots tissues, the fungus differentiates between antheridia and oogonia which will form oospores after copulation, in this form the fungus overwinters and ressumes its evolutional cycle (Mitrea Rodi 2006).

The physiological analyses were performed in August 5th 2014 on the attacked plants, in comparison with healthy plants.

The estimation of the attack (frequency, intensity and degree of attack) caused by the *Plasmopara viticola* at the grapevine (*Feteasc*ă *Albă* variety) is presented in Figure 3.

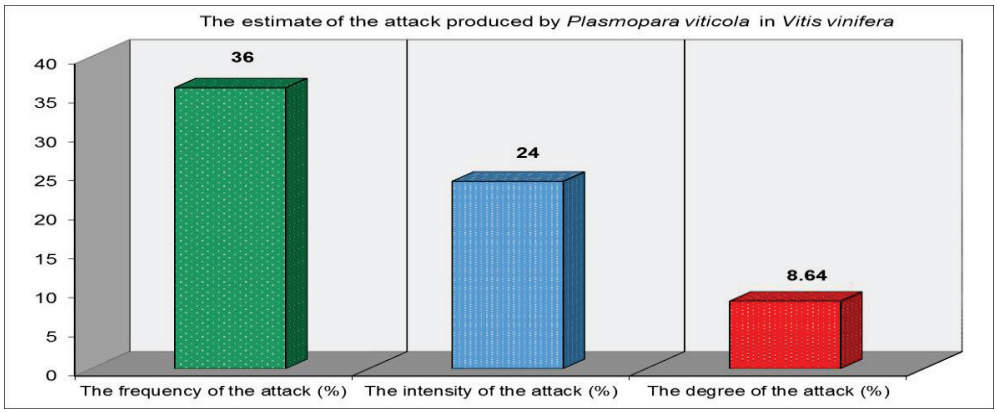

Figure 3. The estimate of the attack produced by *Plasmopara viticola* (Berk. & Curt.) Berl. & De Toni in grapevine - *Feteasc*ă *Albă* variety.

The diurnal dynamics of photosynthesis in the attacked leaves is similar to that in the healthy leaves, but the recorded values are lower due to the reduction of the assimilation surface (Figure 4). The diurnal dynamics of transpiration in the attacked leaves record lower values as a result of the malfunctioning of the stomatic apparatus and the water imbalances occurring (Figure 5).

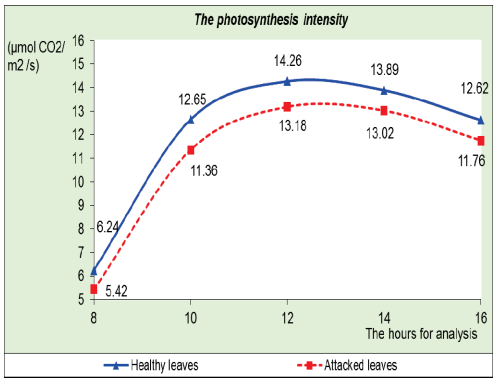

Figure 4. The photosynthesis intensity at the grapevine - *Feteasc*ă *Albă* variety.

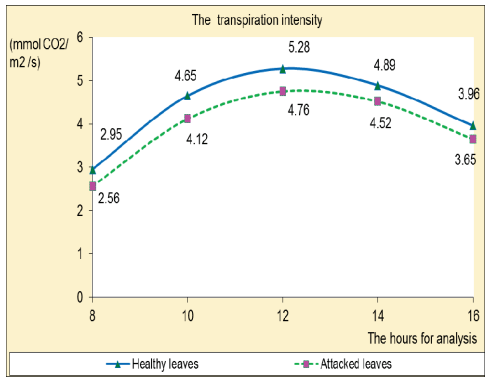

Figure 5. The transpiration intensity at the grapevine - *Feteasc*ă *Albă* variety.

In grapevine leaves an intensification of the photosynthetic active radiations present on the surface of the leaves can be noticed starting from the morning (8 a.m.) when it can record values of 950 µmol / m^2 / s in the healthy leaves and of 942 µmol / m^2 / s in the attacked leaves by pathogen, their growth up until afternoon (12 a.m.) when it records values of 1440 µmol / m^2 / s in the healthy leaves and 1420 µmol / m^2 / s in the attacked leaves and to the evening (4 p.m.) it can notice a gradual decrease recording values of 1365 µmol / m^2 / s in the healthy leaves and of 1352 µmol / m^2 / s in the attacked leaves.

Linear regression made between the photosynthesis intensity and photosynthetic active radiations show a positive correlation, the coefficient of determination (R^2) was 0.95 in the healthy leaves and 0.94 in the attacked leaves, and linear regression made between the transpiration intensity and photosynthetic active radiations show a positive correlation - R^2 was 0.78 in the healthy leaves and 0.81 in the attacked leaves (Figure 6 and 7).

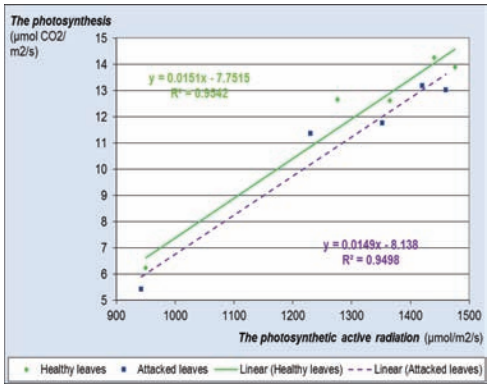

Figure 6. The correlation between the intensity of photosynthesis and the photosynthetic active radiation at the grapevine - *Feteasca Albă* variety.

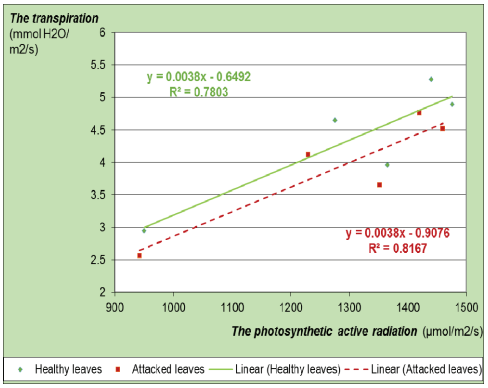

Figure. 7. The correlation between the intensity of transpiration and the photosynthetic active radiation at the grapevine - *Feteasca Albă* variety.

In the grapevine leaves one can notice an increase of the leaf temperature starting with the early hours of the morning (8 a.m) when it can record values of 27.4 ºC in the healthy leaves and of 27.5 ºC in the attacked leaves, their growth up until afternoon (12 a.m.) when it records values of 32.9 ºC in the healthy leaves and 33 ºC in the attacked leaves and to the evening (4 p.m.) it can notice a gradual decrease, recording values of 31.1 ºC in the healthy leaves and of 31.3 ºC in the attacked leaves.

Linear regression made between the photosynthesis intensity and the leaf temperature shows a good positive correlation, the coefficient of determination (R^2) was 0.90 in the healthy leaves and 0.88 in the attacked leaves, and linear regression made between the transpiration intensity and leaf temperature shows a positive correlation - R^2 was 0.82 in the healthy leaves and 0.81 in the attacked leaves (Figure 8 and 9).

At the leaves of the grapevine it can notice an intensification of the stomatal conductance of CO_2 starting with the early hours of the morning (8 a.m.) when it can record values of 0.06 mol / m^2 / s in the healthy leaves and 0.05 mol / m^2 / s in the attacked leaves, their growth up until afternoon (12 a.m.) when it records values of 0.12 mol / m^2 / s in the healthy leaves and 0.11 mol / m^2 / s in the attacked leaves and to the evening (4 p.m.) it can notice a gradual decrease, recording values of 0.1 mol / m^2 / s in the healthy leaves and 0.09 mol / m^2 / s in the attacked leaves.

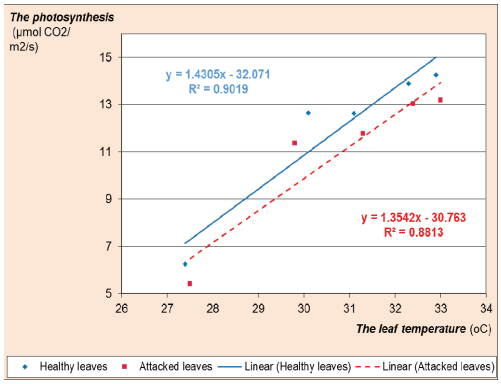

Figure 8. The correlation between the intensity of photosynthesis and the leaf temperature at the grapevine - *Feteasc*ă *Albă* variety.

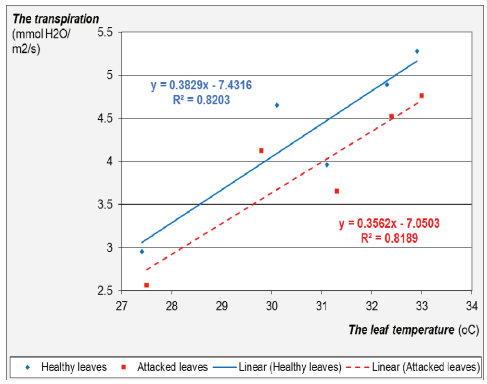

Figure 9. The correlation between the intensity of transpiration and the leaf temperature at the grapevine - *Feteasc*ă *Albă* variety.

Linear regression made between the photosynthesis intensity and stomatal conductance of CO_2 shows a positive correlation, the coefficient of determination (R^2) was 0.90 in the healthy leaves plants and 0.82 in the attacked leaves, and linear regression made between the transpiration intensity and stomatal conductance of CO_2 shows a positive correlation - R^2 was 0.83 in the healthy leaves and 0.76 in the attacked leaves by the pathogen (Figure 10 and 11).

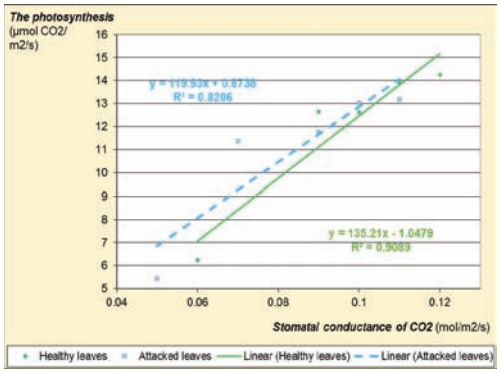

Figure 10. The correlation between the intensity of photosynthesis and the stomatal conductance of CO_2 at the grapevine - *Feteasc*ă *Albă* variety.

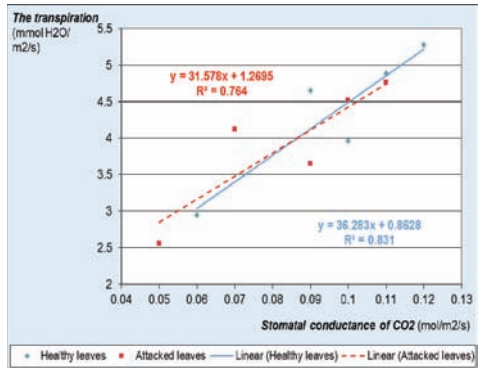

Figure 11. The correlation between the intensity of transpiration and the stomatal conductance of CO_2 at the grapevine - *Feteasc*ă *Albă* variety.

The grapevine leaves attacked by *Plasmopara viticola* (Berk. & Curt.) Berl. & De Toni present a lower water content and a higher dry substance content, in comparison with the healthy leaves (Figure 12).

In the attacked leaves by pathogen it records a lower chlorophyll content as a result of the blockage of its biosynthesis chlorophyll and the deterioration of the chlorophyllian pigments, in comparison with the healthy leaves (Figure 13).

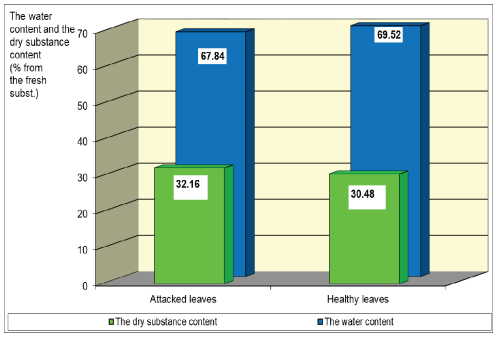

Figure 12. The water content and the dry substance content at the grapevine - *Feteasc*ă *Albă* variety.

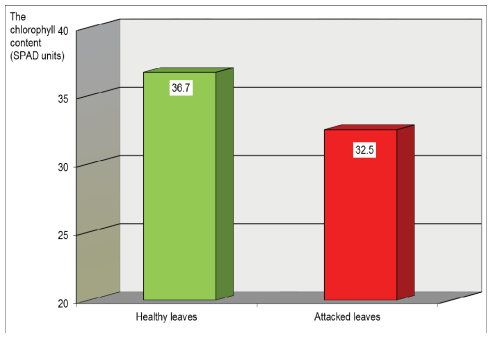

Figure 13. The chlorophyll content at the grapevine - *Feteasc*ă *Albă* variety.

CONCLUSIONS

In the *Vitis vinifera* L. it was observed that diurnal dynamics of the photosynthesis and transpiration present a minimum in the morning, a maximum at afternoon and a minimum to the evening, but the photosynthetis and transpiration intensity presents lower values, in the leaves attacked, compared with the healthy leaves.

The linear regressions performed at the grapevine *(Feteasc*ă *Albă* variety) between the physiological processes and the photosynthetic active radiation, the leaf's temperature and the stomatal conductance shows a positive correlation between these.

In the plant's leaves attacked by pathogen, was recorded a lower water content and a higher dry substance content, compared with healthy leaves. The chlorophyll content was lower in attacked leaves, being a positive correlation between the chlorophyll content and the photosynthetis intensity, fact that has consequences for grape production.

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DYNAMICS OF ANTIBODIES TO *HELICOBACTER PYLORI* IN PATIENTS TESTED IN MEDICAL DIAGNOSTIC CENTRE EUROMEDICA CRAIOVA IN 2014

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Keywords: *bacteria, infection, stomach, ulcer*

ABSTRACT

Helicobacter pylori (HP) is a gram negative bacterium, which locates usually in gastric mucosa crypts. The name is derived from a helix form, which apparently is responsible for adaptability and ability to infection in strong acid medium in the stomach. Helicobacter pylori infection is a major cause of chronic gastritis and ulcer disease; also in epidemiological studies of recent years it has been confirmed the association of persistent infection with an increased risk of gastric cancer. Even if the symptoms do not manifest, infection with Helicobacter pylori is one of the most common bacterial infections, considering that one in two people has this bacterium in the stomach.

INTRODUCTION

The gastric mucosa is well protected against bacterial infections. *Helicobacter pylori* is able to withstand the unfavorable acidic environment of the stomach due to a significant evolution, hiding in the protective mucus layer of the stomach which is resistant to the corrosive action of stomach acid. Helical shape is one of the adaptations which enable it to penetrate stomach mucosa membrane (Lutan 2004).

Unique characters allow entry into mucosa, attaching to epithelial cells and avoiding the immune response and, therefore, persistent colonization and spreading.

Australian pathologist Robin Warren in 1979 and then Barry Marshall in 1981, isolated bacteria from the stomach and have managed to cultivate the culture in adequate area. The two researchers have shown that this is responsible for gastric infections (https://ro.wikipedia.org/wiki/Helicobacter_pylori).

Increasing of acidity and gastric liquid and decreasing of mucosal protective capacity are the two major mechanisms involved in the occurrence of gastric and duodenal ulcers.

Mucosal ulcer disease means autodigestion of the mucosa by its own pepsin, the presence of hydrogen chloride, as a consequence of imbalance between the factors assault lining and protective factors, with the function of counteracting aggression (Lutan 2004).

Gastric mucosal barrier, made up of mucus and bicarbonate can be degraded by

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the action of *Helicobacter pylori*. The involvement of bacteria in the production of gastric ulcers explains treatment with antibiotic, together with inhibitors of HCl synthesis (Iancău 2009).

Helicobacter pylori has flagella that allow mobility and penetration of the mucus layer (Fig.1). It specific attaches to lipid structures of membranes of gastric mucosal cells. Pathogenicity factors constitute the enzymes and citotoxines they secrete. Enzymes synthesized and released by pathogenic *Helicobacter pylori* are urease, phospholipase A and protease digesting mucus and the apical membrane of the gastric and duodenal mucosa cells.

The indirect ulcerogenic mechanism of *Helicobacter pylori* consists in increasing chlorhydropeptic secretion. Patients with duodenal ulcer, HP^+, have hypergastrinemia, involving hyperacidity (Lutan 2004).

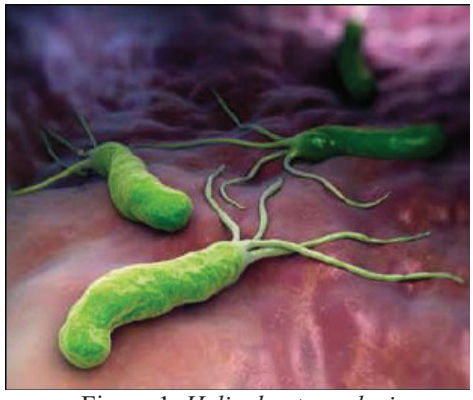


Figure 1. *Helicobacter pylori*
(http://www.mayomedicallaboratories.com/articles/communique/2013/11-hpylori-infection/)

The infection develops in many cases asymptomatically. When accompanied by clinical manifestations, patients typically show symptoms of dyspeptic type with abdominal discomfort, abdominal pain, nausea, heartburn, regurgitation, fullness after meals (Sopa et al. 2005).

Recent studies show the involvement of *Helicobacter pylori* in a number of extragastric diseases as well as cardiovascular, cerebrovascular, mental diseases, collagen vascular diseases, sideroblastic anemia or idiopathic thrombocytopenia (Andrabi et al. 2012).

Treatment of *Helicobacter pylori* infection is achieved by a series of procedures and protocols in case of gastritis and peptic ulcers where the main purpose is not to relieve symptoms, but to complete elimination of bacteria.

The main obstacle to an effective treatment against *Helicobacter pylori* is the resistance to antibiotics of bacteria, different from individual to individual, depending on the strain present in the body and how the patient managed previous antibiotic treatments. Usually there are used a combination of 2 or 3 antibiotics with proton pump inhibitors to counteract the resistance of bacteria to antibiotics. Set believed that about 50% of the existing strains are resistant to metronidazole and 15% to clarithromycin. Note that there is still no consensus on these dosages and combinations of antibiotics.

Saccharomyces boulardii, a beneficial bacteria in the intestinal flora is considered as a coadjutant in the eradication of the *Helicobacter pylori* strategy, also having the positive function of reducing the side effects as a result of therapy with antibiotics. For this reason, *Saccharomyces boulardii* supplements offer a simple way of action (https://en.wikipedia.org/wiki/Helicobacter_pylori_eradication_protocols).

Highly effective adhesion of *Helicobacter pylori* in the stomach mucosa is carried out by means of adhesion proteins to sugars naturally found on the stomach wall. This adhesion mechanism was recently identified by researchers in the School of Pharmacy, at the University of Nottingham. With extremely powerfull X-rays the researchers discovered the interactions between Lewisb sugars of the gastric mucosa and the *Helicobacter pylori* adhesion protein BabaA. Currently, studies are focused on finding a treatment with inhibitors of this protein to determine *Helicobacter pylori* bacteria to be released from the layer mucus of the stomach. Adhesion mechanism involves a network of hydrogen bonds, the study indicating that it only needs a few of them to be stopped in order to destabilize the entire network. The importance of this discovery is the fact that the protein BabA is unique to *Helicobacter pylori*, which offers the possibility of specifically target for eradicate it without harming the other good bacteria in our normal flora (http://www.nottingham.ac.uk/news/pressreleases/2015/august/revealed-helicobacter-pyloris-secret-weapon.aspx).

For eradication and prevention of *Helicobacter pylori* various vaccine are currently carried out in clinical trials. According to Markus Gerhard, professor of medical microbiology and immunology at Technique University of München, vaccination against *Helicobacter pylori* could help fight the global problem of rising antibiotic resistance (Sando 2014). In China, the oral recombinant *Helicobacter pylori* vaccine was effective, safe, and immunogenic in *Helicobacter pylori*-naive children (Ming Zeng et al. 2015).

There are a number of positive effects of the bacteria, for example in case of allergic diseases and obesity. The presence of this bacterium in the stomach may reduce the effects of asthma, allergic rhinitis, dermatitis, inflammatory bowel disease, gastroesophageal reflux and cancer of the esophagus because of its ability to influence immune responses systemic. *Helicobacter pylori* can influence and regulate acidity of stomach by releasing CagA protein when acidity increases, a protein that signals to the stomach the excess acidity and thus reduces secretion. On the other hand, CagA is responsible for causing stomach ulcers (https://en.wikipedia.org/wiki/CagA).

Another beneficial effect of *Helicobacter pylori* is the ability to adjust the appetite by reducing gastric secretion of ghrelin. It is believed that ghrelin would have a modulator peripheral effect on them, affecting the sensitivity of gastric vagal afferents, making them less susceptible to stomach distension resulting from a sumptuous consumption level of food (https://en.wikipedia.org/wiki/Ghrelin, https://ro.wikipedia.org/wiki/Grelin%C4%83).

Helicobacter pylori infection in gastric mucosa was reported to be one of the major factors influenced in serum ghrelin levels (Sugimoto & Yasuda, 2011).

Chronic gastritis in association with *Helicobacter pylori* infection is influenced by the presence of plasma ghrelin concentrations. The decrease in gastric ghrelin production accounts for lower concentrations of plasma ghrelin in *Helicobacter pylori*-positive individuals. After *Helicobacter pylori* cure, gastric ghrelin production increases (Hiroyuki Osawa 2008).

MATERIALS AND METHODS

Tests to identify *Helicobacter pylori* in the organism are not 100% safe. They are not recommended as routine tests to identify the bacteria, but only in special cases when one of the conditions that can be caused by it is diagnosed or when there is first degree relatives diagnosed with gastric cancer.

Tests used to detect *Helicobacter pylori*:

-Blood-test to determine the presence in the organism of antibodies to *Helicobacter pylori*, indicating that the organism is currently infected, or it was infected in the past.

-Stool antigen test to determine if substances that trigger the immune system to fight with *Helicobacter pylori* infection (*Helicobacter pylori* antigens) are present in feces (stool).

- Urea breath test to determine an *Helicobacter pylori* infection. This test can also be used to see if treatment has worked to get rid of *Helicobacter pylori*.

- Stomach biopsy. During an endoscopy, a small sample (biopsy) is taken from the lining the stomach and small intestine.

Endoscopic histological analysis of samples taken from several areas associated with a urease test is the best method of identifying bacteria in the body, antibody tests having a margin of 76 - 86% of success (http://www.webmd.com/digestive-disorders/helicobacter-pylori-tests).

Serological tests are useful in determining the cause of chronic gastritis or gastric / duodenal ulcers, and for screening asymptomatic individuals in families of the patients associated with *Helicobacter pylori* infection.

This paper is based on a study containing a number of 400 patients, pacients who were tested in Medical Diagnostic Centre Euromedica Craiova, in 2014 for the detection of antibodies to *Helicobacter pylori* in serum or plasma.

The obtained results were statistically processed.

For the diagnosis of antibodies to *Helicobacter pylori* in human serum or plasma, it was used two types of tests: Rapid Immunocromatographic Test for the Detection of Antibodies to Helicobacter pylori in Human Serum or Plasma and the Helicobacter pylori Antibody Rapid Test.

SD Bioline *Helicobacter pylori* test from Standard Diagnostics, Inc. is a rapid test for the qualitative detection of antibodies of all isotypes (IgG, IgM, IgA) specific to *Helicobacter pylori* in human serum or plasma.

Specimen: serum, plasma

Test result: 10 min

Sensitivity: 95.9%

Specificity: 89.6%

24 month at 2-30°C (http://www.standardia.com/en/home/product/rapid/infectious-disease/Anti-Hpylori.html).

The Helicobacter pylori Rapid Test is a chromatographic immunoassay (CIA) for the rapid determination of antibodies to *Helicobacter pylori* in serum and/or whole blood specimens.

The CD Helicobacter pylori Antibody Rapid Test is a lateral flow, immunochromatographic screening test.

The test is lo be stored refrigerated or at room temperature (2-28°C) in the sealed pouch for the duration of the product shelf life (http://img.creative-diagnostics.com/pdf/DTS130,H.%20Pylori.pdf).

RESULTS AND DISCUSSIONS

The presence of antibodies to *Helicobacter pylori* in human serum or plasma indicates that the organism is currently infected or it has been infected in the past.

If test is negative, then it is unlikely that a person has had an *Helicobacter pylori* infection. If ordered and positive, results should be confirmed using stool antigen or breath test. A positive blood test for *Helicobacter pylori* antibody may indicate a current or previous infection. A different test for *Helicobacter pylori* such as the breath test may need to be done as follow up to determine whether the infection is a current one.

A negative test result means that it is unlikely that the individual has an *Helicobacter pylori* infection (https://labtestsonline.org/understanding/analytes/h-pylori/tab/test/).

Blood tests for *Helicobacter pylori* can only tell if the body has *Helicobacter pylori* antibodies. It cannot tell if it is a current infection or how long has it. This is because the test can be positive for years even if the infection is cured. As a result, blood tests cannot be used to see if the infection has been cured after treatment (https://www.nlm.nih.gov/medlineplus/ency/article/007501.htm).

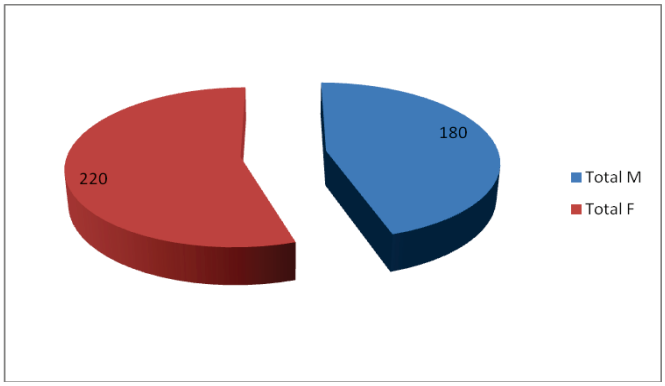
To observe the dynamics of antibodies to *Helicobacter pylori* in the tested patients serum or plasma, the study group was divided by gender (male and female) and by age group (2-20 years, 20-40 years, 40-60 years, 60 years) (Table 1).

Table 1

Gender dynamics of antibodies to *Helicobacter pylori* at tested patients

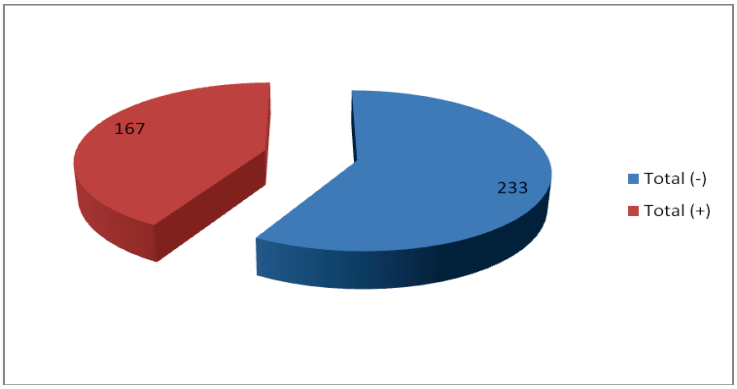
Total patients 400			
Total Male (M) 180		Total Female (F) 230	
Positive (+) 78	Negative (-) 102	Positive (+) 89	Negative (-) 131

Following the analyzes performed in patients under study it has been revealed that, out of 400 individuals investigated for antibodies to *Helicobacter pylori* in serum or plasma, the biggest share was held by females, 220 individuals, compared to male, 180 individuals (Graphic 1). Of these, 167 individuals were tested positive (HP^+), the remaining 233 being negative (HP^-) (Graphic 2).

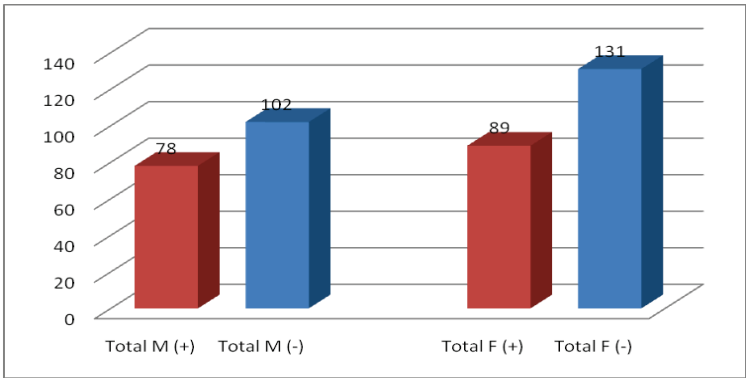


Graphic 1. Patients tested for the diagnosis of antibodies to *Helicobacter pylori* in serum or plasma

In terms of dynamics of *Helicobacter pylori* infection depending on the sex it is observed the prevalence of antibodies to *Helicobacter pylori* in female individuals. It was observed the presence of antibodies to *Helicobacter pylori* at 78 male individuals, (HP^+), while the absence of antibodies to *Helicobacter pylori* was observed at 102 individuals, (HP^-). Among individuals belonging to female sex, 89 were positive (HP^+), the remaining 131, being negative (HP^-) (Graphic 3).



Graphic 2. Dynamics of antibodies to *Helicobacter pylori* at tested patients



Graphic 3. Gender dynamics of antibodies to *Helicobacter pylori* at tested patients

When referring to the dynamics of infection by age, it is noted that the largest share is the age group 20- 40 years (164 individuals), followed by group 40- 60 years (128 individuals). The other group was lower, 61 individuals in the age group over 60 years and only 47, in the 2-20 years group (Table 2).

Of those screened, the largest number of patients was found positive in the age group 20-40 years, 68 positive (HP^+), compared to 96, negative (HP^-). In the next age group, 40-60 years, there were found 57 positive patients (HP^+) and 71 negative patients (HP^-). Adults belonging to the group over 60 were tested positive in large numbers, 38 (HP^+), compared with 23, negative (HP^-). In 2-20 years age group, only 4 patients were positive (HP^+), while the majority, that is to say the remaining 43, were negative (HP) (Graphic 4).

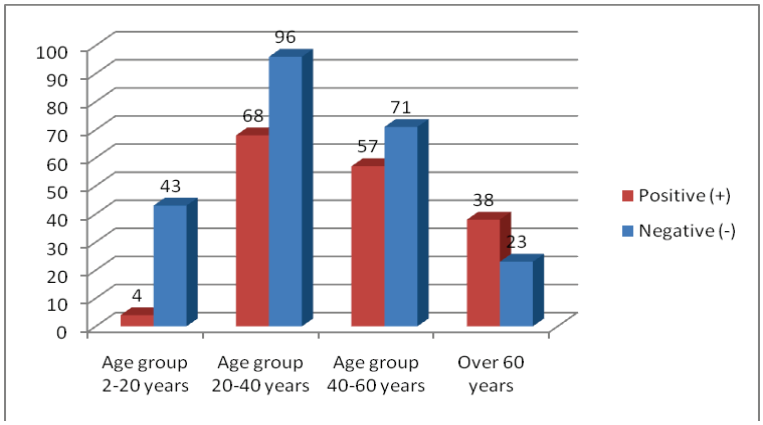
This demonstrates that the epidemiology of *Helicobacter pylori* infection is characterized by a linear increase with age. Unfortunately, in our country infection is

widespread among the very young (children and teenagers). The main tank infection is *Helicobacter pylori* positive individuals and the intrafamilial and interpersonal contact is the most important route of transmission mainly in infancy.

Table 2

Dynamics by age of antibodies to *Helicobacter pylori* at tested patients

Age group		Positive (+)	Negative (-)
Age group 2-20 years	47	4	43
Age group 20-40 years	164	68	96
Age group 40-60 years	128	57	71
Age group over 60 years	61	38	23



Graphic 4. Dynamics by age of antibodies to *Helicobacter pylori* at tested patients

In developing countries ways of transmission can occur through water (Sopa et al. 2005).

Also, the prevalence of adults, especially the females in medical analysis laboratory in order to detect *Helicobacter pylori* infection is due to the media, which determines them to treat the problem more seriously, and which is unknown to children and even to adolescents.

CONCLUSIONS

Helicobacter pylori is considered the primary risk factor of a series of diseases of the digestive tract, such as dyspepsia, peptic ulcer and gastric cancer. Even if the symptoms do not manifest ever, *Helicobacter pylori* is one of the most common bacterial infections being more common in developing countries.

Tests for *Helicobacter pylori* infection are performed both to determine whether *Helicobacter pylori* infection is the cause of ulcer or inflammation of stomach lining (gastritis) and to determine whether treatment for *Helicobacter pylori* was performed successfully.

Epidemiology of *Helicobacter pylori*, prevalent in women, increases with age. In our country, infection is quite widespread among young people.

The main tank infection is the *Helicobacter pylori* infected individuals. Interpersonal and intrafamilial contact representing the most important way of transmission, mainly in childhood.

Treatment of *Helicobacter pylori* infection is achieved by a series of procedures and protocols in case of gastritis and peptic ulcers where the main purpose is not to relieve symptoms, but complete eradication of bacteria. *Helicobacter pylori* therapy has greatly diminished relapses.

Eradication of bacteria increases healing and reduces the risk of recurrence or bleeding in patients with gastric or duodenal ulcer.

Various vaccines are currently carried out in clinical trials for prevention and eradication of *Helicobacter pylori.*

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***http://www.standardia.com/en/home/product/rapid/infectious-disease/Anti-Hpylori.html).

***https://en.wikipedia.org/wiki/CagA

***https://en.wikipedia.org/wiki/Ghrelin

***https://labtestsonline.org/understanding/analytes/h-pylori/tab/test/

***https://www.nlm.nih.gov/medlineplus/ency/article/007501.htm

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THE EVALUATION OF THE FETAL CARDIAC ANATOMY IN THE SECOND TRIMESTER OF PREGNANCY

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Key words*: ultrasonography, fetal heart, prenatal screening*

ABSTRACT

Congenital heart disease is the most common congenital abnormality in the human fetus. The aim of this study was to evaluate the fetal heart anatomy in the second trimester of pregnancy and to identify the structural cardiac defects.

In the majority of the cases was possible to evaluate the appearance and the length of the atria and ventricle, the atrial and ventricular septae, the flap of the foramen ovale and the cardiac rhythm.

INTRODUCTION

The ultrasound examination of the fetal heart is an important method of prenatal diagnosis (screening) of congenital anomalies (malformations).

Systemic ultrasound examination of the fetal heart should not be limited to pregnant mothers with known risk factors because the fact that most infants with congenital heart disease (CHD) are born to pregnancies without risk factors (Abuhamad & Chaoui 2010).

CHD is the most common severe abnormality in the newborn. The prenatal diagnosis improved neonatal outcome. The anomalies with the higher incidence are the ventricular septal defects. The incidence of CHD is around 8 to 9 per 1000 live births (Hoffman & Kaplan 2004).

Maternal risk factors for congenital heart disease are:

-family history of CHD;

-metabolic disorders (diabetes, phenylketonuria);

-teratogen exposure (drog related);

-pregnancy of assisted reproduction;

-obesity (Abuhamad & Chaoui 2010).

The incidence of CHD is 5-fold higher in infants of diabetic mothers. The most common type of CHD are ventricular septal defects and transposition of the great arteries (Rowland et al. 1973).

Fetus of monochorionic pregnancies are at an increased risk for CHD (Bahtiyar et al. 2007).

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Fetal risk factors for CHD are:

-chromosomal abnormalities;

-extracardiac anatomic anomalies;

-cardiac arrhythmia;

-suspected cardiac anomaly on routine ultrasound;

-monochorionic plancetation (Abuhamad & Chaoui 2010).

The etiology of CHD is multifactorial, with interaction between genetic and environmental factors (Manning et al. 2005).

The incidence of CHD is 40% to 50% in trisomy 21 (Eydoux et al. 1989, Benacerraf 2005).

A population based study in children born after in vitro fertilization (IVF) noted a fourfold increase in congenital heart disease, with the majority of cardiac anomalies representing atrial and ventricular septal defects (Hansen et al. 2005).

MATERIALS AND METHODS

The study was performed over a number of 224 women during the second trimester of pregnancy, between 20 and 28 weeks of gestation. The study was made between June 2014 and June 2015.

The anatomy of the fetal heart was evaluated by using the ultrasound examination.

There were studied the following anatomic characteristics:

-the normal situs of the heart (the fetal cardiac position);

-the four-chamber view;

-the two atria;

-the flap of the foramen ovale (to the left atrium);

-the two ventricles – if they are equal in size and contractility;

-the appearance of the atrial and ventricular septae;

-the insertion of the atrioventricular valves;

-the measurement of the cardiac frequency;

The extended basic cardiac examinations have shown a better detection of CHD.

Clinical factors that may affect the ability to obtain a satisfactory four-chamber view include (ISUOG, 2006):

-maternal obesity;

-fetal position;

-gestation age;

-oligoamnios.

RESULTS AND DISCUSSIONS

The evaluation of normal situs of the heart it was obtainable in all cases indifferent of the fetal position. It is the first step in the ultrasonographic evaluation of the fetal heart.

The heart occupied the central portion of the thoracic cavity in the middle mediastinum and is bordered by the diaphragm inferiorly (Figure 1).

The heart of a fetus lies horizontally in the torax, and the four-chamber view is obtained in the transverse plane of the chest.

In all cases it was situs solitus which refers to the normal arrangement of organs within the body. Situs inversus refers to a mirror-image arrangement of organs and it has an incidence of about 0.01% of the population (Bronshtein et al. 2002).

Situs inversus is associated with a slight increase in the incidence of CHD (0.3% to 5%) (Bernasconi et al. 2005, Walmsly et al. 2004).

The evaluation of the four-chamber view it was possible in all cases except two cases of maternal obesity (99,1%). In those cases it was observed just the heart activity and no elements of the cardiac morphology (Figure 2).

Figure 1. The fetal cardiac position

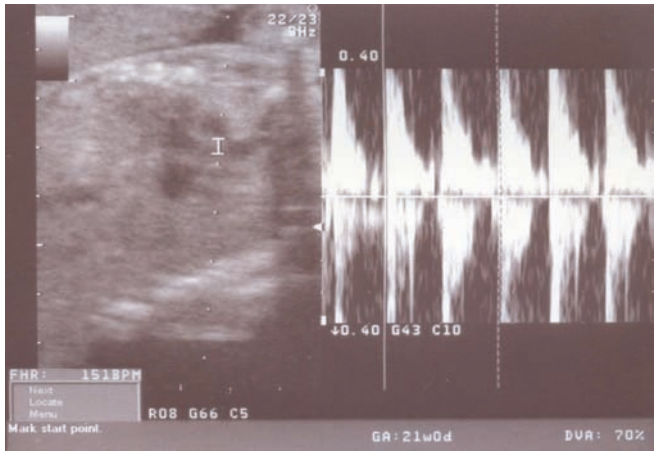

Figure 2. The cardiac rhythm

The four-chamber view of the heart it a good screening test for CHD. It does not require specialized ultrasound skills as it is easily imaged in a transverse view of the fetal chest. It is obtainable in more than 95% of ultrasound examinations performed after 19 weeks of gestation (Ogge et al. 2006).

On the four-chamber view were evaluated the simetry of the atria and the ventricles. Normally the two atria are equal in size and the flap of the foramen ovale is seen within the left atrium. The right and left ventricles are nearly equal in size (Figure 3).

One of the main ultrasound characteristic of the right ventricle is the coarse trabeculation with the moderator band occupying the apical portion (Abuhamad & Chaoui 2010).

In 224 cases it was possible to measure the length of the atria and the ventricle and calculate the atrioventricular length ratio (AVL ratio) (Figure 4).

Figure 3. The four-chamber view of the fetal heart -
the two atria, the two ventricles, the atrial and ventricular septae

Figure 4. The four-chamber view of the fetal heart -
the measurement of the length of the atria and the ventricle

Recently, it was noted that the AVL is increased in fetus with atrioventricular septal defect (AVSD). The normal value of AVL ratio is under 0.5. A cutoff value over 0.6 detects AVDS in 83% of cases with a false-positive rate of 5.7% (Machlitt et al. 2004).

The value of the AVL ratio was between 0.43 and 0.62. In 3 cases the value was over 0.6, but is was not observed a structural anomaly.

This defect in the center of the heart results from the large atrial and ventricular septal defects at the atrioventricular region.

The diagnosis of an isolated atrial septal defect is very difficult in the fetus (Abuhamad & Chaoui 2010).

The flap of the foramen ovale is normally to the left atrium. The foramen ovale was observed in all cases, but in 53 cases (23.87%) it was not possible to evaluate its orientation to the left atrium (Figure 5).

Figure 5. The flap of the foramen ovale to the left atrium

The evaluation of the ventricular septum is necessary for the diagnosis of a ventricular septal defect (VSD). This anomaly is an opening in the ventricular septum leading to a hemodynamic communication between the left and right ventricle (Abuhamad & Chaoui 2010).

It was measured the thickness of the ventricular septum and it was observed its appearance using the color Doppler. The small muscular VSD are not visible without color Doppler.

The thickness of the IVS was from 1.8 mm to 4.2 mm (Figure 6).

The evaluation of the appearance of the ventricular septum and the measurement of its thickness should be repeated in the third trimester of pregnancy when the septum is well developed (Figure 7).

In one case it was observed a large defect in the muscular portion of the ventricular septum associated with others extracardiac anomalies.

In other 2 cases a small VSD was diagnosticated postnatal.

Under a value of 2-3 mm, it is not possible to exclude a ventricular septal defect. VSD smaller than 2 or 3 mm are often overseen on prenatal ultrasound.

Isolated VSD accounts for 30% of children born with CHD are associated with other cardiac anomalies in about 30% of cases. Postnatal echocardiographic evaluation reports the prevalence of VSD to be 50 per 1000 live births (Hoffman & Kaplan 2004).

VSDs tend to have a high recurrence rate and are slightly more common in girls.

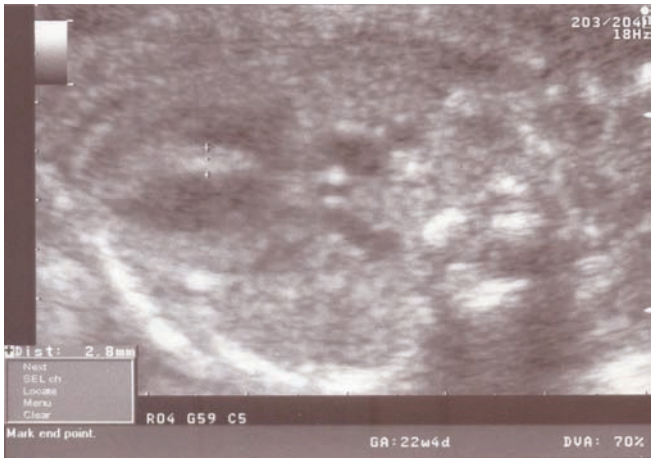

Figure 6. The measurement of the ventricular septal thickness at 22 weeks of gestation

Figure 7. The appearance and the thickness of the ventricular septum at 31 weeks of gestation

The long-term outcome of fetuses with VSD is dependent on the size and location of the defect and the associated cardiac and extracardiac malformations (Garne 2001).

Small muscular VSD have a good prognostic and up to 80% close spontaneously before by the first 2 years of life (Paladini et al. 2000).

A prenatal CHD detection rate of 21% was reported in a study involving more than 77,000 infants over a period of 5 years (1999 to 2003) (Nikilla et al. 2006).

A nonselected population-based study has shown a 57% prenatal detection rate for major CHD (Tegnander et al. 2006).

Prenatal diagnosis of CHD has increase from 8% to 50% in the period from 1992 to 2002 in the United States (Mohan et al. 2005).

CONCLUSIONS

The presence of CHD is the result of abnormal cardiac development during embryogenesis.

Despite the accuracy of fetal echocardiography, second-trimester detection occurs infrequently.

Prenatal detection rates for isolated CHD have remained significantly below 50%.

The detection of CHD in utero improves neonatal morbidity and mortality.

CHD is the most common congenital anomaly in the human fetus and it accounts for more than half of deaths from congenital abnormalities in childhood.

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THE ULTRASOUND EXAMINATION OF THE GREAT VESSELS OF THE FETAL HEART

Olimid Diana[1]

Key words*: ultrasonography, aorta, pulmonary artery, malformations*

ABSTRACT

The aim of this study was to analyze the great vessels of the fetal heart using the ultrasound method in a number of 221 cases of pregnant women. The examination included the emergence of the aorta, the crossing-over of the aorta and the pulmonary artery, the aortic arch and its three emergent arterial branches.

The visualization it was possible in 69.68% of cases for the ascending aorta, in 80.99% for the aortic arch and in 62.44 % for its emergences.

The fetal cardiac sonography can't exclude 100% a cardiac anomaly.

INTRODUCTION

The spatial relationships of cardiac chambers and outflow tracts are essentially for the functional cardiac activity.

The right ventricle is the most anterior cardiac chamber in proximity to the anterior chest wall. The left ventricle and its outflow tract (aorta) occupy the midsection of the fetal heart. The left atrium it is the most posterior cardiac chamber in proximity of the fetal spine.

The pulmonary artery emerges from the right ventricle, crosses over the aorta and dips posteriorly into the chest. It divides into the right and left pulmonary arteries and the ductus arteriosus.

The aorta has its long axis parallel to the long axis of the left ventricle.

The ascending aorta passes between the right and the left atrium and inferior to the pulmonary artery before it emerges from the heart and curves posteriorly from the aortic arch.

The aortic arch crosses over the right pulmonary artery and bronchus, defining a normal left aortic arch. The descending aorta (the thoracic and the abdominal aorta) descends along the left side of the spine.

Three arteries originate from the aortic arch: the brachiocephalic, the left common carotid and the left subclavian (Sadler 2012).

The long axis of the two ventricular outflow tracts are perpendicular to each other. This is an important anatomic aspect in fetal echocardiography.

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MATERIALS AND METHODS

There were analyzed the great vessels of the fetal heart using the ultrasound method. It was used an equipment Aloka α-5-ultrasound and the scan it was realized using a 3,5 MHz transducer.

There were observed 221 cases of pregnant women during the second-trimester of pregnancy.

The examination included the following anatomic structures:

-the emergence of the aorta from the left ventricle;

-the visualization of the continuity of the anterior wall of the aorta with the ventricular septum;

-the aortic arch view;

-the three arterial branches emerge from the aortic arch.

The image of the great vessels was obtained starting from the four-chamber view of the fetal heart and following the next steps (Abuhamad & Chaoui 2010):

-the emergence of the aorta from the left ventricle can be imaged by a slight rotation of the transducer in the direction of the fetal head (the five-chamber view);

-the transverse view of the aortic arch can be obtained by a slight cranial tilt of the transducer while maintaining the transverse orientation in the chest;

-the three-vessel-trachea view can be obtained by slightly angulating the transducer caudally and to the left;

-the descending aorta view can be obtained by an orientation of the transducer parallel with the fetal thoracic spine.

Color Doppler was used to evaluate flow patterns in the great vessels.

RESULTS AND DISCUSSIONS

The results of the study are included in the table 1.

Table 1

The repartition of the visible vascular structures

The anatomic structure	No. of cases				Percent
	First examination	Second examination	Unobserved	Total	
The emergence of the aorta	143	11	67	154	69.68%
The "V" sign	139	8	74	147	66.51%
The aortic arch	162	17	42	179	80.99%
The aortic arch emergences	115	23	83	138	62.44%

The ascending aorta was observed in 69. 68% of cases, respectively in 143 cases at the first examination and in 11 cases at the second one (Figure 1 and 2).

Some vascular structures were observed at the first examination. In other cases it was necessary a second examination.

When a morphologic cardiac element is not observable at the first examination it is mandatory to perform a new one (ISUOG, 2006).

There are some clinical conditions that made difficult the ultrasonic evaluation:

-maternal obesity;

-the anterior position of the fetal spine;

-the anterior position of the placenta;
-the small volume of amniotic fluid;
-the receptivity to the ultrasound.

The anterior position of the fetal spine made the examination more difficult because of the posterior sonic shadows.

The probability to detect cardiac anomalies depends on the examiners experience, the performance of the ultrasonic equipment and the use of the color Doppler. The visualization of the great vessels is related to the technical expertise required to obtain these images (Carvalho et al. 2002).

In a recent consensus statement, the International Society of Ultrasound in Obstetrics and Gynecology stated that color Doppler ultrasonography is an important component of the fetal echocardiogram and recommended its mandatory use (Lee et al. 2008).

The extended basic screening includes demonstration of the left and right ventricular outflow tracts as they emerge from their respective ventricular chambers (Abuhamad & Chaoui 2010).

It was observed the emergence of the aorta from the left ventricle and the continuity of the anterior aortic wall with the ventricular septum (Figure 3 and 4).

The left ventricular outflow tract view which illustrates the four chambers of the heart and the aorta as it emerges from the left ventricle is known as the five-chamber view.

A wide angle is seen between the direction of the ventricular septum and the anterior wall of the ascending aorta. This anatomic element is absent in cotruncal anomalies (more parallel orientation with the ventricular septum).

The five-chamber view shows the continuity of the posterior wall of the aorta with the mitral valve.

The three vessel view was obtained in a transverse plane of the fetal upper thorax. The transverse aortic arch and pulmonary artery merge toward the descending aorta (Figure 5). It is helpful in the assessment of cotruncal anomalies which may involve vessel size, arrangement, number and location of descending aorta (Jeanty et al. 2008).

In the three vessel view the main pulmonary artery, ductus arteriosus, transverse aortic arch, aortic isthmus form a “V-configuration” which points toward the posterior spine on the left (Figure 6).

In this study the “V” sign was observed in 66.51% of cases, respectively in 139 cases at the first examination and in 8 cases at the second one.

The view of the outflow tracts of the fetal heart should be attempted as part of an extended basic screening examination (Oggé 2006).

The anomalies of the great vessels are associated with an abnormal four-chamber view in only 30% of cases (Jeanty et al. 2008).

Complete transposition of the great arteries (TGA) is a common cardiac malformation, with atrioventricular concordance and ventriculoarterial discordance. There is a switched connection of the great vessels, the pulmonary artery arising from the left ventricle and the aorta arising from the right ventricle. Both great arteries display a parallel course (Abuhamad & Chaoui 2010).

Transposition of the great vessels occurs when the cotruncal septum fails to follow its normal spiral course and runs straight down (Sadler 2012).

It is a relatively frequent malformation occurring in 5% to 7% of all congenital cardiac anomalies, with an incidence of 0.315 cases per 1000 live births and a 2:1 male preponderance. It is associated with a defect in the membranous part of the interventricular septum (Vinals et al. 2007).

Figure 1. Parasagittal view of the fetal thorax -
the heart and the emergence of the aorta from the left ventricle

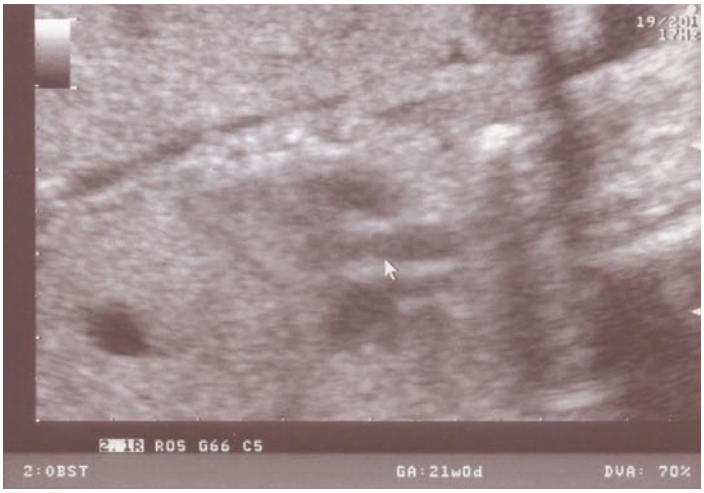

Figure 2. Parasagittal view of the fetal thorax -
(zoom image)

Figure 3. The five-chamber view -
the walls of the aorta at its emergence from the left ventricle

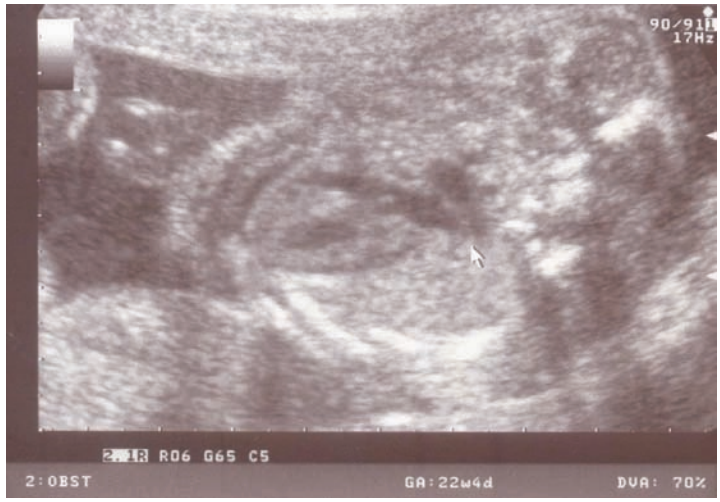

Figure 4. Oblique view of the fetal thorax -
the heart and the outflow tracts

Since the secondary heart field (SHF) and neural chest cells contribute to the formation and septation of the outflow tract, influence to these cells contribute to cardiac defects involving the outflow tract (Sadler 2012).

Figure 5. The "V" sign

Current evidence suggests that folic acid supplementation taken preconceptionally reduces the risk of congenital heart anomalies (Botto et al. 2000).

Folic acid is an active factor involved in fetal heart embryogenesis and that periconceptional use may reduce the risk for congenital cardiac malformations (Bailey & Berry 2005).

The aortic arch was observed in 80.99% of cases, in 162 cases at the first examination and in 17 cases at the second evaluation. The emergences of the aortic arch were visualized in only 62.44% of cases (Figure 6 and 7).

Figure 6. Parasagittal view of the aortic arch and the descending aorta

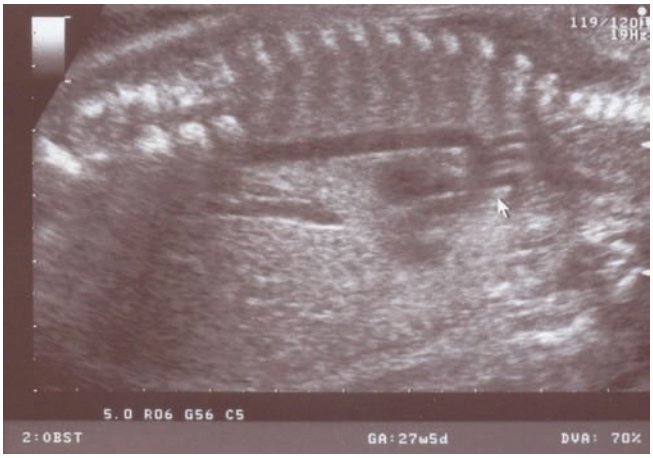

Figure 7. Parasagittal view of the aortic arch with the origin of the three brachiocephalic vessels

Coarctation of the aorta is a common anomaly which involves narrowing of the aortic arch, typically located at the isthmic region, between the left subclavian artery and the ductus arteriosus (Abuhamad & Chaoui 2010).

The malformation is found about 5% of newborns with congenital heart disease. It is occurs more common in boys, with a male-female ratio of 1.27 to 1.74 (Rosenthal 2005).

The in utero course of the fetus with coarctation of the aorta is generally uneventful. It is recommended serial ultrasound examinations every 4-6 weeks to observe the development of the transverse arch and the progression of the coarctation (Abuhamad & Chaoui 2010).

Prenatal diagnosis of aortic coarctation should lead to the delivery of the neonate at a tertiary center with immediate availability of pediatric cardiology services. Prenatal diagnosis has been shown to improve neonatal outcome (Franklin et al. 2002, Paladini 2004).

The long term follow-up of treated infants show complications like chronic hypertension, surgery complication and coronary artery disease (Rosenthal 2005; Taro-Salazar et al. 2002).

The risk of recurrence for corrected transposition of great arteries is 5.8%, for transposition of great arteries is 1-1.8%, for aortic stenosis 2.2%, for coarctation of the aorta 1.8% (Calcagni et al. 2007).

CONCLUSIONS

The evaluation of the outflow tracts of the fetal heart in prenatal screening is useful for a better detection of congenital heart disease when compared to the four-chamber view.

There are some clinical conditions which reduce the visibility of the cardiac and vascular structures as extreme maternal obesity, anterior position of the fetal spine and the small volume of amniotic fluid tyre.

The morphologic examination should be repeated as many times as it needs for a better evaluation of the cardiac function. Even with a performant ultrasonic equipment and sonographic clinical experience the percentage of the anomalies detection is low and the prenatal diagnosis is difficult.

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INFLUENCE OF ABIOTIC FACTORS ON BIOLOGICAL CONTROL ABILITY OF DIFFERENT *TRICHODERMA* SPP. STRAINS

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Keywords: *Fusarium, antagonism, temperature, pH*

ABSTRACT

The antagonistic potential of two strains of Trichoderma sp. (T85 and T50) were evaluate in vitro against some soil phytopathogens like Fusarium oxysporum fsp. radicis lycopersici (FORL) and Fusarium solani (F.solani) depending on temperature and pH. These strains were characterized via molecular analysis based on DNA sequences of the rDNA internal transcribed spacer region, elongation factor-1α gene. Both strains of Trichoderma sp. species showed strong competition for nutrients and space compared to all phytopathogens studied. T85 strain showed maximum activity against F solani and FORL at 30°C compared to 25°C, which was indicated by better growth and colonization of strain over phytopathogens after 6 days of incubation. The strain T50 inhibits growth of two phytopathogens stronger at 25°C compared to 30°C. The most favourable pH for maximum antagonistic potential of both Trichoderma sp. strains against F. solani was the 5.5 pH. This study revealed that at temperature between 25° and 30°C temperature and 5.5 pH were found optimal for expression of the biocontrol traits of both Trichoderma sp. strains.

INTRODUCTION

Although fungicides have shown promising results in controlling the disease, phytotoxicity and fungicide residue are serious problems leading to environmental pollution and human health hazards or may lead to the appearance of new resistant strains of pathogens.

An attractive alternative is biological control which involves the use of biological organisms to control pathogens or diseases. The application of microorganisms as biocontrol agents is important since they may increase beneficial microbiological activity which extends for a long period time.

Species of the genus *Trichoderma* spp. are considered as potential biocontrol agents (BCA) for many plant diseases (Galarza et al. 2015; Abdel-Monaim et al. 2014; Singh et al. 2013; Srivastava et al. 2009; Kohl &Schlosser 1989; Sierota 1976).

Several research paper reveal the fact that various species and isolates of fungal antagonist *Trichoderma* suppress mycelia growth, reduce root rots, induce resistance in

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different crops affected by *Fusarium* species (El Komy et al. 2015; Moraga-Suazo et al. 2011; Morsy et al. 2009; Hajlaoui et al. 2001; Sivan &Chet 1987; Sivan &Chet 1986).

The effectiveness of biocontrol agents depends on several parameters, that includes soil pH and texture, water content, temperature, microorganism used, therefore their application should consider climatic factor that could affect not only survival but also their biocontrol capacity (Bagwan 2010; Berg 2005).

Environmental pH is one of the major factors affecting the activity of both *Trichoderma* and pathogenicity factors secreted by different microorganisms. Some antibiotics are degraded at high pH and air drying and low pH may induce enzyme degradation by acidic proteases (Delgado-Jarana *et al*. 2000; Delgado-Jarana *et al*. 2002).

External pH is also important to pathogens because their pathogenicity factors are produced only within a very narrow range of pHs (Prusky and Yakoby, 2003; Kacprzak &Manka,2000), so that pH modification determines the pathogen's ability to successfully colonize and invade the targeted host. *Trichoderma* strains able to modify external pH and to adapt their own metabolism to the surrounding growth conditions would consequently reduce the virulence of phytopathogens because most pathogenicity factors could not be synthesized.

Some studies have addressed the effect of temperature on the interaction between biocontrol agent *Trichoderma* and various pathogens (Nikolajeva et al. 2012; Bagwan 2010; Mukherjee & Raghu 1997; Tronsmo & Dennis 1978). Some authors have supported that efficacy of *Trichoderma* spp is compromised at low temperature (O'Neill et al. 1996). However Clarkson et al. 2004, have shown efficacy of *Trichoderma viride* as biocontrol agent on *S. cepivorum* at 10°C after 8 week.

Trichoderma spp should be carffuly identified before application as biocontrol agents and suitable strains should be selected to fit the target fields, crops and pathogens (Galarza et al. 2015). A combination of morphological and molecular methods is desirable for the reliable and accurate identification of *Trichoderma* spp (Samuels 2006).

In the present study attempts have been made to investigate antagonistic potential of *Trichoderma* spp. strains against *Fusarium oxysporum* sp. *radicis lycopersicum* (*FORL*) and *Fusarium solani* (*F.solani*) at different temperature and pH under *in vitro* conditions.

MATERIAL AND METHODS

The fungal strains (test and pathogenic) used in this study were obtained from the culture collection of the RDIPP. These fungal strains were maintained on potato dextrose agar medium (PDA) slants at 4°C, which used as inoculus for subcultures. The antagonistic strain T50 and T85 was identified to the species level by sequence analysis of the internal transcribed spacer regions ITS-1 and ITS-2 of nuclear rDNA (Druzhinina et al. 2005).

Nucleic acid extraction

DNA was extracted from mycelia of two strains studied grown in liquid cultures potato dextrose broth (PDB) at 25°C for 48 h. DNA was isolated using the Animal and Fungi DNA kit from Jena Bioscience according to the manufacturer's protocol.

PCR reaction and sequencing product analysis

The PCR amplification reaction mixture consisted of genomic DNA, flexi GoTaq buffer, 25 mM $MgCl_2$, 0,2 mM dNTPs (deoxynucleotide triphosphate), 5U/µl FlexiGo*Taq* DNA polymerase (Promega,USA). Amplification from genomic DNA was performed at the following conditions: 1. 95^0 for 5 minutes; 2. 95^0 for 30 seconds; 3. 56^0 for 30 seconds; 4. 72^0 for 30 seconds; cycle through steps 2-4 35 times; 5. 72^0 for 5 minutes; 6. 4^0C forever. The DNA functionality was further tested by PCR amplification using forward primer ITS

1_F with sequence 5'-TCCGTAGGTGAACCTGCGG-3', reverse primer ITS 2_R with sequence 5'-GCTGCGTTCTTCATCGATGC-3'.

Amplified products were subjected to electrophoresis at 100 V for 30 min in a 1,5% agarose gel prepared in TAE buffer, containing 0,5 ug/ml ethidium bromide. A gene ruller 1Kb DNA ladder (Fermentas Gmbh, St. Leon Rot, Germany) was used as standard with each gel to asses the sizes of the amplicons. Sequencing of the rDNA region, including the spacers ITS 1 and ITS 2 and 5.8 S rDNA was performed at Macrogen Inc Europe. Sequence analysis of the ITS amplicons was performed with the aid of the TRICHOKEY 2.0 (Druzhinina et al. 2005) and TRICHOBLAST (Kopchinskiy et al. 2005) tools available online at http://www.isth.info/.

The dual culture technique described by Morton and Stroube, 1955 was used to testing the antagonistic ability of *Trichoderma* against soil borne pathogens *Fusarium oxysporum* sp. *radicis lycopersicum* (*FORL*) and *Fusarium solani* (*F.solani*). The mycelial disk (5mm) from the margins of 7 days old culture of two *Trichoderma* strains and test pathogens were placed on the Petri plate opposite to each other equidistant from the periphery and incubated at two temperature 25°C and 30°C for 6 days. Both pathogen and *Trichoderma* strain were inoculated at the same time. The medium inoculated with the pathogen alone served as control. The experiment was conducted in triplicate. Periodical observations on the radial growth of *Trichoderma* spp strains and their ability to colonize the pathogens were recorded at 2, 4, 6 days and also percent inhibition of mycelial growth of pathogens was calculated by using the formula:

I% = C - T/C

I % - percent inhibition in mycelia growth

C - radial growth of pathogen in control plates

T – radial growth of pathogen in dual culture plates

PDA with pH level 4.5 and 5.5 were poured into Petri plates and 5mm from the margin of actively growing colony of *Trichoderma* strains and *Fusarium* strains were placed in opposite direction and incubated at 28°C for 4 days. The experiment was conducted in triplicate.

RESULTS AND DISCUSSIONS

Trichoderma strains T50 and T85 which were previously identified via morphological observation as *T. viride* and *T. pseudokoningii*. The strains T50 and T85 were subsequently identified to be *T. asperellum* using molecular analysis (table 1).

Table1

Trichoderma spp. isolates used in this study and corresponding homologue sequences in the NCBI data base

Isolate no.	Species	Sources of isolation	Length of sequence	Homologue sequence	Query coverage %	Similarity %
50	*Td. Asperellum*	Wheat stubble, Calarasi county, Romania	529	KP340279.1	84	100
85	*Td. Asperellum*	Wheat stubble, Calarasi county, Romania	434	KP340278.1	84	100

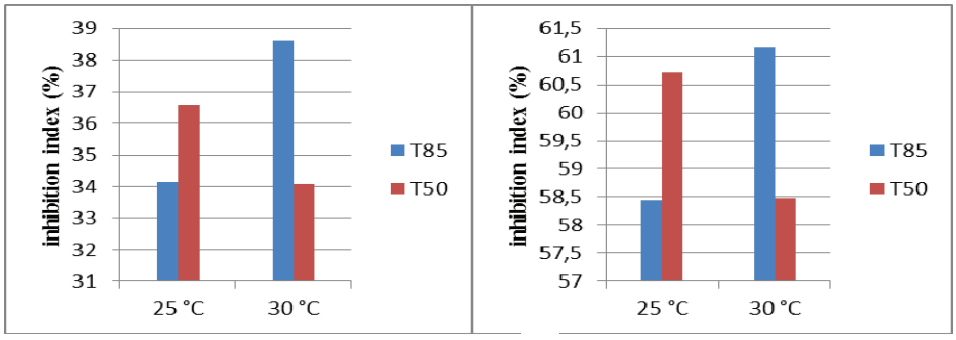
In this study *Trichoderma* strains was consistently found that is able to inhibit the growth of two fungal pathogens (*FORL and F.solani*) at different inhibition levels depending on the pathogen being tested, the temperature and the pH studied.

The results of dual culture showed that T85 reduced mycelia growth of *FORL* by 38.63% at 30°C compared with 34.08% at 25°C after 6 days of incubation. T50 have stronger inhibitory effect against *FORL* at 25°C with a percentage of inhibition of 36.58% compared with 34.14% at 30°C (figure 1A).

Also, we found that the strain T85 is most effective in inhibition of *F. solani* mycelial growth at 30°C with a rate of 61.17% inhibition compared to the temperature of 25°C where it recorded a percentage of inhibition of 58.44% after 6 days of incubation (figure 1B). These results are in accordance with those obtained by Morsy et al. 2009 who reported that *Trichoderma viride* reduced growth of *F.solani* by 58%. Also, Sivan and Chet, 1986 have reported that the some strains of *Trichoderma* have the potential to supress *F. solani*.

As with *FORL* phytopatogenic strain, T50 strain is more effective at 25°C with a percentage of 60.72% inhibition compared to 58.48% at 30°C.

Among antagonists tested, T85 was found to be more effective at 30°C, but T50 was more effective at 25°C against both *FORL* and *F.solani* phytopathogens. The experimental results indicate that isolates of *Trichoderma* grew considerably faster than phytopathogenic strains *F.solani* and *FORL* under same conditions at both temperatures tested. This is advantage in competition for nutrients and space with plant pathogenic. This mechanism of antagonism used by Trichoderma has also been found against other *Fusarium* species such as F. *cincinatum* (Morago-Suazo et al. 2011). Also, studies of Kumar et al. 2007 clearly indicated that three *Trichoderma* spp isolates *is* suitable as biocontrol agents against *F. solani and Fusarium oxysporum lycopersici (FOL).*



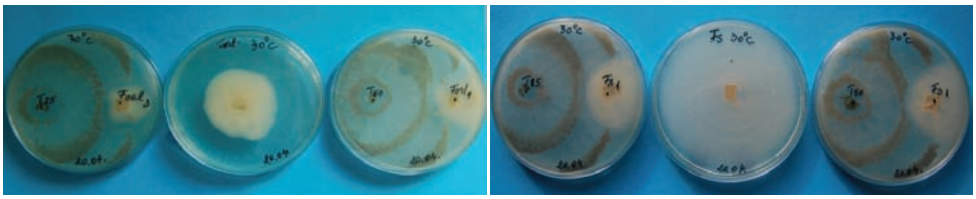
A B

Figure 1. The inhibitory effect of *Trichoderma* strains on mycelial growth of phytopathogenic *FORL* (A), *F.solani* (B) at two different temperature after 6 days of incubation

The data obtained by Singh et al. 2013 showed that *Trichoderma harzianum* have highest percentage (60%) inhibition against *F. oxysporum f.sp.ciceri* and *F. oxysporum f.sp..udum* while the least percentage inhibition was observed for *T. virens* (40%) against both phytopathogens.

The data obtained in this study showed that both T85 and T50 strain inhibits growth of mycelium *FORL* stronger at pH 4.5 compared to pH 5.5 after 4 days of incubation at 28 °C (figure 3A). However T85 strain has a larger percentage of inhibition

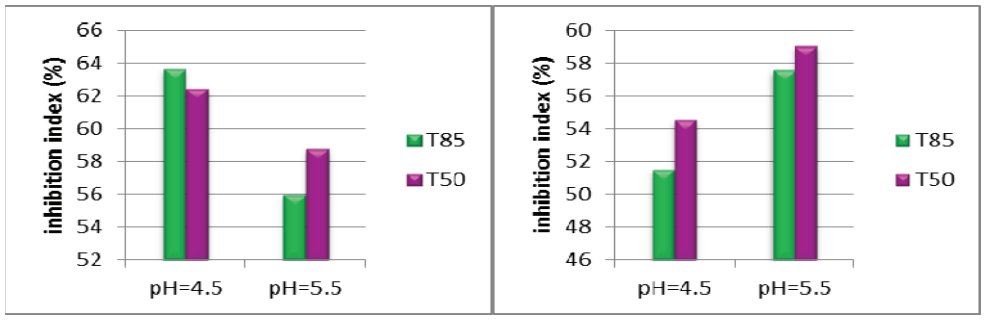
(63.63%) compared to the percentage inhibition (62.42%) of the T50 strain at pH 4.5. We remarked that at pH 5.5, T50 strain has a larger percentage of inhibition (58.78%) compared to T85 strain with a percentage of 56% inhibition.



A) B)

Figure 2. Dual culture interaction between *Trichoderma* and *FORL* (A), *F.solani* (B) la 30°C after 6 days of inoculation

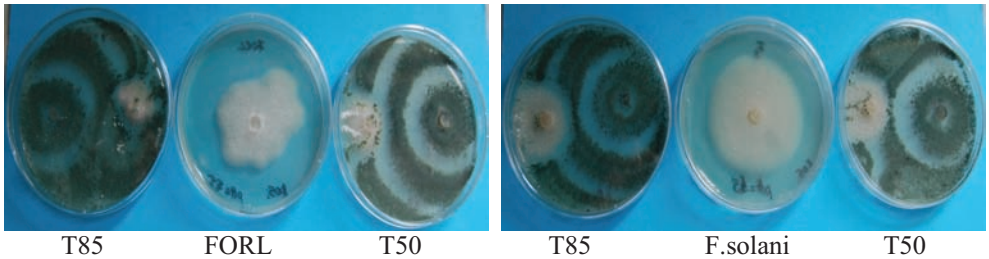
Both antagonistic strains of *Trichoderma* studied had higher percentage inhibition of mycelial growth of *F.solani* at pH 5.5 compared to pH 4.5 (figure 3B). But T50 strain have stronger inhibitory effect (59.04%) compared to T85 strain with a percentage inhibition of 57.6% at pH 5.5. These results are consistent with previous studies of Sireota 1976 and Vinale et al. 2008. These authors report that *Trichoderma* is strongly active against phytopathogens at pH 4.5 but with increasing pH values the antagonistic activities decreases.



A B

Figure 3. The inhibitory effect of *Trichoderma* strains on mycelial growth of phytopathogenic *FORL* (A), *F.solani* (B)) after 4 days of incubation at two different pH

A) B)



T85 FORL T50 T85 F.solani T50

Figure 4. Dual culture interaction between *Trichoderma* and *FORL* (A), *F.solani* (B) at pH=5.5 after 4 days of incubation at 28°C

However, Bagwan 2010 supported that most favourable pH for maximum antagonistic potential of *Trichoderma viride* against *S. rolfsii* and *R. solani* ranged between 5.5 to 6.5.

CONCLUSIONS

According to molecular identification, the two *Trichoderma* strains studied proved to be *T. asperellum.*

The dual culture interaction revealed that *Trichoderma* spp caused appreciable inhibition of mycelia growth of *FORL* and hight inhibition of mycelia growth in case of *F. solani.*

Trichoderma strains studied colonize a large area of culture medium due to higher growth rate compared to the growth of the mycelium *FORL* and *F.solani* phytopatogenic strains at both temperatures tested; such as the main mechanism of action for antagonistic strains studied (T85 and T50) was space and nutrients competition.

T85 strain have stronger inhibitory effect on *F. solani* and *FORL* phytopathogens at 30°C compared to 25°C,but T50 strain inhibit stronger growth of *F. solani* and *FORL* phytopathogens at 25°C compared to 30°C.

The two strains of *Trichoderma* studied have the maximum antagonistic capacity against FORL at pH 4.5.

The antagonistic potential of the two *Trichoderma* strains against phytopathogenic *F.solani* strain expressing stronger at pH 5.5 .

AKNOWLEDGEMENT

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THE ECOLOGICAL STATUS EVALUATION FOR THE WATER BODIES IN JIU MIDLE RIVER BASIN

Paunescu C.*[1]

Keywords*: river basin, water bodies, ecological status*

ABSTRACT

This paper presents a way for assessment of the ecological status and ecological potential for the surface water bodies. The ecological status evaluation is a relatively new concept, both in Romania and in Europe also, developed upon the implementation of the Water Framework Directive (2000/60/European Commission) for the natural rivers. This paper has two parts, in the first is presented a general characterization of the general conditions represented by the Jiu river basin, and the second part that presents the assessment of anthropogenic impact on the water body taken in to account for this research.

INTRODUCTION

The sever alteration of the environment in the past century, is a challenge for the decisional factors in the water management domain, because they have to find realistic solutions for the improvement of its quality. In Europe the environmental specialists are trying to develop a framework to have a common way to achieve a good status for the surface water. To fulfill this target had to be done a lot of steps in according with WFD/60/2000/EC: to define the biotical types for the surface water, to designed the water bodies, to establish the reference condition for the ecological status or ecological potential of water, to characterize the artificial and heavily modified water bodies, to establish the targets for the health of the environment, to implement the measures programs for each anthropogenic pressure. The most important thing of this work is to establish the *ecological status* of the water body with scientific arguments and terms.

MATERIAL AND METHODS

The materials used in this research are the samples collected for the physicochemical parameters and bacteriological measurements, respecting sampling and analysis techniques in accordance with the current standards. The method for assessing *ecological status* of the water bodies from the middle Jiu river basin, was water quality index method –WQI (Lazăr et al. 2006) as an expression of the anthropogenic impact under the surface water bodies.

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RESULTS AND DISCUSSIONS

Jiu River Basin is situated in S-W of Romania, between 43°45' - 45°30' N latitude and 22°34' – 24°10' E longitude. Jiu river crosses the Romanian specific forms of relief: mountain, sub Carpathian arc, the foothills and the plain area (Jiu River Basin Management Plan, 2009). In large areas of the basin there are skeletal and podzolic soils (mountain area), reddish brown forest soils, brown podzolic soils (in Getic Piedmont region and low plateaus), black earth and sandy soils (the great plains of large rivers) under which they are stationed strong underground waters. In the investigated area is a temperate climate with variations from N to S and from W to E. Jiu hydrographical network has a length of 3876 km and 0.34 km/km^2 as density. The main source of freshwater in this region is represented by the precipitation. Jiu basin has 69 lakes and ponds, of which 14 are greater than 0.5 km^2. Most are located in the Danube valley (Jiu River Basin Management Plan, 2004 and 2009 report). After recent reports in Jiu River Basin were designated 200 water bodies (rivers, lakes), 11 heavily modified water bodies. There are 8 groundwater bodies, according to the National Institute for Hydrology and Water Management (Bretotean et al. 2004). The water body studied in this research paper (Jiu middle river basin) has the next coordinates: in the upstream point- 23°15'57" E longitude, 45°02'07" N latitude. For downstream point the coordinates are: 23°50'39" E longitude and 44°14'19" N latitude.

For a realistic approach in this research was used the index of water's quality adapted. The index of water's quality (WQI) was defined conceptual at the beginning of 70' years by the National Sanitation Foundation (NSF) to compare the water's quality in various water sources and to monitor the variations in time of water's quality (Lazăr et al. 2006). For this purpose, 142 experts from this domain, have carried out 25 different tests, and selected 9 indicators, having as main purpose the individual indicators aggregation (expressed in physical units in table 1) into a unique water's quality index (on a conventional scale 0-100). The stages for achieving the set objective were the following:

- the transforming of each of the 9 indicators into a quality index;
-the performing of a weighted average of the values thus obtained.

This method (table 1) was applied according to the method described in the paper "*The impact of the anthropogenic activities on the environment* "(Lazăr et al. 2006), the results were centralized for 2014 year and the results were transposed graphical on in the figure 1 that accompanying the following tables (table 2, table 3). The results interpretation obtained through a carried out research, take account of the quality's scale taken from the same paper.

Table 1

Water's quality indicators (Lazăr et al. 2006)

Indicator	Unit of measurement	Weight
Dissolved oxygen	% saturation	0.17
Coliforms fecal	colony/100 mL	0.11
BOD	mg/L	0.11
pH	-	0.11
Nitrates	mg/L	0.1
Temperature variations	ºC	0.1
Total phosphates	mg/L	0.1
Turbidity	NTU	0.08
Total dissolved solids	mg/L	0.07

For natural water bodies was evaluated „*ecological status"* and for heavily modified water bodies was evaluated „*ecological potential"* . For Jiu River Basin BH Jiu, from the 11 heavily modified water bodies, 8 have a good potential (GP) and 3 have moderate potential (MoP).

For the investigated water body have been identified 18 point pollution sources, a considerable weight of the budget of the pollutants has and diffuse sources. Just from biological indicators point of view, the surface water bodies in the Jiu middle river basin (the water's ecosystems) are in good, moderate or bad status (Jiu River Basin Management Plan, 2009).

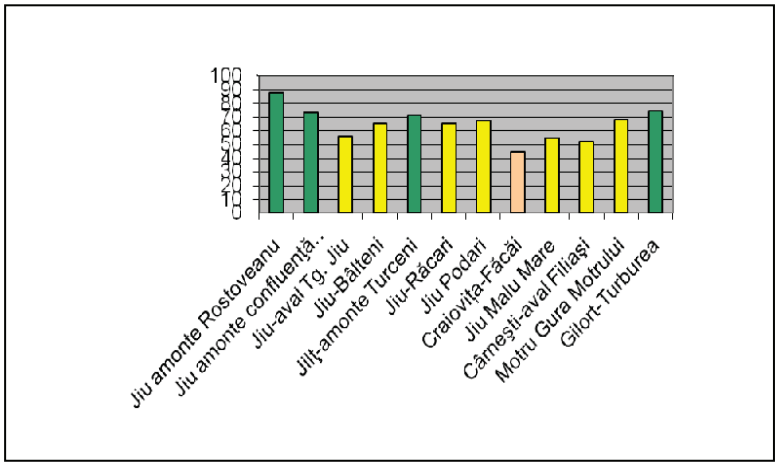

Figure 1. The ecological status of the water bodies according to WQI and WFD in Jiu middle river basin

For 2014 the heavily modified water body Craiovita, which represent the emissary for domestic and industrial wastewaters of Craiova city, presents a very low value for the WQI (44.46%), the quality of water body, respectively the ecological status of water being a low one and having a negative impact upon Jiu River.

CONCLUSIONS

The Jiu river sector between Targu Jiu-Craiova cities can be classified as heavily modify water bodies, due to the combined action of heavily modified water bodies from upstream and also because the human pressures, constant and relatively uniform in the researched river basin. The main pressures on this water body are: power station (thermo pollution), the localities without sewers and treatment plants, mining industry, agriculture and hydro technical works (dams, embankments, and water-course regulations).

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Table 2

The quality scale (takeover and adaptation Lazăr et al. 2006)

Score	Quality		Ecological status acc. to WFD 60/2000/EC	The anthropogenic impact evaluation on water body
91-100	Excellent	A	FB-very good	Natural water body
71-90	Good	B	B-good	Water body under a reduced anthropogenic impact
51-70	Medium	C	M-moderate	Water body under a reduced anthropogenic impact
26-50	Low	D	S -low	Water body under a significant negative anthropogenic impact
0-25	Failed	E	P- failed	Water body under a severe anthropogenic impact

Table 3

The anthropogenic impact evaluation upon the ecological status of the water bodies using WQI method in the middle basin of Jiu River year 2014

Water body section	WQI score	Ecological status of water bodies according to WQI and WFD	Water category	The evaluation of anthropogenic impact
Jiu upstream of confluence Sadu	73.16	Good	B	reduced anthropogenic impact
Jiu downstream Tg. Jiu	56.07	Medium	C	moderate anthropogenic impact
Jiu-Bâlteni	65.46	Medium	C	moderate anthropogenic impact
Jilţ downstream Turceni	71.14	Good	B	reduced anthropogenic impact
Jiu-Răcari	65.51	Medium	C	moderate anthropogenic impact
Jiu Podari	67.33	Medium	C	moderate anthropogenic impact
Craioviţa-Făcăi	44.46	Low	D	significant negative anthropogenic impact
Jiu Malu Mare	54.91	Medium	C	moderate anthropogenic impact
Cârneşti-downstream Filiaşi	52.12	Medium	C	moderate anthropogenic impact
Motru Gura Motrului	68.02	Medium	C	moderate anthropogenic impact

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CONTRADICTIONS BETWEEN WATER FRAMEWORK DIRECTIVE (WFD) AND RENEWABLE ENERGY DIRECTIVE (RED)

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Keywords: *Small hydroelectric power plant, Water Framework Directive*

ABSTRACT

The Water Framework Directive is a Directive of aquatic environment in which the hydro-morphological quality elements namely the hydrological regime (quantity and dynamics of water flow; the link with groundwaters), river continuity, morphological conditions (depth of rivers and width variation, structure and the sub layer of the river bed, the structure of riparian area) are considered support elements necessary for the life of aquatic communities. Small hydroelectric power plants have impact upon aquatic ecosystems but they also bring benefits to the environment by reducing greenhouse gases that lead to climate changes and socio-economic benefits (reduce energy dependence and new jobs). Undoubtedly small hydroelectric power plants have impact on the water body, the major challenge being to find an optimal solution in technical, environmental and economic terms. Taia small hydroelectric power plant is a case study on how regulators (National Administration "Apele Romane", Environment Agency) solved the contradiction WFD and RED, taking into account the aspect that it has two water catchments.

INTRODUCTION

Producing electricity through hydroelectric power plants represents about 20% of the world's electricity. Medium-term scenarios forecast an increase in electricity demand that can be met from fossil fuels and renewable energy. As sequence of the awareness of global warming (due to the emission of greenhouse gases from power plants and due to other sources), the political pressure will increase for the production of electricity through hydroelectric power plants, this one being the most developed and non-polluting form of renewable energy (2000, Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for Community action in the field of water policy).

Promoting the production of electricity from renewable energy sources is a priority for the European Union as it contributes to the achievement of the following objectives:

- environment protection;
- sustainable development;
- security in electricity supply by reducing the dependence on energy imports;
- increase in industrial competitiveness;

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- positive impact on the regional development and on provision of new jobs;

The European Directive on the promotion of electricity from renewable energy (2001/77/EC) sets a target of 12% of gross inland consumption from renewables and 22% green energy for European Union in its whole by 2010. The member states have set their own targets and they will take appropriate measures to achieve them (2010, Assessment, at river basin level, of possible hydropower productivity with reference to objectives and targets set by WFD and RES-e directives, brochure under SHERPA project – Small Hydro Energy Efficient Promotion Campaign Action). The small hydroelectric power plants have a major role in electricity generation and they arise a particular interest as they represent a clear alternative to getting electricity. Often, the disputes regarding the small hydroelectric power plants generated materials such as "7 myths about hydropower" stated by WWF Romania or the advantages of small hydroelectric power plants stated by Romanian Association of Hydropower. Both approaches are exaggerated and they have not the specialists' opinion.

The environment constraints take into consideration a big variety of environmental requirements that a hydropower plant must meet to be built and to be exploited.

Some of them are related to the impact that the hydropower plant have on the river ecosystem and they are closely linked to the implementation of WFD (as for example ecologic flow, fish pass, favourable turbines for fish).

Other requirements are linked to the impact that a hydropower plant can cause on the landscape (as for example aesthetic improvements of hydropower plants) and on the environment in general (as for example noise reduction systems, hydraulic – forestry arrangements).

Taia hydropower plant is the only one made after 1989 in Jiu river basin. So the regulators have imposed in all respects the principles of Water Frame Directive. Special attention was paid to the migration of fish fauna.

Photo1. Intake water and fish pass (SHPP Taia)

MATERIAL AND METHODS

In 2005, a risk assessment of WFD was carried across Europe and it showed the fact that the morphological pressures and impacts are some of the most important risks of failure in achieving the objective of WFD in many Member States. This term summarizes all physical and structural changes, including regularization of rivers, navigation channels, dams (barrier) and so on. Three important driving forces were identified: hydropower, navigation and flood protection.

In fact, even if hydropower has no direct effect upon the chemical quality of water, this technology is inevitably linked to water morphological alteration.

The key hydro morphological alterations associated typically with hydropower include: diversion of water courses (derivations for SHPP, catchments with derivation for big hydroelectric power plants), the impact on the water balance due to the effects of storage (dams), the massive supply of groundwater due to the big reservoirs, disruption of biological continuity (fish migration upstream and downstream). Many of these impacts can be mitigated by various measures, but some changes are so significant that they do not allow a water body to reach the good ecological status. (2009, Common Implementation Strategy for the Water Framework Directive (2000/60/EC) Guidance document no. 20, Guidance document on exemptions to the environmental objectives).

Therefore, it is obvious that Article 4 of WFD is the core of this legislation, because it provides the methodology to assess if an existing or new hydropower plant is compatible with the environmental objectives.

For surface waters, article 4 provides 2 general principles:

- Member States must prevent deterioration of the status of all water bodies;
- Member states must protect and enhance the status of all water bodies.

In the first months after discussing WCD, hydropower producers were concerned about the impact of the Directive on the development of the sector; after a few years of experience, SHPP producers believe that there is no general rule and that it is important to take into consideration the entire water body and not just one part.

Hydropower is not the only human activity that has impact on the river hydro morphology, but it is the one that arises a particular interest regarding the environmental impact.

The small hydroelectric power plants represent a viable alternative for the generation of electricity at large scale. Compared to big hydroelectric power plants with dam, the small hydroelectric power plants have the following advantages:

- The river continuity ensured by the absence of big reservoirs and the ease to execute fish passes due to the minor differences of level. The provided power is thus sacrificed but daily energy is predictable compared to wind and photovoltaic;
- The small hydroelectric power plants in Romania have an ecologic flow required by INHGA ($Q_{95\%}$ of duration curve of daily flow), namely approximately 20-25% of the annual average flow, compared to the dams that have a required flow 4-5 times smaller and most of the time difficult to follow, because the unloaders do not technically allow;
- The lower water is more protected compared to dams by assuring a bigger downstream flow and a flow variability closer to the natural one. An exception is represented here by the hydropower plants with fail water reservoirs, which in this way provide a pulsed regime downstream with negative effects on fauna and vegetation, it is imposed the obligation of a rectifier basins at the outlet conduits or at the cancellation of fail water reservoirs;

- No impact on groundwater compared to the dams and big derivations for dams which have a major impact. The reservoirs supply the groundwater massively, and the derivations and the secondary catchments dry the rivers reducing thus the groundwater intake;
- Zero emissions of greenhouse gases compared to the reservoirs realized by dams for the big hydropower plants and for the hydropower plants with pumping;
- Obtaining cheap energy sources in near future. In present, is a source of energy relatively expensive (up to 70 Euro / MWh on 10 years) because the financing is done through the scheme of green certificates, but even in this case it is much cheaper compared to big hydropower plants (about 300 Euro/ MWh on 10 years). Only wind power is close to these costs, but it has the disadvantage of a relatively big specific cost due to the wind potential;
- The investments are small compared to big hydropower plants, creating the perfect environment of free competition because the big hydropower plants are made only by the state;
- The fact that they are small power units and they are generally made in mountain areas, they assure a dispersal of electricity generation and especially at the end of the network where there are isolated settlements, where large losses are usual and there is no access to electricity. By the dispersal of electricity generation are made big savings regarding its transport by reducing transport losses.

Taia hydropower plant illustrates pertinently the advantages of small hydropower plants, with several particularities that make of it a good example:

For the capitalization of the hydropower potential, a daily flow duration curve was calculated (Figure 1).

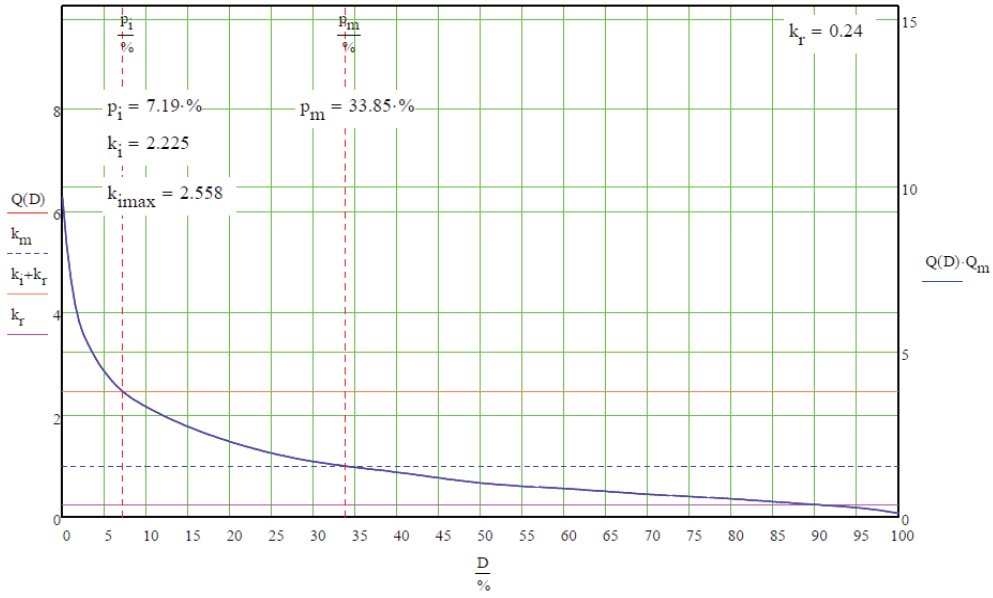

Figure1. Daily flow duration curve for the calculation of hydropower potential

Examining some time series by design, the following were imposed:

- The ecologic flow must be variable to simulate its seasonal variation. Thus the ecological flow is ensured through the fish pass at a constant value and through the winter intake, variable depending on the season (flows bigger than $Q_{95\%}$ during autumn and spring).
- The fish pass is with relatively low speeds to allow the migration not only of *Salmo trutta fario* but also of *Cottus gobio*. A main problem is the lack of regulations for fish passes in Romania and the implementation of some regulatory documents from other European countries must be applied taking into consideration the specific species from Romania.
- Water catchment with tyrolese intake and with a discharge sill of low height.
- The equipment was performed with two turbines (Pelton and Francis) for a higher revaluation of hydropower potential. At low flows, it is machined with Pelton turbine due to good efficiency at variable flow and at average flow with Francis turbine due to good efficiency at nominal power.

RESULTS AND DISCUSSIONS

An important issue for small hydropower plants is the fish passes. For Taia, the fish passes were the main element to assure river continuity.

The fish passes are designed for the migration of fish fauna. The maximum speed to assure the migration of fish fauna is Vmax= 2m/s. The fish passes have optimal dimensions allowing the migration at very low flows (drought periods – the maximum allowable size is 50 cm). These are designed and built specifically for a maximum size of fish fauna of 20 cm (the average fish fauna of the site is 12 cm, compared to DVWK where the specimen average is 40 cm, resulting a minimal dimension of the basin of 40 cm. Thus the basin dimensions for small rivers are between 40 and 50 cm to be functional anytime during a year.

According to Austrian and German norms, the recommended width of the fish pass slot is 15-18 cm, calculated according to the relation 2x3xs, where ‘s’ represents a maximum width of fish fauna of 2-3 cm.

To remove any doubts in terms of assuring the minimum flow, it must be assured through a smaller number of control sections. The recommendation to assure the minimum flow only through the fish pass is very good but it implies certain dimension principles:

- The fish pass must be functional during low waters (drought) which means that the speeds at fish pass slots to be more than 0.8-1.0 m/s because the fish fauna do not migrate at low speeds;
- The fish pass must be functional during medium waters, meaning that the speed at fish pass slots must be less than 1.8-2 m/s, as fish fauna do not migrate at higher speeds;
- The difference of level among basins is recommended to be less than 20 cm;
- The slots must be of at least 12 cm, being recommended 15 cm and maximum 20 cm;
- The solution of fish passes with submersed slots (DVWK) provides a higher flow, but they are likely to be clogged, thus not providing the required flow;
- The functional and optimal fish passes are those with high slot and with a maximum discharge of the basins of 5-8 cm.

Following the above principles, the minimum flow is required to be assured through the fish pass and through the winter intake; in this case, the flat valve is open

partially downstream the winter intake to assure the minimum flow. This contradicts the fact that the minimum flow can be assured only on the fish pass.

CONCLUSIONS

The need to develop some good practice guidelines for small hydroelectric power plants is imperative. The public awareness on the advantages and on the disadvantages of hydropower was easily done and the actions done were wrong and biased.

Special attention must be given to fish passes and to the ensuring of variable ecological flow, this aspect being initiated by INHGA.

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INFLUENCE OF HARVEST TIME UPON THE PRODUCTION AND ITS QUALITY AT CORNICHON CUCUMBERS CULTIVATED IN PLASTIC HOUSES

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Keywords: *cornichon cucumber fruits, fruits dimensions, fruits weight, fruits density*

ABSTRACT

Cornichon cucumber fruits produced in plastic houses for autumn consume fresh or for industrialization are valued in our country on internal market at kilogram. The quality standards for this product designated for industrialization states that the main quality element is fruit length. Another very important quality element for the cucumbers for industrialization is represented by the density which is influenced by the presence or absence of gaps in the area of placenta tissue, gaps determined by the characteristics of fruit formation and growth. This article presents a comparative analysis of some quality elements influenced by the fruit size.

INTRODUCTION

Cornichon cucumber fruits are starting to become more and more attractive not only for consumers but also for cultivators. Cornichon cucumber fruits are used not only for fresh consume but also for cans preparation for cold season consume.

In the last years, in the cornichon cucumbers culture have appeared new elements like new hybrids with disease resistance and/or tolerance and cultivated area in plastic houses enlargement, for summer and autumn consume. We underline also the fact that in the Romanian export for fresh vegetables, cucumbers are on the first place. The quality elements for cornichon cucumber fruits are related to the pigmentation intensity and to fruits density, mostly for those subject to industrialization.

This article is trying to establish the relation between fruits size and some quality elements of them for cornichon cucumber fruits obtained in successive crop culture in plastic houses.

MATERIALS AND METHODS

For this experiment was used the cornichon cucumber hybrid F_1 - Mirabelle - commercialized in our country by Seminis company. This hybrid is characterized by dark green uniform colored fruits, by very good productivity and by lack of fruits with gaps in

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placental tissues lodges. Plants are resistant to powdery mildew, cucumber mosaic virus, chladosporioze and tolerance to blight.

Mirabelle F_1 is recommended in our country conditions first of all for plastic houses culture. This experiment was set-up in a traditional plastic house tunnel type with 5.40 m basal width. Before the experimental crop, in the plastic house was set-up an early cycle tomato culture (4-5 inflorescences, short cycle) finished in the middle of July.

The plastic house from Periș area (aprox 25 km North from Bucharest) is placed on reddish-brown soil, with moderate favorability degree for cornichon cucumbers culture.

The main fertilization was done in autumn through application of 3 kg of manure well fermented per square meter of terrain. After finishing the previous crop culture (early tomatoes) was planted cornichon cucumbers crop, at distances of 80/50 cm that allows a density of 2.5 plants/m^2. This density was established because the very good light conditions from the first part of the culture cycle favors not only vegetative growth but also cucumber fructification.

The fazial fertilizations during vegetation were done to the soil, in the same time with irrigation, using the recommended dose rates by Universol, higher content of nitrogen before fructification and higher potassium content during fructification period and also together with extra-radicular fertilizer – Cropmax (Giovannoni 2001).

The plastic house wasn't equipped with water spraying machines for increasing the atmospheric humidity and for keeping inside the plastic house. The consequence of this was unfavorable to the crop, negatively impacting the yield level (Horgos 1999).

For gathering the volume and diversity of experimental necessary data, were done observations regarding morpho - physiological, biochemical and agrochemical characteristics. The needed fruits for determination were harvested from the first 3 internodes from the plant stem, where small in formation fruits weren't disregard.

The morphological determinations were done on probes of 10 fruits, separated randomly from harvested cucumber fruits. The fruits length – quality criteria for cucumbers, was determined through measuring with caliper. The average fruits weight was established through weighing, using precision balance. Fruits volume was determined through fruits immersion in water into a graded cylinder. Fruits density was calculated by dividing fruits weight by their volume. For verifying the correctitude of this determination, fruits were introduced in water. Those with the density higher that 1 g/cm^3 are sinking in water (immersion), and those with density below 1 g/cm^3, are floating.

RESULTS AND DISCUSSIONS

The results of these determinations are presented in Table 1. From the data presented in this table can be concluded that the average fruits weight is progressively increasing, compared with fruits length. It can be seen that for relatively small fruits, their average weight, expressed in grams, is of 50% from their length (Table 1). For big and very big fruits, their average weight is very close as number, to the value of their length.

Fruits density, expressed as g/cm^3, with some exceptions, is close to 1 (0.97 – 0.99 g/cm^3) (Kader 2002). For these fruits was seen that most are sinking in water, fact that shows that the real value of this determination is a bit bigger than the one obtained through measuring and calculating methods presented.

Fruits sections showed that the gaps from placental tissue lodges are missing for calculated densities of 0.97 – 0.99 g/cm^3. The explanation for this is that a very good fruit hydration is eliminating possible gaps from seminal lodges. For fruits with low densities, but with high length and weight, in fruits sections were found gaps in seminal lodges.

This fact is explained through high dehydration of the fruits, similar to the one of

the plant leaves during August and beginning of September where were correlated, with negative effects, very high temperatures with very low atmospheric humidity. This microclimate, totally unfavorable for cucumber plants, determines not only plant physiological disequilibrium, but also fruits weight (and density) reductions harvested from plants at higher dimensions.

Table 1

The fruits length (mm), weight (g/fruit), volume (cm^3) and density (g/cm^3). Cornichon cucumbers in plastic house, summer-autumn cycle.

No.	Fruits size class (cm)	Fruits length (mm)	Fruit average weight (g/fruit)	Fruits volume (cm^3)	Fruits density (g/cm^3)
1	6-9 cm	89.00	40.70	40.10	1.02
2	9-12 cm	107.10	62.90	65.20	0.96
3		110.00	66.01	70.10	0.94
4		118.00	78.97	80.20	0.99
5	12-14 cm	121.00	82.10	85.00	0.97
6		124.00	89.32	90.30	0.99
7		125.00	108.27	120.00	0.90
8		127.00	126.50	130.00	0.97
9		137.00	132.08	135.00	0.98
10	Over 14 cm	142.00	149.63	151.00	0.99
11		144.00	139.27	150.00	0.93
12		155.00	178.68	190.00	0.94

For determination of N, P, K content and nutritional value, cornichon cucumber fruits were sorted by size classes, in according to existing quality standards for industrialization. After Burzo & Dobrescu (1999) there are 3 quality classes for cornichon cucumber fruits, as follows: Extra – 3-6 cm length, Quality I – 6-9 cm length, Quality II – 9-12 cm length. Fruits over 12 cm length are used, usually, for fresh consume, in spring, summer and autumn (Popescu & Atanasiu 2000).

For avoiding the pollution with macro-elements, in the experiment were done determinations regarding the accumulation of N, P, K in fruits of different dimensions. The results from Table 2, show the following aspects:

- The content of $N\text{-}NO_3$ is higher for smaller cucumbers compared to the one determined for bigger fruits. This dynamic can be explained: for parthenocarpic cucumbers, the fruits formation and growth is more a vegetative process, with high nutrient absorption for small fruits, and after, the growth rhythm is faster that the absorption of nutrients, having as result the decrease in N, P, K content in bigger fruits.

Independently of the size class, $N\text{-}NO_3$ determined values are below maximum admitted by law limits of 400 ppm – $N\text{-}NO_3$. The same for $P\text{-}PO_4$ and K, for which the determined values are below those mentioned in the Health Minister Order (Low 5/2005 – P – 200-400 ppm/100 g pp and K – 1000-2000 ppm/100 g pp).

Regarding the total yield - were recorded data for the first harvesting period, and after, due to very high temperatures from this summer, physiological disequilibrium and

plant de-hydration, the yield was compromised, so no further observations. So, next year will be done further observations on yield obtained.

Table 2

Agrochemical components in cornichon cucumbers. Cornichon cucumbers in plastic houses, summer-autumn cycle.

Specification	Fruits dimensions at harvest		
	3-6 cm	6-9 cm	9-12 cm
N-NO_3 – ppm	154.23	121.47	78.69
P-PO_4 – ppm	193.10	210.01	1825
K – ppm	2125	1825	1910
Acidity - %	0.13	0.11	1.95
Vitamin C – mg ascorbic acid /100 g fp	2.85	1.95	1.85
Soluble glucides - %	0.89	0.92	1.02

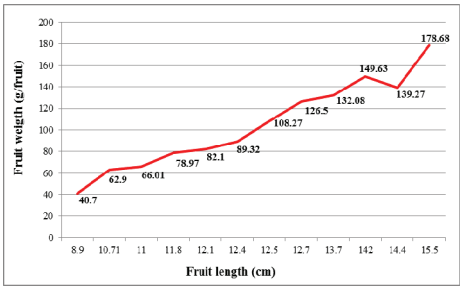

Figure 1. The influence of cornichon cucumber fruits size upon their average weight

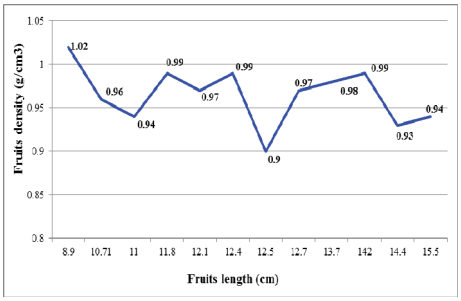

Figure 2. The influence of cornichon cucumber fruits size upon their density

CONCLUSIONS

From the research done, can be underlined the following conclusions:

- The average cornichon cucumber fruits weight is progressively growing compared to their length.
- Cornichon cucumber fruits density is exclusively dependent on environmental conditions.
- Independently of cornichon cucumber fruits size class, N, P, K (N-NO_3, P-PO_4, K) determined values in this experiments are below maximum limits imposed by law.

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✔*Ingineria mediului*

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THE ROLE OF ANTIOXIDANTS IN SLOWING AGING OF SKIN IN A HUMAN

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Keywords*: Antioxidants, Free radicals, Slowing aging, Skin aging slowing*

ABSTRACT

This paper presents the authors' own vision of the human aging process, the normal and the forced. Free radicals are natural nanoparticles which are doing their part well defined in the human cell, but then they must be annihilated or eliminated to not destroy the cell or another part of our body. It has been shown that residual free radicals in the body are responsible for the aging. The role to annihilate them is full-filled by the antioxidants. Antioxidants are a group of compounds produced by the organism or that occur naturally in many foods. Antioxidants work together in the human body to maintain health and vigor, especially during the last decades of life. They do this by protecting us from harm caused by free radicals that can destroy skin and tissues healthy cells of the organism. Antioxidants can prevent and the formation of AGEs (advanced glycation end-products) which if too many can lead to external signs of premature aging such as wrinkles and brown spots on the skin and cause even more damage inside the body.

INTRODUCTION

Antioxidants are a group of compounds produced by the organism or that occur naturally in many foods. Antioxidants work together in the human body to maintain health and vigor, especially during the last decades of life (Rahman 2007). They do this by protecting us from harm caused by free radicals that can destroy skin and tissues healthy cells of the organism. The body produces free radicals in the course of normal power production but there was substance in the environment that certain chemicals, smoke, contamination, solar radiation which stimulates free radical production. As a matter of fact free radicals are major guilty for the process of aging of the skin (Pandel 2013) and of the organism, in general.

Through the process of checking the free radicals, the antioxidants can make a difference between life and death, and can determine the speed and the way in which we age (Godic 2014). Very many tests and scientific experiments demonstrate that the persons who are eating a diet rich in antioxidants and take a supplement of antioxidants, live longer and healthier (Schagen 2012).

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Corneum stratum (layer) of the skin is a barrier between the external and internal of the body. This explains why the stratum corneum thickens in places where the skin is subject to friction and pressure. The protective function of the skin is fulfilled provided that the skin is intact. Wrinkle is defined in DEX as - the cheek skin crease, wrinkle, wrinkles caused by tearing of the dermis elastic fibers. Skin wrinkling is the result of the following mechanisms: aging, attendants thought the sequelae of actinic lesions, and genetic disorders.

Visible morphological changes associated with the aging process are the following: decrease bone structure, reduce skin thickness and elasticity to subadiacente layers, the gravitational fall of the soft tissue, the formation of wrinkles in areas of adhesion with deep structures and areas of muscle insertion.

There may be several categories of wrinkles:

-Wrinkles of expression -which may arise early, being related to face constrained, which prints a specific activity to the facial muscles.

-Wrinkles due to aging which are divided into: -wrinkles of animation, resulting in contraction of mimic muscles; -fine wrinkles caused by breaking of the fibrillating network structure; -wrinkles pronounced produced by solar elastosis.

The face makes wrinkles early due to facial skin mobility, driven by functions or mimic facial muscles. Age at which appear wrinkles, varies according to: the regime of life and habits, solar radiation, heat, cold, humidity, light too high or low, alcohol abuse, smoking, stress, diets, using cosmetics inappropriate, genetic baggage.

MATERIAL AND METHODS

Free radicals accelerate aging

Free Radicals meet many critical functions in our body, checking blood passing through artery up to the fight against infection. Some free radical signal molecules that is responsible for starting and stopping of genes. Some free radicals, such as nitric oxide and superoxide, are produced in large quantities by our cells immune to "poison" viruses and bacteria.

However in less than a second, free radicals may turn against us, we may sicken and we can grow old too fast.

Where there is a stroke or a heart attack, or just an inflammatory disease such as arthritis, free radicals are existing or in production. For us to understand what are free radicals must be known human cells, where every day, and every second, is wearing a war between free radicals and antioxidants.

As anything in the universe, and the cells are made up from smaller units called atoms. Each atom contains a nucleus that is surrounded by electrons. Two or more atoms may be linked by dividing electrons forming molecules.

The biological process of oxidation (the process of training of energy) involve the transfer electrons from an oxygen molecule to the next. For these reasons sometimes may escape one lone electron.

An atom remained without one electron (an ion) present in human body, bears the name of a free radical.

Free radicals are formed constantly almost everywhere in the body in an amazing proportion. If free radicals spread by all over the body are not caught, may attack and oxidize DNA, genetic material that controls growth and development of cells, promote spiral down premature aging, or may cause many other heavy damage by intoxicating the body.

Many people consume network antioxidants - vitamin C, vitamin E, lipoic acid, coenzyme Q10, glutathione, etc. because they want to look and feel younger. Keeping antioxidant use -ie keeping free radicals in check can be one of the most effective ways to slow the aging process.

What became known as the free radical theory of aging was proposed in 1954 by Dr. Denham Harman, a researcher in Berkeley, studying the effects of radiation on human skin. In that time the United States was in the Cold War with the Soviet Union and there were fears that it will reach a nuclear war. Dr. Harman was commissioned by the government to find an effective antidote to radiation poisoning resulting from an atomic attack.

What makes skin exposure to radiations to be so dangerous is that it attracts lethal hydroxyl radical production, the most powerful and extremely dangerous free radical known. This free radical usually occurs when water comes into contact with ionizing radiation.

Hydroxyl radical is highly reactive, destroying everything in its path. Once created it is almost impossible to be stopped. Dr. Harman was the first to make the connection between free radicals produced during irradiation and free radicals produced by normal production of energy in the human body.

Radiation poisoning produced symptoms comparable with aging and hypothesized idea that free radicals are responsible for producing the same effect but in a longer period of time.

It was long believed that the key to revealing the mysteries of aging lies in human cells - (mode in how cells use oxygen to produce energy).

Dr. Harman has shown that bio-oxidation product of free radicals from human body, essentially contributes to the aging process, and while we can't prevent the passing years or aging body, but we can use antioxidants to reduce damage caused by free radicals, thus slowing down the aging process.

Free radicals aging both of body: outside and inside. Ultraviolet radiation from the sun, when they touch the skin excites a molecule on the surface of the skin, which reacts with oxygen to form singlet (atomic) oxygen. The atomic oxygen generates the production of free radicals including ozone.

What actually happens? Ultraviolet radiations are those who manage to split water into oxygen and hydrogen. This can be used in the automotive industry but it is not useful to the human body. Ultraviolet radiations manage to break the water present on the skin but also in tissues.

The human body is composed of 70% water, but any uncontrolled loss can disrupt the human machine. In addition atomic oxygen produced quickly turns into ozone, extremely toxic to the human body. On how atmospheric ozone is necessary to clean the air of toxic byproducts and stop and limit the penetration of ultraviolet radiation in the Earth's atmosphere as it is toxic and dangerous to the earth's surface or in the human body. Aging skin tissue occurs through dehydration and by the attack of the free radicals produced including the resulting ozone.

Ozone is an unstable compound consisting of three oxygen atoms bound together, in which only one normal and the other two are ions, one positive and the other negative. While it is not a free radical ozone promotes the formation of free radicals. Ozone not only attacks the skin, it can destroy the lining of lungs, mouth and nasal cavity.

And in free radicals produced by solar radiation with dehydration, and in those produced in the human body hydration is a serious and useful remedy immediately (because water has a cleansing effect and antioxidant). But to combat permanent free radicals inside

our and their negative effects on the human body, requires a permanent cure with network antioxidants.

The network antioxidants

Antioxidants network (network of special antioxidants) work together in the body (Packer 1999). Only five are considered the network antioxidants: Vitamin C, Vitamin E, lipoic acid, coenzyme Q10, glutathione. Vitamin C and E are not produced by our body but must be obtained through food.

Lipoic acid, CoQ10 and glutathione are produced by our body, but levels of these antioxidants decreases as we age. Scientists worldwide are investigating the role of antioxidants in preventing skin aging and disease prevention in aging.

Many people think that inherit genes premature aging or inherit a tendency to develop skin cancer. These five antioxidants can stop bad genes and reduce the risk of developing hereditary diseases. Antioxidants may delete premature brown spots and other signs of skin degraded by sunlight. Antioxidants may erase the signs of aging skin and protect the skin cancer (Ganceviciene 2012).

Parker Laboratory (Packer 1999) of the University of California-Berkeley include an antioxidant skin care regimen that not only prevent skin cancer but can slow down and even eliminate wrinkles, fine lines and other signs of aging skin.

Antioxidants are the body police against free radicals, call whenever needed to quell free radicals where they are so that their destructive power can't be extended to other cells.

When an antioxidant encounters a free radical, the radical is automatically joined to antioxidant molecular structure. Antioxidant becomes a new type of free radical, harmless. This will exempt cells and tissue destructive action of a radically freely got out of control.

What really makes the network of antioxidants to be special is that they can "recycle" or regenerate after they were loosened a radically free, widening and more power.

For example: When Vitamin C triggers a radically free it becomes weak free radical in the process.

This anti-oxidant can be recycled in the form of vitamin C. As an anti-oxidant network saves him on the other side, cycle continues by making sure that the body will keep the correct balance of the antioxidants.

This particular scenario - the antioxidant meets a free radical - it takes it, becomes a free radical friend - is recycled for another antioxidant network - occurs repeatedly in the body, in the blink of an eye.

Research has estimated that the number knocks oxidative degradation administered daily DNA in each cell is 10,000 and if this figure is multiplied by the millions of cells in the body can be understood the scale of such processes in the human body.

Each antioxidant has a unique niche in the cell; for example in the areas of aqueous cell or in the blood, which consists primarily of water, they will act only vitamin C and glutathione.

The role of vitamins C and E in maintaining young skin

Vitamin C prevents skin cancer, guarding DNA of threat free radicals. In normal amounts Vitamin C provides beautiful skin (Marx 2000). Vitamin C is essential for collagen production cellular glue that holds the body bound, and keep skin young and supple. Vitamin C protects the body against health problems especially in the elderly.

Vitamin C is considered the center of the antioxidant network, because the connection between fat-soluble antioxidants and the water soluble (Bojovic 2005).

Vitamin C is important for reloading a fat-soluble vitamin E; when it becomes a free radical, it best meets function (Packer 2002).

Vitamin C (ascorbic acid) is found in the following foods: citrus, green peppers, broccoli, blueberries, strawberries, tomatoes, cabbage. The daily requirement of Vitamin C: 90mg / day for men, 75mg / day women, 100 mg / day smokers (Pérez-Ruíz 1995).

Glutathione is the main water-soluble antioxidant. In the network of antioxidants, glutathione recycles the oxidative form of vitamin C, restoring its oxidative power. Product of the body contributes to liver detoxification of pollutants and drugs. Glutathione is important for a strong immune system; an increase in the levels of glutathione can redress the fall due to the age of the immune function. Glutathione is found in fruits, vegetables, fresh meat cooked (Pisoschi 2011).

Vitamin E is an antioxidant against the aging process; reverses the fall of immune function with age and helps brain cells to do not become old. Vitamin E keeps the skin young and protects from UV radiation and ozone, especially against skin cancer.

In the network of antioxidants vitamin E is recycled by vitamin C, lipoic acid and coenzyme Q10.

Vitamin E can flow through the thick portions of the cell membrane searching and eliminating free radicals.

Vitamin E can be found in the following foods: raw vegetable oil, butter walnut, rice oil, nuts, rice, green vegetables with leaves, broccoli, carrot, mango, zucchini, papaya. The required daily dose for an individual is about 30mg / day.

RESULTS AND DISCUSSIONS

Antioxidant miracle - slowing down the aging process

Strategic use of antioxidant network as suggested plan Packer can stop and even solve problems associated with aging. Today though some people live longer than ever, achieving the age of 120 years associated with life expectancy is a rarity.

Theory free radicals which cause aging, the alleged for the first time by the laboratories Packer declares that aging is a cumulative damage of cells and tissues produced for several decades due to exposure to free radicals.

In nature there is a direct connection between high level of antioxidants and the life expectancy.

The protective effect of antioxidants is striking if we try to correlate the average lifetime of different species of mammals with their level of antioxidants. In each case, the species with the highest amount of vitamin E or the strongest antioxidant defense system live most.

Humans and elephants are in the forefront, both in terms of antioxidant activity and in life expectancy, whereas mice and other rodents (with antioxidant least) living low.

Numerous studies have shown that antioxidants can prevent many of the signs of aging of the cells announced. Thus, in a culture of human cells by adding the vitamin E has doubled the life of human cells.

Antioxidants can prevent signs of aging announced by cell, namely the accumulation of aging pigment called lipofuscin, in all specialized cells of the body, especially in the brain.

Lipofuscin is a direct result of lipid oxidation, accelerating the aging process in the tube-like body. Antioxidants may greatly slow down the formation of lipofuscin, keeping young cells proper for a longer period of time.

Antioxidants can prevent the formation of AGEs (advanced glycation end-products). Consumption of refined sugar triggers a process called glycation (glicosilation non-enzymatic) by which sugar molecules attach to proteins.

This results in novel proteins referred to as harmful according to the "AGE" (Advanced Glycation End-products, end products of advanced glycation), which damage the cell and collagen proteins are more rigid with decreasing elasticity. Glycation occurs in all cells of the body and is accelerated by a diet rich in sugars as well as prolonged exposure to sunlight.

Glycation occurs when glucose reacts with proteins, resulting in binding of the protein chain, and the formation of free radicals. Too many of these proteins can lead to external signs of premature aging such as wrinkles and brown spots on the skin and cause even more damage inside the body (see Fig. 1) (Rimbach 2005).

Figure 1. External signs of premature aging such as wrinkles and brown spots on the skin

CONCLUSIONS

The development of modern methods and fast like this still takes place with or without the consent of many existing opposing forces on the planet today who do not want the development of mankind and in this way simply because they follow other interest groups (usually financial).

Any important contribution to people's health and extend life with health is a serious scientific contribution and deserve to be taken into account.

The best way to prolong life is to strengthen the antioxidant defense network that can control the forces that drive the aging process.

The main antioxidants that must be consumed daily (especially that can't be synthesized by the human body) are vitamins C and E.

A daily moisturizing wider also has a key role in active protection of the body against free radicals internal and external.

A well thought permanent food diet can help essentially to balance and strengthen the immune system of our body.

The best way to prolong life is to strengthen the antioxidant defense network that can control the forces that drive the aging process. The main antioxidants that must be consumed daily are vitamins C, E and A. This is done easiest by a diet rich in fruits, vegetables and fresh greens.

Antioxidants can prevent signs of aging announced by cell, namely the accumulation of aging pigment called lipofuscin, in all specialized cells of the body, especially in the brain.

AUTHOR'S CONTRIBUTIONS

All the authors have contributed equally to carry out this work.

ETHICS

This article is original and contains unpublished material. The corresponding author approved the manuscript and confirms that no ethical issues involved.

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EFFECTS OF SILT TRANSIT TROTUŞ BASIN DURING FLOODS IN 1991

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Keywords*: solid flows, erosion, transit, clogging*

ABSTRACT

During the transit of silt on the river is of great importance. The Siret river basin, forming conditions of transit of sediments are very complex and linked the great variety of the natural and human influence. This article covers the main aspects of transit of suspended silt basin Trotuş in 1991 and the lower sector of the river Siret.

INTRODUCTION

The issue of transit of silt on watercourses has a great theoretical and practical importance. The leak is a result of silting of rivers and corrosive action reflects the potential erosion of the river network, with direct effects on the overall evolution of landforms, geographic landscape, and resources so necessary ballast. Given the fact that floods are the main phenomenon that carries downstream products of areolar erosion or rain, caused by the action of heavy rains, the following will refer to transit solid during the floods of 1991 in the most affected Trotuş and the lower basin of the Siret River.

MATERIAL AND METHODS

For this article I used the hydrological data, especially liquids and solids flow supplied by the Siret Water Directorate and meteorological data, particularly amounts of precipitation, which we've processed statistically.

RESULTS AND DISCUSSIONS

The specificity average silt runoff in the investigated areas. Hydrometric silt began systematically after 1950. Currently operates in the Siret river gauging stations of 178, of which 86 monitors and silt in suspension. Lately, with the obligation of drawing up regional studies on the impact on the evolution riverbeds ballast, need knowledge flows and volumes of silt dragged it became pressing (Diaconu & Şerban 1994). The statistical processing of water flow and silt in suspension from a representative number of hydrometric stations, P. Olariu presents a complex table the average flow of liquid and solid characteristics in the river Siret (Olariu 1997).

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The above table represents a summary of spill liquids and solids during the period 1991-1997. In connection with the processing and tests of detail on the strings of values emerged several aspects the characteristic that are mention below:

a) The duration of the transit monitoring of silt, directly, the large variations in time and space, determined by the water leak and anthropic impact dimensions

b) In the case of the Siret River, arranged through the Lakes, the impact of these works be put very well demonstrated both during the execution of the works and after putting them into service. Other research out the impact of these flows on the accumulation of sediment downstream in suspension (Olariu & Vatamanu 2001).

Thus, at the station, located at hydrometric Huțani 20 km downstream of the Bucecea dam, the average flow of sediment recorded after 1970 represent 59% of the previous period.

Along the way, gauging stations, Lespezi and Drăgești flow deposits recover by intensifying erosion downstream of the dams: the flow of sediment recorded after 1970 represent 106% 111% and Slabs at Drăgești, compared to the period before, so you no longer feel the influences of accumulations.

Downstream lacustrine complex Galbeni-Răcăciuni-Bereşti, hydrometric station, located at the Adjudu Vechi only 1 km downstream from the dam Berești, sediment flow suspended calculated values after 1983 represents only 13% of the values. Towards downstream, the flow of silt partially recover, so station hydrometric Lungoci, they account for 44% of the value.

c) In the case of large rivers, which drain the different geographic areas and on courses which were placed gravel, elements of anthropic impact felt is made, to the effect that, during periods in which they have exploited the significant quantities of ballast, turbidity was higher (Moldova, Putna, Trotuș, their extramontane sector).

d) In the high mountain area, which was not affected too much by human interference were not reported, while significant changes to solid transport.

e) A special case is the catchment Putna, Ramnicu Sărat and Buzău, where, after 1970, there is a general trend of decreasing water turbidity, due to which there are some variations.

f) Landscape Barlad basin complex also led to a gradual reduction of solid transit.

Conditions of silt during the flood of 1991. Flash floods are deeply discontinuous phase of the hydrologic regime characteristic Siret river basin. During large floods, silt flows grow exponentially. Therefore, the relationship between the flow of sediments and the water no linear correlations, but enlargements wide curve to the right.

Factors controls of runoff silt are very numerous and all operate in a continuous interdependence. It is obvious that liquid leakage is the essential and indispensable training solids flow regime.

Analysis of sediments suspended conditioning flow starts from the reality that the same water flow in a given profile, the flow of silt in suspension are very different at different times, covering a wide gap. The same can be said about the flow of sediments dragged directly depending on volume suspensions (Diaconu & Șerban 1994).

During large floods, the complexity of these relationships is even greater. Typically, the growth phase of floods are increasing more slopes and drainage speeds, so erosion and transport capacity, and on downward slopes and lowering speeds and decreases power with them and intensifies River alluvial processes.

The flood of 1991 occurred between 28.07-5.08. In principle, the period was relatively rainy and local floods occurred which caused flooding on rivers basins Bistrita (Table 1a., Table 2), Putna Vrânceană and some smaller tributaries of the Siret: Soci,

Polocin. During 28-29.07.1991, at short notice, particularly rich precipitation fell. They have caused flooding in most watercourses in pericarpathian space, but the highest intensity of these events occurred in the catchment Tazlău (with propagation Trotuş and Siret) in the Răcăciuni-Orbeni. During this flood was destroyed Belci lake basin on the river Tazlău. This accumulation into operation in 1962 with a volume of 12.5 x 106 m^3 more in 1991 had a volume of only 2x106 m^3.

Maximum flow Helegiu registered hydrometric station, situated immediately upstream of the lake was 1.550 m^3 / s. By breaking the dam, downstream hydrometric station Slobozia, maximum flow rate was estimated at 3290 m^3 / s. The flood was propagated to Trotuş River. On this river upstream flood peak had outstanding debits (1290 m^3 / s in Onești). After the confluence with the river Tazlău (Table 1b), hydrometric station Vr nceni, the maximum flow of 3720 was m^3 / s. Flood wave was felt by the lower course of the river Siret (3270 m^3 / s hydrometric station Lungoci).

Regarding the flow of silt, the available data are quite sketchy. Extreme events that have occurred in the dam area Belci measurements resulted in discontinuation of silt. Based on more general relationship adapted to the area, the flow of silt in suspension from the flood culmination reconstituted. If Lungoci section of the river Siret, silt flows were monitored. Table 2 shows the change in fluid flow and silt suspended in the hydrometric stations representative of this flood.

CONCLUSIONS

In the drainage basin of the Siret river, located in an area where the climate aridization processes emphasizing water leakage and silting of becoming more often torrential, representing the major factors of risk. Exceptional floods in 1991 and other large-scale floods represent clear evidence in this respect. With regard to the main source of silt, dashed for the formation of gravel pits, more resources; it is necessary to resume the monitoring through modern means, because it is found that there are many deficiencies in knowledge of their regime.

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Table 1a

Basics of leaked liquid and solid space Siret river. Average annual values in the period 1991-1997*

Nr. crt	River	Hydro metric station	Catchment area F (kmp)	Alt. med H(m)	Q med multian (mc/s)	Q max mc/s	Q med monthly minim annually mc/s	Factor torrent	R med multian. Kg/s	Vol annual 10^6 t	Dragged flow rate	Total annual vol. 106 t	Alluvial Production r_0 t (ha/an)	Diffusivity
1	Siret	Siret	1.659	570	12.8	1.193	0.698	1.709	9.06	0.286	25	0.358	2.16	7.86
2	Siret	Huțani	2.030	517	14.2	866	0.700	1.237	14.2	0.448	20	0.538	2.65	7.00
3	Siret	Lespezi	5.921	513	35.2	1.133	3.40	333	50.8	1.60	15	1.84	3.11	5.94
4	Siret	Dragănesti	11.811	538	74.1	1.900	5.04	377	123	3.88	10	4.27	3.61	6.27
5	Siret	Răcătău Adjudu Vechi	20.219	647	138	2.320	22.3	104	114	3.60	10	3.96	1.96	6.83
6	Siret	Lungoci	36.083	539	197	3.270	32.7	100	275	8.68	10	9.55	2.65	5.46
7	Suceava	Itcani	2.330	616	16.0	1.354	1.30	1.042	13.4	0.423	25	0.529	2.27	6.87
8	Moldova	Prisaca Dornei	663	1.027	7.10	304	1.01	304	2.29	0.072	30	0.094	1.42	10.7
9	Moldova	Tupilați	4.028	703	32.1	1.210	2.86	423	36.8	1.16	20	1.39	3.46	7.97
10	Moldovița	Dragoșa	475	934	4.95	440	0.345	1.275	1.80	0.057	35	0.077	1.62	10.4
11	Bistrița	D. Giumalău	740	1.255	11.9	310	1.45	214	1.62	0.051	30	0.066	0.89	16.1
12	Bistrița	Dorna Arini	1.656	1.206	24.4	580	2.60	223	3.44	0.109	25	0.136	0.82	14.7
13	Bistrița	Frumosu	2.816	1.172	34.8	772	4.50	172	6.65	0.210	20	0.252	0.89	12.4

(*Source: Siret Water Directorate)

Table 1b

Basics of leaked liquid and solid space Siret river. Average annual values in the period 1991-1997*

Nr. crt	River	Hydro metric station	Catchment area F (kmp)	Alt. med H(m)	Q med multian (mc/s)	Q max mc/s	Q med monthly minim annually mc/s	Factor torrent	R med multian. Kg/s	Vol annual 10^6 t	Dragged flow rate	Total annual vol. 106 t	Alluvial Production r_0 t (ha/an)	Diffusivity
1	Dorna	D. Candreni	566	1.138	7.19	180	0.450	400	0.880	0.028	25	0.035	0.62	12.7
2	Bistricioara	Bistricioara	762	1.048	5.69	85.0	0.600	142	1.76	0.056	25	0.070	0.92	7.47
3	Trotuş	Goioasa	765	1.052	6.41	196	0.850	231	3.24	0.102	25	0.128	1.67	8.38
4	Trotuş	Tg. Ocna	2.084	924	17.2	678	1.40	484	14.0	0.442	20	0.530	2.54	8.25
5	Trotuş	Vrânceni	4.077	734	34.1	5.590	2.45	2.282	34.4	1.09	15	1.25	3.51	8.36
6	Uz	Cremenea	160	1.074	1.89	196	0.300	653	0.206	0.006	40	0.008	0.50	11.8
7	Tazlău	Helegiu	984	520	6.92	1.550	0.500	3.100	13.0	0.410	25	0.512	5.20	7.03
8	Putna	Botărlău	2.518	554	15.9	1.250	2.38	525	98.3	3.10	25	3.88	15.4	6.31
9	Rm. Sărat	Tătaru	992	320	2.80	282	0.010	28.200	34.3	1.08	30	1.40	14.1	2.82
10	Bărlad	Tecuci	6.778	220	10.4				20.4	0.644	15	0.741	1.09	1.53
11	Buzău	Racoviţă	5.240	530	28.1				129	4.07	20	4.88	9.31	5.36

(*Source: Siret Water Directorate)

Table 2

Flood during 28.07-4.08.1991 on the rivers Tazlău, Trotuş and Siret*

Days	Helegiu-Tazlău		Vrânceni-Trotuş		Lungoci-Siret	
	Q m^3/s	R/Kg/s	Q m^3/s	R/Kg/s	Q m^3/s	R/Kg/s
JULY 25	8.88	0.85	51.9	26.4	283	136
JULY 26	9.35	1.16	37.4	31.5	246	108
JULY 27	18.7	1.43	53.6	160	160	150
JULY 28	26.5	7.15	32.2	450	333	180
JULY 29	348	1600	1880	32000	1300	14000
JULY 30	224	740	786	9500	2464	22300
JULY 31	80.8	86	280	240	3110	36100
AUGUST 1	96	115	292	260	2560	24600
AUGUST 2	39.4	43.5	204	180	2190	11.700
AUGUST 3	37.2	11.6	265	210	1772	5990
AUGUST 4	27.8	7.30	210	190	1712	3130
Maximum Value Days	1550/07.29	10100/07.29	3720/07.29	100000/07.29	3270/07.31	37900/07.31

(*Source: Siret Water Directorate)

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CHANGES IN THE LANDSCAPE OF N SIRET BASIN PRODUCED BY THE FLOOD OF 2008

Pleşoianu Daniela*[1], Simionescu Violeta*[1]

Keywords*: rainfall, accumulation, confluence, floods, dimensions*

ABSTRACT

During 23.07-05.08.2008 in the northern half of Moldavia, dropped large amounts of rainfall which have caused serious flooding on large areas, resulting in numerous material damages and even human casualties.

Rainfall that fell in the range 23-28.07.2008, placed second with intensity (24-25.07 and 26-27.07) totaled 284.05 L/m^{2}to Brodinei, 431.9L/m^2 Vicovu de Jos, 297,3L/m^2 to Horodnic, 265,8 L/m^{2}t Sucevița, 202,6 L/m^{2}at Rădăuți and exceptional product flood the River Suceava and its tributaries on the upper river Siret River and Moldova.

The peak flows on the Siret River and tributaries Suceava, Moldova and others are much larger than the maximum flow known until now.

INTRODUCTION

Floods are a natural phenomenon with a significant potential risk, which by their magnitude and frequency have quite serious consequences on landscape and human life. In the Siret river basin floods are quite common and they occur as a result of increased river flow levels and rainfall in particular. By the summer of 2008 it was considered that these were the major's floods. For some water courses of the river basins Suceava, Moldova and on the Siret River upstream of the confluence with the River Bistrița, flood that occurred during 23.07-05.08.2008 exceeded the long, sometimes almost double the historical values known up to that date.

MATERIAL AND METHODS

For this material we used hydrological data, especially debits taken by the Directorate of Waters Siret and meteorological data, the quantity of rainfall, which we statistically processed, obtaining and graphics that, then, we have played.

RESULTS AND DISCUSSIONS

The geographical location of the Siret River Area has some hydroclimatic features that make the most part of precipitation and flow (Diaconu & Șerban 1994); among these we mention:

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- The Area Siret basin full temperate zone with moderate continental climate, with frequent discontinuities and thermal pluviometric;

- The east of the Eastern Carpathians, which represents a complex barrier in the path of movement of air masses from the western, more humid and moderate heat;

- The presence in the neighbourhood Peri-Pontic space, characterized by an excessive dryness fund climate;

- Fragmentation and high energy forms of relief and general high valleys and depressions;

- Human presence since ancient times, with major implications in the changing geographic environment.

All these elements can be considered control factors of the hydroclimatic system including training and development of the large floods.

Evolution and the magnitude floods. The flood of the period 07/23 to 08/05/2008 had two peaks. At some gauging stations in the upper catchment of the River Suceava (Brodina on the Suceava River, Putna on the Putna River, Horodnic on the Pozen River, Ţibeni on the Suceava River) and that even on the lower river (Iţcani on the Suceava River) floods have three branches.

Floods occurred in the period 07/23 to 08/05/2008 in the northern half of the Siret River Area were at most gauging stations, the largest of all the monitoring period of 60 years.

Table no.1 presents a comparative situation of maximum debits former registrated of this flood and the maximum values registrated from July-August 2008 flood. The overflowing probability of these debits is also presented.

Table 1

Comparative analysis of products during the flood peak flow of 07.23 to 08.05.2008, recorded during the previous monitoring*

Nr.	River	Hydrometric station	Q max by 2008 (m^3/s)Month and year	Month and year	P %	Q max 2008 (m^3/s)	P	Since data are…
1.	Siret	Siret	1193	VII.1969	1-2	920	1-2	1950
2.	Siret	Huţani	866	VII.1969	2	813	2	1950
3.	Siret	Lespezi	1133	VII.1969	5	2414	0.1-0.5	1950
4.	Siret	N.Bălcescu	919	VIII.2005	5-10	2200	0.1-0.5	1986
5.	Siret	Drăgeşti	1948	VIII.2005	2-5	2850	1-0.5	1950
6.	Suceava	Brodina	365	VI.1969	2-5	426	2	1950
7.	Suceava	Ţibeni	520	VI.1995	10	1118	1-2	1981
8.	Suceava	Iţcani	1354	VI.1969	2	1710	1	1948
9.	Brodina	Brodina	212	VI.1995	2-5	235	2-5	1961
10.	Putna	Putna	133	VI.1969	2-5	145	2	1962
11.	Pozen	Horodnic	108	VI.1975	5	168	2-3	1962
12.	Soloneţ	Părhăuţi	309	VII.2006	2	382	1	1950
13.	ŞomuzM.	Dolheşti	135	VIII.1969	5	54.9	›10	1950
14.	Moldova	Fd. Moldovei	175	VII.1972	10	149	10-20	1955
15.	Moldova	Pr. Dornei	304	VI.1972	5-10	300	5-10	1950
16.	Moldova	G.Humor	694	VIII.2002	5-10	696	5-10	1972
17.	Moldova	Tupilaţi	1402	VII.1991	2-5	795	›10	1950
18.	Moldova	Roman	1415	VII.1991	2-5	724	›10	1962
19.	Moldoviţa	Lunguleţ	186	VII.1969	2-5	245	2-5	1964
20.	Moldoviţa	Drăgosa	463	VIII.2002	2-5	496	2	1950

(*Source: Siret Water Directorate)

From table no.1 results that on the superior flow of Siret River the flood in 2008 hasn't had the historic maximum debit, which was registered in 1969. At Siret hydrometric station, in uninfluenced regimen, the maximum debit of the flood was of 920m^3/s.

Watching the values in table no. 1 it can be observed that the highest debits, from hydrometric station from Siret hydrographic basin, registered until 2008, were registered also in 2008. Thereby, the values are the following: at hydrometric station Siret on Siret River 1193 m^3/s until 2008 and 920 m^3/s in 2008; at hydrometric station Lespezi on Siret River 1133 m^3/s until 2008 and 2414 m^3/s in 2008; at hydrometric station Drăgești on Siret River 1948 m^3/s until 2008 and 2850 m^3/s in 2008; at the hydrometric station Iţcani on Suceava River 1354 m^3/s until 2008 and 1710 m^3/s in 2008.

Observing these values we can say that the risk of flooding at these hydrometric stations is high. The following graph illustrates the floods since 2008.

In figure 1 it can be observed that the debit values are increasing in the following order: hydrometric station Siret 920 m^3/s, hydrometric station N. Bălcescu 2200 m^3/s, hydrometric station Lespezi 2414 m^3/s, and hydrometric station Drăgești 2850 m^3/s. At these hydrometric stations were registered high values also in the period previous to 2008, which highlight the fact that in these areas the risk of a flood is higher. For the period previos to 2008 the following values were registred: hydrometric station N. Bălcescu 919 m^3/s, hydrometric station Lespezi 1133 m^3/s, hydrometric station Siret 1193 m^3/s, hydrometric station Drăgești 1948 m^3/s.

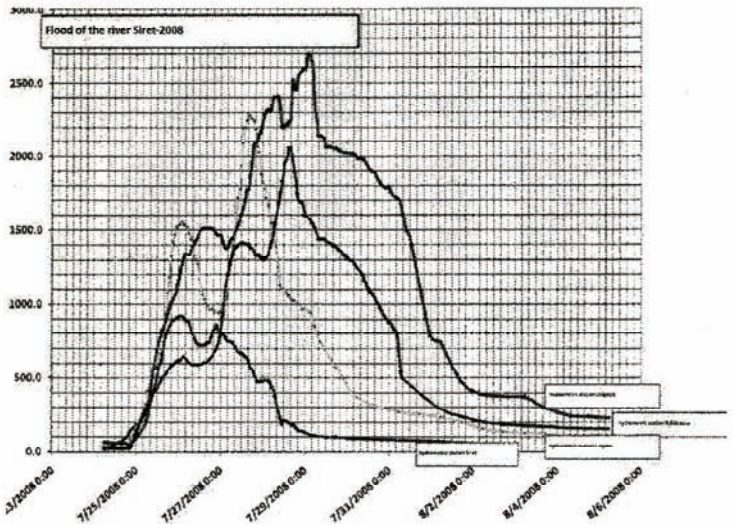

Figure 1. The Siret River flood – July 2008

We must mention the remarkable efforts made by the workers in Rogojești and Bucecea dams to manage as well as they could these remarkably high debits and to evacuate downstream lower debits. To this effect were made former emptying and accumulated water volumes up to the maximum retention capacity.

It can be found that the floods in downstream, respectively those in hydrometric stations Zvoriștea (downstream the dam Rogojești) and Huțani (downstream the dam Bucecea) have smaller debits than those at the hydrometric station Siret.

Downstream the junction with Suceava River, whose water contribution was especially high, the flood in Siret River had remarkable high debits. At hydrometric stations Lespezi and N. Bălcescu, the debits values in 2008 are more than double compared to the previous monitorization period.

Effects of floods. Floods of the period 07/23 to 08/05/2008, in the northern part of the Siret River Area the maximum flow levels resulted in significant increases have caused floods that affected large areas towns, farmland and communications routes.

In addition to property damage, there must be mentioned bed and slope processes that occurred during pre-rains and floods (Olariu & Gheorghe Delia 1998).

In Suceava, a preliminary estimation was made immediately after the floods, leading to a total damage of 735 million RON. Among the main objectives and destroyed property it is worth mentioning: a missing person, two persons killed, 2422 houses damaged, 313 annex affected socio-economic targets 19.963 bridges and culverts, 114 bridges, 12.58 km DN, DJ + 1258.701 km DC, DF 483.412 km, 345 km railway, 5 dams, 10 hydro power plants, 19 hydrometric stations, 94.13 km of shore defenses and dams, canals, ditches and 55.4 km, 110 km anti-erosion works, 18.867 ha of agricultural land, 1.68 km water supply network, sewerage network 37.175 km, 234.8 km grid, 1.6 km natural gas supply network, 6.07 km clogging of river beds and erosion.

Floods also caused Neamt county very important damages produced especially on Siret River, where the flood came through the propagation of the Suceava River. According to preliminary ratings were affected: 9750 people, 1320 households, 36.73 km rural roads, 17.97 km of county roads, 106 bridges destroyed, 34 damaged bridges, 30 km water pipeline destroyed, protection works, road, dikes, diversion of ballast, 1268 flooded wells, four medium voltage lines damaged, 1647.51 ha of agricultural land affected seven hydrometric work. The total amount of damage amounts to 54 million RON. To this value may be added over 1 milliard RON, sum representing the value of hydraulic works destroyed.

Bacău County territory, where not abundant rainfall fell, but along the Siret River occurred due to severe flooding from upstream flood propagation. Damages include: 350 homes destroyed, 515 damaged houses, five economic objectives, 1818 hectares of arable land, 5.5 km DJ DG 40 km, 3.6 km roads, a bridge, 24 culverts, 49 km canals, dikes, 3.55 km, 1 hydrometric station.

CONCLUSIONS

We conclude that floods can alter the landscape but also on people's lives. The effects are all the greater as the amount of rainfall is higher. In this case competent authorities must be prepared for emergencies and take action if necessary.

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QUALITATIVE ASPECTS OF JIU RIVER'S WATER IN THE SECTION DOWNSTREAM OF THE MINING AREA ROVINARI – GORJ COUNTY

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Keywords*: remediation, water quality, good condition*

ABSTRACT

This paper tries to present the surface water quality of Jiu River in downstream section from the Rovinari City, in Balteni area, Gorj County, a specific area for mining industry, activity that exert a great influence on environment, influence that manifests in all phases of production processes both in exploitation and also in preparation. The influence on the environment factors begins with the development of productive activities, in some cases, the negative influence manifests a very long time, even after the total cessation of production activity in the area. The paper aims to emphasizes the remediation process of the surface water quality from the studied area, to fulfill the fundamental objectives of Water Framework Directive 2000/60/ EEC, respectively to achieve a "good status" of the water body Jiu - Rovinari- Turceni accumulation (RORW7.1_B51), Balteni area.

INTRODUCTION

Rovinari area, due to the two important branches - mining and energetic- is one of the most affected areas by the anthropic activities from Gorj County, and from the hall country (Chimerel 2011, Dodocioiu Ana Maria et al., 2013). At 2001 year level, Fodor D. and Baican G. mentioned that annually the National Lignite Company (company's name at that time) discharges the following quantities of water: 4 mil.m^3 mine waters, 86 mil.m^3 career waters, 4 mil.m^3 waters from dewatering drillings, 1 mil.m^3 domestic waste waters. An expression of structural quality and of aquatic ecosystems functioning associated to surface waters is represented by their ecological status (Alina Girbagiu et al. 2015). According to Order no.161/16.02.2016 of Ministery of Environment and Water Management on "classification of surface waters in order to establish the ecological status of water bodies"- the assessment of ecological status is achieved on 5 state of quality: very good (I), good (II), moderate (III), weak (IV), and bad (V), based on the biological quality of elements, hydro morphological, chemical and physico-chemical. In accordance with Water Framework Directive 2000/60/ EEC the achievement of fundamental objectives through this regulation consists in achieving a "good status" of all water bodies in natural regime from Europe, till 2015 year, preserving a "good status" of water bodies where there

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it already exist, achieving a "good ecological potential" for water bodies strongly modified and artificial. The importance of monitoring activity of water quality consist in the fact that this accentuate permanently the quality status of water resources and underlying the adoption strategy of effective protection of the quality of this resources. Taking into account the requirements of Law 310/2004 with amendment and supplemented of Water Law 107/1996, which took over the previsions of Water Framework Directive 2000/60/ EEC in water domain and other UE Directives, the national system of waters monitoring that comprises two types of monitoring: supervisory monitoring, having the role to assess the status of whole water bodies from hydrographic basins and operational monitoring for the water bodies that have the risk of not fulfill the water protection objectives.

MATERIAL AND METHODS

The undertaken analyses aimed the surface waters evaluation, at level of the years 2011-2015, according to Water Law no 107/1996 with further amendments and ulterior additional, using methodologies of classification systems and global evaluation of surface waters status drawn up according to Water Framework Directive 2000/60/ EEC requirements on the basis of physico-chemical elements. The assessment was performed on water body, respectively Jiu - Rovinari -Turceni accumulation (RORW7.1_B51), Balteni area, this is the basic unit that is used to establish and verify how are achieved the environment objectives of Water Framework Directive 2000/60/ EEC. It were performed physico-chemical analyses at SGA Gorj laboratory, using laboratory methodologies in accordance with current law, to establish the qualitative parameters of water samples collected from Jiu River upstream of Rovinari, Balteni area, to establish the influence in time of careers from the Rovinari area: Rosiuta Career, Garla Career, Pinoasa Career, Tismana, Cican and Beterega Careers (ash and slug deposits).

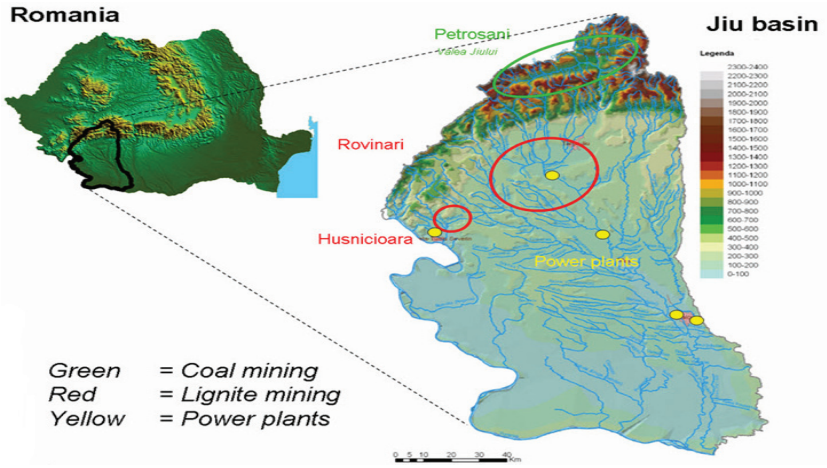

Figure 1. Rovinari area

RESULTS AND DISCUSSIONS

The results of the analyses carried and compared to the level of years 2011 and 2015 to accentuate the quality status of water body Jiu - Rovinari - Turceni accumulation (RORW7.1_B51), Balteni area, are presented in table no 1.

Table 1

Physical and chemical quality indicators obtained in 2011 and 2015

No.	INDICATOR	Characte-ristic values CLASS 1	Charact-eristic values CLASS 2	Charact-eristic values CLASS 3	Test methods	RESULTS (averages)		U.M.	Complying importance class according to the Order 161/2006	
						2011	2015		2011	2015
1	Materials in suspension	-	-	-	SR EN 872/2005	31.5	35	mg/L	-	-
2	Turbidity	-	-	-	SR EN ISO 027/2001	3.98	4.03	NTU	-	-
3	Temperature water/air	-	-	-		17.5	19.5	° C	-	-
4	Disolved Oxigen	-	-	-	SR EN 25813/2000	9.32	9.6	mg/L	-	-
5	CCOCr	10	25	50	DIN 38409-H44-1/1992	8.23	14.26	mg/L	1	II
6	CBO_5	3	5	7	SR EN 1899-2/2002	3.05	3.96	mg/L	II	II
7	Conductivity	–	–	–	SR EN 27888/1997	255.2	236.5	µS/cm	-	-
8	Filtred Residues at 105^0C	500	750	1000	STAS 9187/1984	165.25	152	mg/L	I	I
9	Ph	6.5-8.5	6.5-8.5	6.5-8.5	SR ISO 10523/2009	7.66	7.55	Units pH	I	I
10	$N\text{-}NH_4$	0.4	0.8	7	SR ISO 7150-1/2001	0.114	0.20	mg/L	I	I
11	**$N\text{-}NO_2$**	**0.01**	**0.03**	**0.06**	**SR EN 26777/C91/2006**	**0.16**	**0.05**	**mg/L**	**IV**	**II**
12	**$N\text{-}NO_3$**	**1**	**3**	**5.6**	**SR ISO 7890-3/2000**	**1.05**	**0.9**	**mg/L**	**II**	**I**
13	**Ntot**	**1.5**	**7**	**12**	**SR ISO 10048/2001**	**< 5.6**	**1.24**	**mgN/L**	**II**	**I**
14	$P – PO_4$	-	-	-	SR EN 6878/2005	0.05	0.07	mg/L	-	-
15	Ptot	0.15	0.4	0.75	SR EN 6878/2005	0.059	0.08	mgP/L	I	I
16	Chlorides	25	50	250	SR ISO 9297/2001	10.36	47.24	mg/L	I	II
17	Sulphates	60	120	250	EPA 375.4 : 2005	30.97	46.31	mg/L	I	I

It's found up that after assessment of the water body Jiu - Rovinari - Turceni accumulation (RORW7.1_B51), typology RO11, Balteni section upstream Rovinari mining area, depending on the main physico-chemical elements, this water body is framed at level of year ***2011 in the moderate ecological status***, mainly because of the Ion presence $N\text{-}NO_2$ in concentrations of 0.16 mg/L, respectively class IV of importance, according to Order no. 161 from 16 February 2006, to approving the Normative regarding the clasification of the surface water quality in order to establish the ecological status of water bodies. At level of year ***2015***, the obtained results lead to the framing of the studied water body in ***good ecological status***. An important indicator is represented by the report CBO_5/ CCOCr, giving information about the capacity of biological self-treatment of water body, thus: if it is above 0.6 mg/L the self-treatment will be easy; if it is between 0.2 - 0.4 mg/L the self-treatment it will be produced only on favorable thermic regime, under 0.2 can no loger being produced the biological self-treatment.

It is noticed that at level of year 2011 this indicator had values of 0.27 , correlating with climatic conditions with high temperatures, which favors the biological self-treatment of the studied water body, leading to the restoration of the ecological status from moderate to good.

CONCLUSIONS

The waters quality of water body Jiu - Rovinari - Turceni accumulation (RORW7.1_B51), typology RO11, Balteni section upstream Rovinari area, affected by the mining industry, possibly through the discharge of career water, or the rain water fallen on the career bottom, or through the discharge of wastewater from bed mining, have naturally improved in the period 2011-2015, reaching a "good status" of water bodies in natural regime from Europe, according to Water Framework Directive 2000/60/ EEC, this phenomenon can be favored also by the exploitation activities diminution carried out in the careers in the area.

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*** Law 458/2002 completed with Law 311/2004 concerning drinking water quality;

*** Law 107/1996 completed with Law 310/2004, Law 112/2006, OUG 3/2010 concerning water law

*** Order 161/2006 concerning the surface waters classification in order to establish the ecological status of water bodies.

*** Water Framework Directive - 2000/60/ EEC concerning the establishment of a framework for community action in the field of water policy.

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ABOUT THE AQUATIC AND PALUDOUS HABITATS FROM OLTENIA (ROMANIA)

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Key words*: aquatic, habitat, paludous, Oltenia*

ABSTRACT

The present paper includes data referring to the aquatic and paludous habitats from Oltenia region (description, characteristic vegetation and chorology). According to the research we made, it was noticed that some of these habitats are part of Natura 2000 sites (see bibliography) while some of them are not included in these sites. In case of certain sites, they are mentioned in the standard sheets while in case of other sites they are not mentioned even if they are well represented (3160 Natural dystrophic lakes and ponds). Within the studied area, there were analysed 7 habitats (2190, 3130, 3140, 3150, 3160, 3260 and 3270).

INTRODUCTION

The main reason that triggered the achievement of this study was the identification of numerous locations with aquatic and paludous habitats within those Natura 2000 sites where the standard sheets did not mentioned the presence of such areas.

Oltenia historical region is a region with numerous springs and streams that are tributary to two main rivers, namely the Jiu and the Olt.

In the floodplains and on the terraces of these rivers there appear numerous pools, some of them temporary, but others permanent, enabling the growth of a characteristic vegetation.

Information on the aquatic flora and vegetation of Oltenia are rendered in some specialized works (Păun 1967, Păun & Popescu 1969, Roman 1974, Popescu 1996, Costache 2005, Răduţoiu 2006a, 2006b, 2008). The specialized literature mentions the presence of 51 vascular species belonging to aquatic flora and 28 associations (Popescu & al. 2001).

MATERIALS AND METHODS

The used methods consisted in numerous field trips in different spots of the counties from Oltenia region in order to study the present state of the aquatic and paludous habitats.

In order to recognize these habitats it was taken into account the characteristic vegetation according to the Romanian manual for the interpretation of EU habitats (Gafta & Mountford 2008).

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For each habitat, there is rendered a short description and the characteristic vegetation. In case of the characteristic vegetation, besides the data mentioned in the specialized literature, there are also used the data gathered by us in the field in different locations from Oltenia region. The location of the habitats was established by means of GPS, Garmin etrex 30.

RESULTS AND DISCUTIONS

According to the research made in different locations from Oltenia, there were identified 7 habitats with aquatic and paludous vegetation.

2190 Humid dune slacks - this is a habitat the floristic composition of which is determined by the hydric regime of the soil. The vegetation characteristic to this habitat is edified by *Scirpoides holoschoenus*. In Oltenia, the surfaces the physiognomy of which is imposed by zebra rush are not compact. They were identified within the Danube floodplain, in the proximity of Ciupercenii Noi, Desa, Rastu Vechi settlements.

3130 Oligotrophic to mesotrophic stagnant waters with vegetation of the Littorelletea uniflorae and / or Isoëto-Nanojuncetea

This habitat includes groups of emergent plants that grow on bog soils or in the shallow water from the ditches. They are hygrophilous surfaces, permanently flooded, which are often influenced by anthropogenic factors. Certain surfaces included pioneer, annual species and sometimes, ephemeral species. The essential conditions for these habitats are the water content, the duration of a relatively high water level and the amount of accumulated vegetal matter.

Cyperetum flavescentis Koch ex Aichinger 1933

It is a pioneer association that grows in alluvial, sandy, and often compacted areas. The presence of the phytocoenoses of this association for longer periods is conditioned by the hydric regime (especially floods).

Chorology: It was identified within Ciupercenii Noi-Desa site; along Daina rivulet in Bădoşi settlement (N 44˚08'13"; E 23˚53'41", alt. 67 m); within the Danube floodplain in the proximity of Tinoasa Pool (the Danube floodplain in the proximity of Ciupercenii Noi settlement) (N 43˚51'907"; E 22˚53'754", alt. 33 m); Horezu-Poenari (N 43˚57' 301"; E 22˚52'380", alt. 51 m); near Ciuturoaia Pool - Calafat (N 43º59'13"; E 22º55'17", alt. 36 m); within the Jiu floodplain near Horezu-Poenari settlement (N 43˚58' 073"; E 23˚52'872", alt. 45 m).

3140 Hard oligo-mesotrophic waters with benthic vegetation of Chara species

This habitat is well represented only in Desa settlement. Elsewhere, it is absent or the dominant species appears as isolated specimens. The vegetation of this habitat belongs to ***Charetum fragilis*** Corillion 1957 and ***Charetum conniventis*** Corillion 1957. The composition of these phytocoenoses is quite poor because of the predominance of the edifying species. The difference between the two associations is imposed by the floristic composition of the vascular plants. If in case of *Charetum fragilis* Corillion 1957, there were identified *Eleocharis palustris*, *Schoenoplectus lacustris*, *Ceratophylum demersum* and *Butomus umbellatus*, in case of *Charetum conniventi* Corillion 1957, other taxa, such as *Nymphoides peltata*, *Alisma plantago-aquatica*, *Bolboschoenus maritimus* and *Juncus articulates* represent 90%.

Chorology: in a pool located at the periphery of Ciupercenii Noi settlement, at the edge of the road to Ciupercenii Vechi (N 43˚55' 318"; E 22˚56'433", alt. 40 m); Păsărica Pool - Desa settlement (N 43˚51' 151"; E 23˚00'472", alt. 36 m); in a pool located within the Danube floodplain (N 43˚50' 869"; E 23˚00'239", alt. 36 m).

3150 Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation

It is a habitat well-represented within Oltenia. The aquatic vegetation of this habitat includes pleustophyte associations, which display a temporary character most of the times. The structure of the vegetal associations is simple being often reduced to some species recorded within a relevé. Their composition is often represented by a single layer of natant pleustophytes. They group natant associations that populate stagnant or slowly-flowing waters. From the sinodynamic point of view, they often have a stabilizing role leading to the development of the successions of hydroseries due to the increase of the submerged stratification complexity.

Lemnetum minoris Miyavaki & J. Tx. 1960

The optimum of this association is registered in stagnant waters. It appears in both deep and temporary, shallow pools (to a depth of 0.5 m). On small surfaces, there were met monosynusial phytocoenoses, while in case of canals and pools deeper than 0.8 m they were identified near the paludous vegetation representing the natant synusia. Generally, common duckweed communities are poor in species. Towards the edge of the surfaces covered by these communities there are met those characteristic to *Phragmitetea australis* class.

With regard to the **chorology** of this association we mention: along Daina rivulet in Bădoşi settlement (N 44˚08'15'"; E 23˚53'34"); along a canal from Bratovoieşti settlement (N 44˚06'11"; E 23˚54'29", alt. 67 m); Dobreşti - Stegăroaia Pool (43˚58'10"; 23˚56'31"); Tăbaia Pool from Bistreţ settlement (N. 43º52'35"; E 23º27'16", alt. 20 m); Ţâfaru stream, near its confluence with the Danube - Rastu Vechi settlement (N. 43º51'24"; E 23º17'15" alt. 41 m); downstream Ciupercenii Noi settlement, along a canal (N 43˚52' 673"; E 22˚55'415", alt. 35 m); along a canal located near Mărginiţa Pool (N 43˚52' 838"; E 22˚54'757", alt. 36 m); Arcerului Pool (N 43˚51' 958"; E 22˚54'717", alt. 41 m); Ciuperceni Pool (N 43˚56' 735"; E 22˚52'845", alt. 38 m); along a canal located within the Jiu floodplain near Sadova settlement (N 43˚54' 391"; E 23˚55'656", alt. 43 m).

Lemno-Salvinietum natantis Miyawaki et Tüxen 1960

They were identified in shallow pools (no more than 1 m deep). In these phytocoenoses, the water is completely covered by *Salvinia natans*, together with species characteristic for *Lemnion* & *Lemnetalia minoris*.

The phytocoenoses edified by *Salvinia natans* are classified differently: *Lemno-Salvinietum natantis* Miyavaki & J. Tx. 1960 (Popescu 1996, Răduţoiu & al. 2004) or the association *Salvinio-Spirodeletum* Slavnič 1956 (Păun 1967; Păun & Popescu 1969; Cârţu 1971).

Chorology: Vieru Pool - Piscu Sadovei settlement (N 43˚52'12"; E 23˚55'46", alt. 34 m); along the Jieţ - Grindeni settlement (N. 43º49'14"; E 23º53'33", alt. 21); Diana Pool in Bistreţ settlement (N. 43º52'35"; E 23º27'00", alt. 20 m); on the pool located in the Danube floodplain near Vrata settlement, at the edge of the reed thicket (N 44º10'30"; E 22º51'00", alt. 35 m); downstream Ciupercenii Noi settlement, along a canal (N 43˚52' 670"; E 22˚55'401", alt. 35 m); Arcerului Pool (N 43˚52' 000"; E 22˚54'554", alt. 41 m); Pietrile Pool - Desa settlement (N 43˚50'965"; E 23˚00'283", alt. 34 m).

Ceratophylletum demersii Hild 1956

The compact monosynusial phytocoenoses are exclusively dominated by the hydrophyte species *Ceratophyllum demersum*.

In other phytocoenoses, *Ceratophyllum demersum* is eliminated by other submersed species, which are part of their composition, as they have reduced abundance-dominance indices in the submersed synusia of other associations.

In Oltenia, the association was signalled by Răduţoiu D. & al. 2004.

Chorology: a pool located in the neighbourhood of Piscu Sadovei village, about 300 m away from Zăcătoarea Pool (N 43º53'05"; E 23º55'16", alt. 32 m); along the Jieţ - Ostroveni settlement (N 43º49'13"; E 23º53'35", alt. 21 m); Călugăreni Pool - Bistreţ settlement (N 43º52'48"; E 23º27'39", alt. 20 m), Ciuturoaia Pool - Calafat (N 43º59'11"; E 22º55'15", alt. 34 m); Ciuperceni Pool (N 43˚56'709"; E 22˚52'820", alt. 38 m); on a canal located within the Jiu floodplain (N 43˚54' 259"; E 2˚55'815", alt. 38 m).

Lemno-Hydrocharitetum morsus-ranae (Oberd.) Passarge 1978

The phytocoenoses edified by *Hydrocharis morsus ranae* are found in the pools located within the Danube floodplain near the following settlements: Ciupercenii Noi, Desa, Nebuna, Cetate, Bechet, Rastu Vechi. The specialized literature also mentions these phytocoenoses within the Olt floodplain at Cilieni (Olt) (Popescu & al. 2001).

Chorology: along a canal within the Danube floodplain near Desa settlement (N 43˚50' 743"; E 23˚00'220", alt. 30 m).

Potametum crispi Soó 1927

The first mention of this association for Oltenia makes reference to the Jiu-Desnăţui interfluve (Cârţu 1972). Within the same region, it is also mentioned in the following locations: Dunăreni, Măceşu and the Botanical Garden "Al. Buia" (Dolj County) (Popescu & al., 2001). It is found in slowly-flowing or stagnant waters, in open spaces, where there are also present numerous plants characteristic to the class *Lemnetea*, but also near the shores with reed thickets.

Chorology: a pool located in the neighbourhood of Piscu Sadovei village, about 300 m away from Zăcătoarea Pool (N 43º53'05"; E 23º55'17", alt. 32 m); a canal near Ciulică's Pool – in the proximity of Desa settlement (N 43˚50' 961"; E 23˚00'307", alt. 35 m); along a canal near Pietrile Pool (N 43˚50'959"; E 23˚00'305", alt. 35 m); Ciuperceni Pool (N 43˚56'652"; E 22˚52'645", alt. 37 m); along a canal near Pietrile Pool - Piscu Sadovei settlement (N 43˚52'225"; E 23˚55'727", alt. 40 m).

Lemno – Azolletum filiculoides Br.-Bl. 1952

The specialized literature mentions this association in the irrigation canals from the area Corabia, Orlea-Potelu-Olt, the Botanical Garden "Al. Buia" Craiova (Popescu, 1996).

Chorology: along the Jieţ stream - Ostroveni settlement (43˚49'11"; E 23˚53'35", 34 m); Zăcătoarea Pool - Piscu Sadovei settlement (N 43˚52'13"; E 23˚55'44", alt. 34 m); in an irrigation canal within the Danube floodplain near Rastu Vechi settlement (N. 43º52'50"; E 23º17'13", alt. 40 m); in a canal within the Danube floodplain (N. 43º50'746"; E 23º00'222", alt. 33 m); in a canal located in the neighbourhood of Sadova Monastery (N. 43º54'197"; E 23º55'640", alt. 41 m).

3160 Natural dystrophic lakes and ponds

This habitat is characteristic to those water bodies with reduced depths and rich in nutritive substances. The association with the greatest distribution in this part of the country is the one edified by the yellow floating heart (*Nymphoides peltata*).

Nymphoidetum peltatae (Allorge 1922) Bellot 1951

The phytocoenoses of this association display a coverage between 60 and 90%. Besides the dominant species, with an increased constancy, there were also identified: *Myriophyllum spicatum*, *Ceratophyllum demersum* and *Potamogeton pectinatus*.

Chorology: in a lake, at the edge of Bratovoieşti forest (N 44˚07'12"; E 23˚543'18"); in a lake located at the periphery of Listeava settlement, on the right side of the road DN55 (N 43˚50'34" E 23˚55'47"); Călugăreni Pool from Bistreţ settlement (N. 43º52'48" E 23º27'36", alt. 20 m); Golenţi Pool from Calafat (44º00'50", E 23º01'15", alt. 30 m); Hunia Pool (N. 44º03'35"; E 23º05'09", alt. 45 m); Salcia Pool (Balta Mare) (N.

44º06'48", E 22º55'18", alt. 35 m); downstream Ciupercenii Noi settlement, along a canal located near Mărginiţa Pool (N 43˚52' 664"; E 22˚55'421", alt. 38 m); downstream Ciupercenii Noi settlement, along a canal located near Mărginiţa Pool (N 43˚52' 693"; E 22˚55'283", alt. 39 m).

Potametum natantis Soó 1927;

It is an association largely distributed within Oltenia. It develops in stagnant waters (pools or lakes) or slowly-flowing and shallow waters. In the floristic composition of these phytocoenoses we remark the presence of *Polygonum amphibium* fo. *aquaticum* together with the nucleus of species that are always present on these surfaces.

Chorology: along a canal located near Pietrile Pool (N 43˚50'961" E 23˚00'307", alt. 35 m).

3260 Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation

Hottonietum palustris R. Tx. 1937 is a rare association within Oltenia. It was identified in pools located within and at the edge of the forest Gura Motrului Argineşti (Costache, 2005), on the interfluve Jiu-Desnăţui (Cârţu, 1972) and Carpen-Gebleşti area (Popescu & al., 2001). It prefers shady areas. In dry years, the physiognomy of these phytocoenoses is severely affected. Besides *Hottonia palustris*, in the floristic composition of these pools, there are also identified *Ranunculus aquatilis*, *R. trichophyllus*, *Potamogeton natans* and numerous elements characteristic to the class *Phragmiti-Magnocaricetea*.

Ranunculetum aquatilis (Sauer 1947) Géhu 1961

The phytocoenoses of these associations have a good representation in the south-west, west and north-west of the country (Burescu 2003). They develop in stagnant waters and, rarely, in slowly-flowing water courses, where the physiognomy is imposed by *Ranunculus aquatilis*.

Chorology: at the edge of Poboru Forest (Olt County); Vieru Pool (N 43˚52'134"; E 23˚55'442", alt. 34 m) and Zăcătoarea Pool (N 43º53'067"; E 23º55'179", alt. 34 m) from Piscu Sadovei settlement (Dolj County).

3270 Rivers with muddy banks with *Chenopodion rubri* p.p. and *Bidention* p.p. vegetation

Most of the species of this habitat type are neophytes. The physiognomy of these surfaces is mainly imposed by the species belonging to the genus Bidens (*Bidens frondosa* or *Bidens tripartita*). In order to favour the development and long-time preservation of this vegetation, it is important to maintain wide banks and even sectors without vegetation.

They are characterized by muddy banks with annual, nitrophilous pioneer vegetation belonging to the alliances *Chenopodion rubri* and *Bidention*. In spring and at the beginning of summer, this habitat characteristic to muddy banks does not have vegetation (it develops later). Under unfavourable circumstances, in certain years, this type of vegetation does not develop or is poorly developed.

Polygono lapathifolii - Bidentetum Klika 1935 (Syn. *Polygonetum lapathifolii* Feldföldy 1943)

The phytocoenoses of this association develops on deep and humid soils, as compact clusters or long strips located at the shore of the pools or on the place previously covered by pools that got dry. They are mesohygrophilous – hygrophilous weeds.

In their proximity, on reduced surfaces, there are also present small clusters dominated by *Alopecurus aequalis*.

The instability of these types of biotopes determines different abundance-dominance ratios among the recognition and edifying species, thus resulting the

classification of these phytocoenoses in different associations. The physiognomy of these surfaces is sometimes induced by *Bidens frondosa*, and, in other cases by *Bidens tripartita* or *Polygonum lapathifolium*.

Chorology: along Daina rivulet from Bădoşi settlement (N 44˚08'17"; E 23˚53'36", alt. 68m); at the shore of a pool from the Jiu floodplain from Piscu Sadovei settlement (N. 43º53'01"; E 23º55'32", alt. 34); within the Jiu floodplain near Zăval settlement (N 43˚50'418"; E 23˚50'777", alt. 31); at the shore of Arcerului Pool (Ciupercenii Noi) (N 43˚51'964"; E 22˚54'246", alt. 38 m); Ciuperceni Pool (N 43˚56'857"; E 22˚52'919", alt. 39 m).

CONCLUSIONS

The data collected in the field indicates a good representation of these habitats especially in the lowland region of Oltenia. Of the 7 studied habitats, the most widespread habitat is 3150, opposite to the habitat 3260. The habitat 3160 has a very good representation particularly in the pools from the Danube floodplain between Calafat and Vrata, while the habitat 3140 appears only in the pools located at the periphery of Desa settlement.

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STUDY ON THE BEHAVIOR OF DIFFERENT CULTIVARS OF CABBAGE CROP IN FIELD

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Keywords: *cultivar, cabbage, field, quality.*

ABSTRACT

In Romania, cabbage ranks second in total area cultivated with vegetables, our country being in the top ten world producers of this plant, with an annual production of over one million tones. A crop of cabbage can be an opportunity for farmers including poorer land. It is well known that cabbage needs a good watering as being in vegetative consuming water.

Currently, there are 31 varieties of cabbage and two red cabbages are officially approved. Cabbage summer is destined for consumption in July-September when requested and when it is very early cabbage production cycle has ended and autumn cabbage occurs much later.

The study includes two varieties of cabbage (Licurişcă and Sarmalin) grown in Gorj county, irrigated and fertilized, chemical and biochemical composition of which result from analyzes conducted and yields recommends for introduction in culture in the studied soil and climate.

INTRODUCTION

Cabbage, often lumped into the same category as lettuce because of their similar appearance, is a part of the cruciferous vegetable family. Cruciferous vegetables like cabbage, kale and broccoli are notorious for being chock-full of beneficial nutrients.

Cabbage is an excellent source of vitamin K, vitamin C, and vitamin B6. It is also a very good source of manganese, dietary fiber, potassium, vitamin B1, folate and copper. Additionally, cabbage is a good source of choline, phosphorus, vitamin B2, magnesium, calcium, selenium, iron, pantothenic acid, protein, and niacin (Kusznierewicz et al.2008).

Cabbage has a long history of use both as a food and a medicine. It was developed from wild cabbage, a vegetable that was closer in appearance to collards and kale since it was composed of leaves that did not form a head.

It is thought that wild cabbage was brought to Europe around 600 B.C. by groups of Celtic wanderers. It was grown in Ancient Greek and Roman civilizations that held it in high regard as a general panacea capable of treating a host of health conditions.

While it's unclear when and where the headed cabbage that we know today was developed, cultivation of cabbage spread across northern Europe into Germany, Poland and

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Russia, where it became a very popular vegetable in local food cultures. The Italians are credited with developing the Savoy cabbage. Russia, Poland, China and Japan are a few of the leading producers of cabbage today. According to the USDA National Nutrient Database, one half cup of shredded cabbage (75 grams) contains 17 calories, 4 grams of carbohydrate (including 1 gram of fiber and 2 grams of sugar) and 1 gram of protein.

Eating a half-cup of cooked cabbage would provide 47% of our vitamin C needs for the day. It also provides 102% of vitamin K, 8% of manganese, 6% of folate and lesser amounts of vitamin B6, calcium, potassium and thiamin. Cabbage contains the antioxidants choline, beta-carotene, lutein and zeaxanthin as well as the flavonoids kaempferol, quercetin, and apigenin.

A compound found in cabbage and other cruciferous vegetables known as 3,3'-diindolylmethane (DIM) has been shown to protect against the harmful effects of radiation therapy. In a study conducted at Georgetown University, rats were given a lethal dose of radiation. Some were left untreated, and others were treated with a daily injection of DIM daily for two weeks. All the untreated rats died, but over 50% of those receiving the DIM remained alive at the 30-day mark.

The same researchers did the experiment on mice and found similar results. They were able to determine that the DIM-treated mice have higher counts or red and white blood cells and blood platelets, which radiation therapy often diminishes.

Sulphur is a very useful nutrient because it fights infections. A deficiency of sulphur can result in microbial infections and a greatly reduced rate in the healing of wounds. Again, cabbage is rich is sulphur. So, it helps fight infections in wounds and reduces the frequency and severity of ulcers.

Research undertaken aimed productive and quality characteristics (chemical and biochemical) of two cultivars of cabbage grown in Gorj County, the cultivation is performed in the field.

Greens of vegetable plants (*Brassica oleracea L. convar.capitata Alef.var.alba DC.*) grown in our country on very large areas, because the species are less demanding heat and high ecological plasticity, being able to adapt to various environmental conditions (Ciofu et al. 2003).

The edible part is the loaf that is consumed throughout the year, fresh, pickled, dried or frozen.

Nutritional value of fresh or preserved cabbage is given by the high content of carbohydrates, minerals and vitamins almost fully used by the body.

The head of cabbage contains 3.4 to 6.3% carbohydrates, 1.2 – 1.5% protide, 0.10 to 0.20 % fat, 91.0 to 93.0% water and from 0.37 to 0.80 % mineral salts. It also contains large amounts of vitamin B1 - 0.05 B2 - 0.04 mg / 100 g fresh matter, 45.8 mg / 100 g fresh matter ascorbic acid, etc. (Gherghi et al. 2001)

Also, cabbage belongs to the group of species that use land intensively, with the possibility of its cultivation in succession or as pre-plant or after other crops (R.Mocanu et al., 2013).

Rosette size depends on the variety and is decisive in determining planting distances.

As they grow, the rosette leaves wrap around the terminal bud is having an active growth and closed, forming the head of cabbage is composed of 60-75 etiolated leaves, yellowish-white, fleshy and succulent becoming the deposit reserve substances (Maier 1963).

The average weight of 0.8-2 kg heads is the varieties and hybrids of early and mid early 2-4 kg in the semi late and exceed 4 to 5 kg in the rain period.

Cabbage gives high yields on alluvial soils with medium texture, loose, containing rich in humus and minerals without excess moisture, pH 6.5-7.5 range (Gheorghieş et al. 2002).

Vegetable varieties and hybrids superior quantitative contribute to increasing production, improving its quality, in achieving higher revenue. For green crops currently marketed a large number of seeds of varieties and hybrids.

MATERIAL AND METHODS

The research was conducted in 2015 in the field within the locality Băleşti, Tămăşeşti commune, Gorj county.

The cultivation technology applied in autumn supposed to prepare the ground following the same steps as for the early crop. Some papers mention cabbage crop establishment summer and autumn by planting directly in the field.

In our country this system is rather less common culture, most manufacturers' cabbage crop establishment by opting for seedling production that ensures constant and reliable case that has been applied in our research.

Seedling production was made semiwarm seedbeds, sowing at 04/02/2015, an amount of 350 grams of seed to produce seedlings required for planting one hectare of crop. Seedling sowing rarely occurs by 400-500 threads / m^2 as seedling transplanters not. Planting in the field was made at 05/02/2015 to construct a better harvest.

When planting seedlings were then sorted and shaped by removing a third of the leaf and root cutting tip, then get muddy.

Scheme planting is similar to that of early cabbage between plants in the row distances of 25-30 cm. Care works implemented a number of watering were respectively 4-5 and the watering of 400 m^2 / ha.

The harvest started on 07.21.2015 and took place in stages, work is being performed manually, well stuffed heads detaches from the plant by cutting with a knife then trimmed removing the rosette leaves.

Production obtainable is 35-45 t / ha and was intended for immediate consumption.

Biological material used were two cultivars of cabbage Sarmalin and Licurişca that were grown on areas related to two separate families Băleşti town, village Tămăşeşti.

To verify the quality of drinking green irrigation water to the initial determination and the characteristics of the soil prior to planting and harvesting at the end biometric measurements were carried out chemical and biochemical assays as well as the specific methods.

RESULTS AND DISCUSSIONS

Originally the two water wells from irrigation were analyzed Tudorescu and Magdin families, families whose land was used to produce sprouts culture (Table 1).

Nitrate and nitrite content is low compared with the values provided by STAS 1342-91, content of soluble salts and pH are below the limits is also good for growing cabbage.

Analysis of the soil used in the experiment has a slightly basic pH of 7.1-7.3, a low content of soluble salts which do not affect the growth and development of the culture of cabbage. Humus has high values, respectively 1.76% Magdin family and 1.86% Tudorescu family.

The content of nitrogen is high but the content of phosphorus is low and also the potassium. Lack of phosphorus and potassium in the soil can influence the quality of the cabbage.

In assessing the size of cabbage weight, diameter, height and volume (Table 3) it can be seen that the heaviest bulbs are Sarmalin cultivar with average weight of 2.575kg twenty heads / pc followed by Licurişcă of 1.785kg / pc.

If we examine the average diameter of the cabbage we can see that Licurişcă has the largest diameter 19.3cm / 18.5cm and the average height of 15.5cm. The yields achieved were 48.35t / ha to Licurişcă and 61.23t / ha to Sarmalin.

Table 1

Analyses regarding water wells

Specification	Content (ppm)							pH
	NO_2- (nitrite)	NO_3- (nitrate)	Residue mg/l	Soluble salts mg/l	Chlorides Ppm	Oxa-late ppm	Iron ppm	
Water wells Tudorescu family	0.130	8.36	640	384	0.60	0.5	0.5	7,0
Magdin family	0.080	9.12	560	365	0.45	0.1	0.2	6,9
Admissible values STAS 1342-91	0	45	800	1000	0.55	0.3	0.3	7.0

Table 2

Analyses regarding the soils characteristics used in cabbage culture

Specification	Humus, %	pH	Soluble salts, %	N-NH4, ppm Soluble form	N-NO3, ppm Soluble form	PAL, ppm	KAL, ppm
Tudorescu soil	1.86	7.1	0.046	7.17	35.625	trace	25
Magdin soil	1.76	7.3	0.043	7.17	35.625	trace	25

1- Settlement Băleşti, com Tămăşeşti, Gorj family Tudorescu
2- Settlement Băleşti, com Tămăşeşti, Gorj, Magdin family

Agrochemical characteristics effectuate were determining nitrates, phosphates and potassium cabbage.

Nitrate content varied between the two cultivars being examined at Licurişcă 496 ppm $N\text{-}NO_3$ and 525 ppm $N\text{-}NO_3$ to Sarmalin.

Table 3

Production characteristics of two cabbage cultivars

	Cultivar	Medium weight, g	Medium diameter, cm	Medium height, cm	Medium volume, dm^3	Production t/ha
1	Licurişca	1785	19.3/18.5	15.5	3.5	48,35
2	Sarmalin	2575	15.8/16	15.3	2.3	61,23

This compound is restricted by Law 5/2002 hazardous for human health in the event of excessive consumption causing duodenal or stomach cancer. If cultivated cabbage field is the maximum allowed 600 ppm $N\text{-}NO_3$.

Comparing the results obtained from the analysis presented by the law may say that this element has high absorption but did not exceed the C.M.A.

For the determination of the quality characteristics cabbage experimental variants was analyzed by specific chemical and biochemical methods and the results are shown in Tables 4 and 5.

Table 4

Agrochemical and biochemical characteristics of cabbage cultivars

Cultivar	N-NO3, ppm	P-PO43-, ppm	K+, ppm	Acidity, %	Vit.C, mg/100g f.m..	Glucide, %	Mineral subst. %	Water %
Licurişca	496	258	1120	1.45	48.5	4.5	0.47	90.2
Sarmalin	525	245	1045	1.24	40.35	5.2	0.65	91.7

Table 5

Mineral elements content of two cultivars

Cultivar	Na	K	Mg	Ca	Mn	Fe	Cu	Zn	P
	mg/100g f.m.								
Licurişcă	13.0	227	23	46	0.10	0.50	0.06	0.18	27.5
Sarmalin	8.7	251	40	52	0.12	0.45	0.03	0.10	22.7

If phosphorus according to the literature for quality production this element must be between 200 and 400 ppm P. When analyzed cabbage phosphates reached at Licurişcă 258 ppm P values and 245 ppm P to Sarmalin values that ensure ***good quality of cabbage.***

Potassium has reached another important element values between 1000 ppm K and 2000 ppm K. If cabbage analyzed results of analysis values were 1120 ppm Licurişcă and 1045 ppm to Sarmalin.

Quality analyzes that focused on chemical and biochemical compounds characterized wealthiest products with mineral elements needed for human consumption.

CONCLUSIONS

The research conducted in the two cultivars of cabbage showed:

What two cultivars Licurişcă and behaved accordingly Sarmalin the field cultivation give high yields of sprouts that 48.35t/ha to Licurişcă and 61.23t/ha to Sarmalin;

Dimensions and average weights of 2.575 kg were raised cultivars/pcs Sarmalin followed by Licurişcă of 1.785 kg/pcs, justifying their introduction in the current culture in Gorj county;

The quality characteristics have been observed eating cabbage by failing to consumer health problems.

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STUDY REGARDING THE PROVISION OF HUMIDITY AND TEMPERATURE DEMANDS FOR THE ON-TIME SEEDING OF RAPSEED

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Keywords*: humidity, temperature, seeding, rapeseed*

ABSTRACT

Rapeseed is an especially attractive crop economically speaking. Sown in the fall period in optimal humidity and heat temperature conditions it ensures a good use of the rainfall of the cold part of the year and escapes the drought of the second part of the summer. It is a completely mechanized crop, with high yields and an ensured sale market, given its multiple uses. The restrictive factor of the crop is the soil's humidity during sowing and in the first stages of the plant's development (6-8 leaves). The only measure that can eliminate this restriction is irrigation.

INTRODUCTION

Colza rapeseed is one of the most important oleifici species. The seeds of this plant contain 42-48% oil, with multiple industrial uses, and in the later period with an important role in the production of bio-diesel.

Increasing consumption of rapeseed oil as food is owed to the fact that an increasing number of consumers are aware that in a healthy diet they must avoid as much as possible cholesterol and saturated fatty acids sources.

Canola oil contains omega-6 fatty acids, as well as omega-3 in a 2 to 1 ratio and it is the second oil after flax oil, in the concentration of omega-3 fatty acid. It is one of the healthiest oils for the heart and it appears to reduce cholesterol level, reduce triglyceride levels and stop thrombocytes from crowding.

Rapeseed is cultivated on a surface of more than 27 million ha at the global level. The largest cultivators are China with 7.2 million ha, India with over 6.9 million ha, followed by Canada with 5.1 million ha, Germany with 1.3 million ha, and France with 1,2 million ha.

In our country in the period 2012-2014 788596 ha of rapeseed have been cultivated with a total yield of 1882729 and an average yield of 2169 kg/ha (table 1).

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MATERIAL AND METHODS

In this paper we analyze the evolution of environmental factors that influence at the present time, along with analyzing the genotype, growth, development and production of rapseed.

To achieve this we analyzed the evolution of temperature and amount of rainfall and its distribution in the vegetation period of the period 2012-2014.

RESULTS AND DISCUSSIONS

Between 2012 and 1014, important rapeseed-cultivating areas have been located in the southern part of the country, in the Romanian Plain. In 2014, the ration of rapeseed-cultivated surface to total surface of the county has seen significant values in the southern counties: Călărași, Ialomița and Ilfov over 10%; Brăila, Tulcea, Teleorman, Giurgiu, Constanța – over 7%. Also in 2014, in the counties of Călărași, Ialomița, Constanța, Teleorman, Brăila and Buzău, 53.72% of the total surface has been cultivated with rapeseed.

The counties of Ialomița, Teleorman, Brăila, Constanța, Buzău, Giurgiu and Galați have together produced 63.32% of the national yield.

In the case of return per hectare, the southern counties are overtaken by, mostly, the western counties Cluj, Brașov, Arad, Timiș.

Rapeseed has a very low sowing period. For the crop to succeed, approximately 800-900 degrees Celsius should accumulate until the coming of winter (Balteanu 2001). The optimal sowing period for rapeseed is 1-10 September in the west, north and east of the country and 5-15 September in the southern part of the country and Dobruja.

Sown at the start of September, in appropriate humidity conditions, the sprouting takes place in 10 to 15 days. It is especially important that until the arrival of the frost the plant should have 6-8 fully developed leaves. At this stage of development the rapeseed withstands temperatures as low as -15 degrees Celsius, in conditions of dry soil. In the case of humid soil resistance to frost is significantly lower, the plants could be destroyed at temperatures of minus 7-10 degrees Celsius.

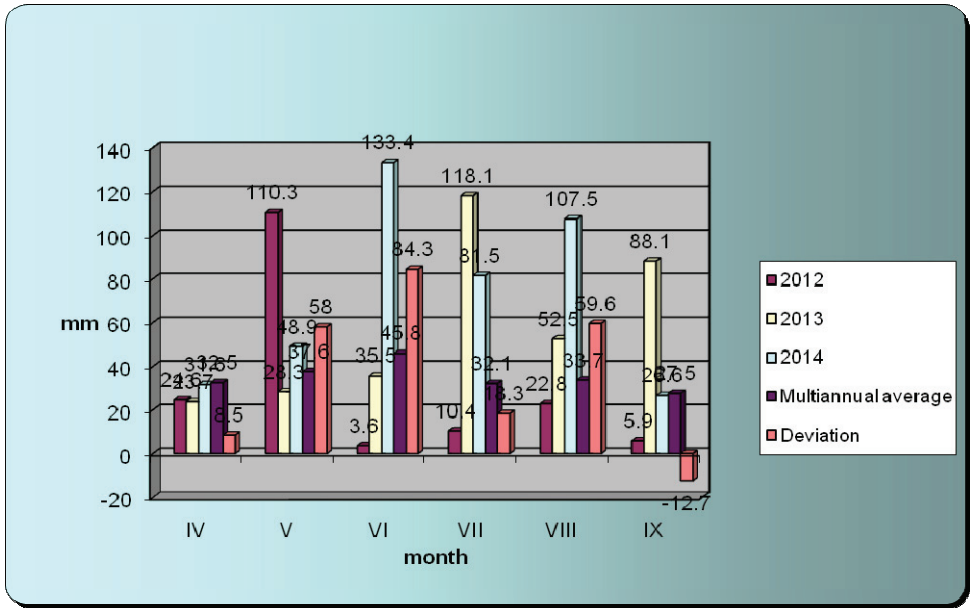
Drought before and after sowing is hazardous for the germination and growth of rapeseed plants. This is the climate phenomenon that plays a determining role in the choice of farmers to sow rapeseed. It has proven to be a risky decision to sow rapeseed in conditions of dry soil, expecting post-sowing rainfall. If the latter fails to appear in the following 15-20 days plants can no longer achieve the development level that enables them to form a high resistance to frost.

As we can observe in table 1 in the year 2012 - 105295 ha have been cultivated with rapeseed in Romania and average yield had been 1496 kg/ha (INS, 2015).

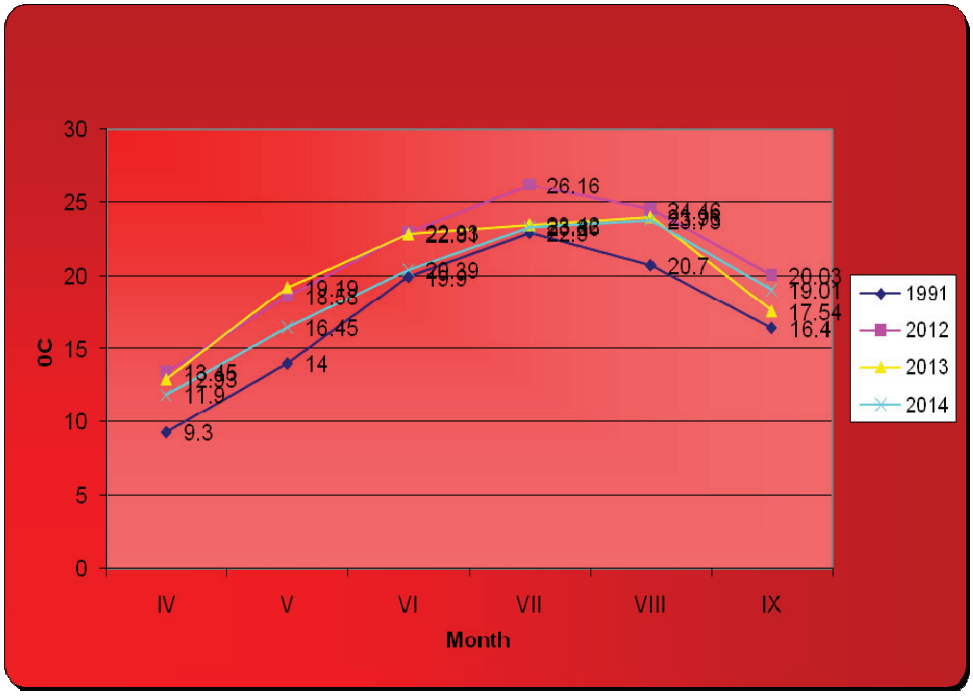
We observe from graph 1 the extreme drought of the vegetation period of 2011, a year when rapeseed was sown in September and harvested in 2012. Also in 2012, in the period of plant vegetation (April - September) 177.60 mm of non-uniform rainfall have been recorded.

The improvement in water supply in the rapeseed sowing period of the years 2013 and 2014 led to the creation of better conditions for crops and crop area and output growth (Table 1).

The lack of water associated with extremely high temperatures in the period of the clearing of the ground and sowing of rapeseed cause many farmers to give up on this crop, although it is a crop which gives high returns, with an important market demand (graph 3). Giving up on this crop leads to an increase in the size of sunflower and maize crops, which are vulnerable to the July-August drought.



Graph 1. The evolution of rainfall in the plant vegetation period, Valu lui Traian, 2012-2014



Graph 2. The evolution of average monthly temperatures in the plant vegetation period, Valu lui Traian, 2012-2014

Pea is also a crop that tends to complete crop structures when soil humidity conditions do not allow the growing of rapeseed. Pea efficiently uses the humidity accumulated during the cold period of the year and it is not exposed to the drought of the second part of the summer as the sunflower and maize crops are. The benefits for the soil are large, through the phenomenon of biological conversion of nitrogen, however, the crop's market demand is much lower (Beleniuc 2006).

CONCLUSIONS

Rapeseed is an especially attractive crop economically speaking. Sown in the fall period in optimal humidity and heat temperature conditions it ensures a good use of the rainfalls of the cold part of the year and escapes the drought of the second part of the summer. It is a completely mechanized crop, with high yields and an ensured sale market, given its multiple uses. The restrictive factor of the crop is the soil's humidity during sowing and in the first stages of the plant's development (6-8 leaves). The only measure that can eliminate this restriction is irrigation.

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Table 1.

Cultivated surface, total yield and average yield, per county, of rapeseed crop, in 2012-2014

County	Cultivated area						Total production (tons)				The average yield (kg / ha)			
	2012 (ha)	2013	2014	Difference 2014 -2012	% Total area cultivated with rape	% county in total area cultivated with rape	2012	2013	2014	Difference 2014-2012	2012	2013	2014	Difference 2014-2012
Alba	454	1242	2210	1756	2.03	0.54	455	2756	4953	4498	1002	2219	2241	1239
Arad	1014	9957	14685	13671	4.47	3.61	1780	26750	43936	42156	1755	2687	2992	1237
Argeş	1392	4559	5962	4570	3.9	1.47	2049	9272	11044	8995	1472	2034	1852	380
Bacău	1780	2209	2611	831	1.78	0.64	2957	3935	5075	2118	1661	1781	1944	283
Bihor	1874	4168	5435	3561	2.2	1.34	1774	8212	11666	9892	947	1970	2146	1199
Bistriţa-Năsăud	:	1	19	:	0.03	0	:	1	48	:	:	1000	2526	:
Botoşani	1504	2748	5723	4219	2.09	1.41	1369	4760	**13709**	12340	910	1732	2395	1485
Brăila	8977	23933	26700	17723	7.7	6.56	20163	65908	76166	56003	2246	2754	2853	607
Braşov	725	940	1048	323	1.33	0.26	1343	2210	3234	1891	1852	2351	3086	1234
Buzău	2335	17934	22127	19792	6.48	5.44	2230	38522	55582	53352	955	2148	2512	1557
Călăraşi	13074	46859	56962	43888	14.48	14.01	16734	140096	156822	140088	1280	2990	2753	1473
Caras-Severin	71	392	902	831	1.23	0.22	57	384	1168	1111	803	980	1295	492
Cluj	664	1058	1675	1011	1.49	0.41	1073	3100	5463	4390	1616	2930	3261	1645
Constanta	7636	6983	32655	25019	6.75	8.03	12906	12010	70776	57870	1690	1720	2167	477
Covasna	145	1282	1701	1556	2.31	0.42	336	2935	4714	4378	2317	2289	2771	454
Dâmboviţa	583	1646	3617	3034	2.35	0.89	430	3198	7937	7507	738	1943	2194	1456
Dolj	8284	4882	8117	-167	1.91	2	10077	5855	18207	8130	1216	1199	2243	1027

Gălăţi	1108	6569	16167	15059	5.69	3.98	1147	12100	43578	42431	1035	1842	2695	1660
Giurgiu	4583	14731	18418	13835	7.25	4.53	7721	43364	47911	40190	1685	2944	2601	916
Gorj	:	:	10	:	0.01	0	:	:	20	:	:	:	2000	:
Harghita	:	:	4	:	0.01	0	:	:	4	:	:	:	1000	:
Hunedoara	2	129	414	412	0.79	0.1	3	320	610	607	1500	2481	1473	-27
Ialomiţa	4039	38950	48925	44886	14.13	12.03	7170	106409	141846	134676	1775	2732	2899	1124
Iaşi	1865	4899	10282	8417	4.28	2.53	2747	9473	25885	23138	1473	1934	2518	1045
Ilfov	2388	4749	7634	5246	11.81	1.88	3221	11461	19144	15923	1349	2413	2508	1159
Maramureş	:	5	:	:	:	:	:	5	:	:	:	1000	:	:
Mehedinţi	546	1477	2165	1619	1.66	0.53	872	2252	5374	4502	1597	1525	2482	885
Mureş	382	1353	2772	2390	1.47	0.68	611	3394	7176	6565	1599	2508	2589	990
Neamţ	2992	6417	8311	5319	5.63	2.04	5819	16182	25607	19788	1945	2522	3081	1136
Olt	6709	8730	11072	4363	3.19	2.72	9354	11049	27826	18472	1394	1266	2513	1119
Prahova	937	4922	9229	8292	6.67	2.27	1413	12970	25759	24346	1508	2635	2791	1283
Sălaj	20	:	52	32	0.08	0.01	39	:	128	89	1950	:	2462	512
Satu Mare	1528	1571	3001	1473	1.54	0.74	2092	3343	8426	6334	1369	2128	2808	1439
Sibiu	182	482	588	406	0.85	0.14	178	1312	1398	1220	978	2722	2378	1400
Suceava	486	1226	1701	1215	0.95	0.42	803	2373	4003	3200	1652	1936	2353	701
Teleorman	14931	23758	30758	15827	7.41	7.56	24119	47165	77972	53853	1615	1985	2535	920
Timiş	2100	6308	9472	7372	2.09	2.33	4186	17170	27804	23618	1993	2722	2935	942
Tulcea	6510	9643	18487	11977	7.63	4.55	5509	17324	38432	32923	846	1797	2079	1233
Vâlcea	:	:	50	:	0.07	0.01	:	:	75	:	:	:	1500	:
Vaslui	2390	6725	11196	8806	5.48	2.75	3253	13158	30484	27231	1361	1957	2723	1362
Vrancea	1085	3159	3848	2763	2.89	0.95	1521	5369	9159	7638	1402	1700	2380	978
ROMÂNIA	105295	276596	406705	301410	4.94	100.00	157511	666097	1059121	901610	1496	2408	2604	1108

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ANALYSIS OF THE EVOLUTION OF VEGETATION FACTORS IN RELATION TO THE REQUIREMENTS OF COTTON IN THE CONTEXT OF CLIMATE CHANGE

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Keywords*: temperature, atmospheric humidity, precipitation.*

ABSTRACT

The changes that occurred in the last 25 years in the evolution of temperature, duration of sunshine, atmospheric humidity and precipitation can cause favorable conditions for certain crops other than traditional ones: wheat, canola, sunflower, maize.

In Agricultural Development Research Station (ARDS) Valul lui Traian, in that time period, the limiting factors in obtaining high yields were the duration of sunshine and temperature. In this paper we analyze the evolution of environmental factors that influence at the present time, along with analyzing the genotype, growth, development and production of cotton (Gossypium hirsutum L).

INTRODUCTION

Greece and Spain own almost the entire cotton production in the European Union. Greece is the main producer of cotton in Europe, with almost 250 000 hectares of the crop.

The community's production represents only 1.26% of the global yield and the cultivated surface only 0.97% (INS 2015) (table 1)**.**

Table 1

Cultivated surface, average yield and total yield of cotton in the European Union

Country	Cultivated surface (thousand hectares)	Average yield (kg/ha)	Total yield (t)
Bulgaria	0	324	0
Greece	250	1120	280
Spain	64	775	50
UE-28	314	1049	330
World total	32464	805	26133
The share of EU-28 in world total (%)	0.97	+30,31	1.26

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In Romania cotton has been grown on larger areas in the south of the country, especially in Teleorman county which in the year 1990 owned 78.62% of the total cultivated area and 99.33% of the total cotton yield (INS 2015).

After the year 1990 both surface area and yield sizes follow a downward trend, so that by the year 1995 cotton plantation ceases to appear in official statistics (table 2).

Table 2

Cultivated area and total yield of cotton by county and by country Romania, (1990 - 1995)

Indicator	County	1990	1991	1992	1993	1994	1995
Cultivated area (ha)	Călăraşi	115	:	:	:	:	:
	Ialomiţa	:	:	4	:	:	:
	Teleorman	423	410	285	:	25	30
	Total	538	410	289	:	25	30
Total yield (kg)	Călăraşi	39	:	:	:	:	:
	Ialomiţa	:	:	:	:	:	:
	Teleorman	445	200	75	:	40	21
	Total	484	200	75	:	40	21

MATERIAL AND METHODS

In this paper we analyze the evolution of environmental factors that influence at the present time, along with analyzing the genotype, growth, development and production of cotton (*Gossypium hirsutum* L).

To achieve this we analyzed the evolution of temperature, duration of sunshine, amount of rainfall and its distribution in the vegetation period of the period 2012-2014.

RESULTS AND DISCUSSIONS

The limiting factor of cultivated area and yield of the cotton crop in Romania is temperature. Cold nights and low temperatures throughout the day lead to vegetating growth with a few fruit-producing strands. The crop is highly susceptible to frost and a minimum of 200 days without cold temperatures is required for it to develop. The entire necessary growth period is approximately 150 to 180 days. Germination is optimal at temperatures between 18 and 30°C, with a minimum of 14 °C and a maximum of 40 °C. Late germination exposes the seeds to soil-based fungal infections (Beleniuc 2006).

Following research done in Romania it has been observed that cotton needs, in order to achieve an economically efficient crop, to go through vegetating phases, from sprouting until the last harvest, for obtaining an economically viable yield, is approximately 3400 (Bîlteanu 2001) (table 3).

For higher yields, water requirements of cotton crops have been estimated at 350 - 600 mm / ha depending on climate conditions and the duration of the vegetation period (150-210 days), with an average rate of daily evapotranspiration from 3 to 4.4 mm / day.

Reached the conclusion that, after going through different vegetation phases and obtaining economically efficient yields, cotton needs certain to accumulate a certain quantity of heat.

Through the accumulation of temperatures observed on the same vegetation phase we have obtained the data in table 4. These show us that the necessary temperature requirements for obtaining an economically efficient cotton yield are achieved.

Table 3

Requirments of early types of cotton relative to temperature

Vegetation phase	Duration (days)	Average daily temperature °C	Sum of t > 0°C
Sowing- dawn	11	16.1	178
Dawn - appearance of first flowers	63	20.6	1300
Appearence of first flowers- opening of first capsules	50	21.8	1090
Opening of first capsules - last harvest	64	13.0	891
Total	188	-	3399

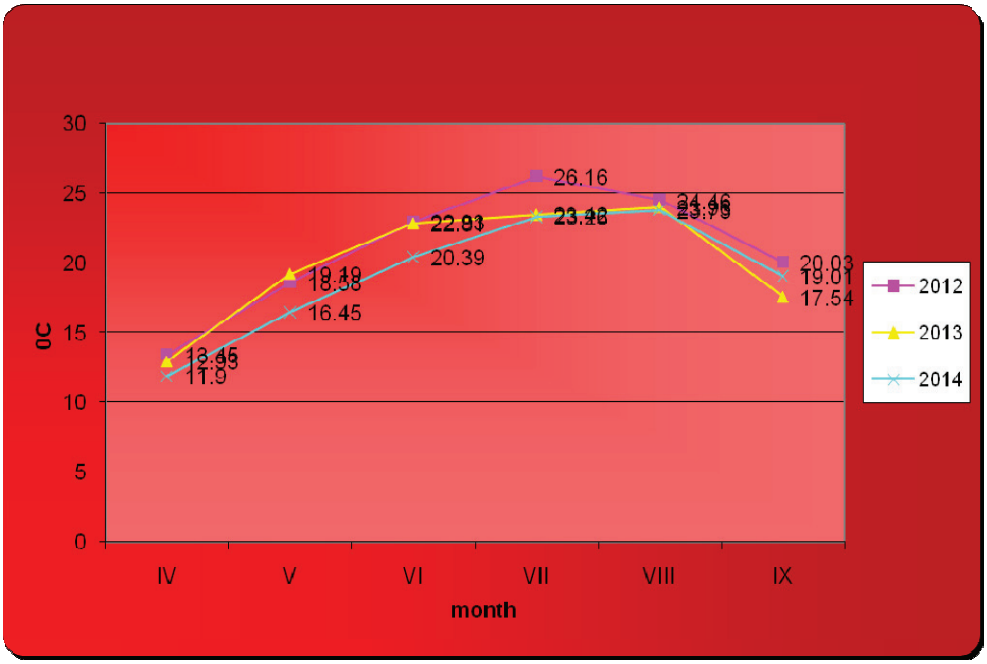
Table 4

Temperatures, relative to cotton vegetation phases, recorded in the vegetation period of the years 2012-2014

Vegetation phase	Duration (days)	Average daily temperature °C		Amount of t>0°C
Sowing- dawn	12	22.74	2012	272.9
			2013	277.5
			2014	205.4
Dawn - appearance of first flowers	65	20.6	2012	1842.4
			2013	1839.1
			2014	1622.2
Appearence of first flowers- opening of first capsules	50	21.8	2012	1693.1
			2013	1873.3
			2014	1731.5
Opening of first capsules - last harvest	64	13.0	2012	1522.8
			2013	1234.5
			2014	746+oct.
Total	181	3400		
Sum of maximum temperatures from sowing to last harvest 1		2012		5331.2
		2013		5224.4
		2014		4859.1

For an early vegetative growth of cotton the temperature must be higher than 20°C - 30°C. For the development of buds and flowering, the daytime temperature must be higher than 20 °C but must not reach over 40 °C and at night time the temperature must be higher than 12 °C, but must not reach over 27 °C (Bîlteanu Gh., 2001) (graph 1).

Temperatures between 27 and 32 °C are optimal for the development and maturation of capsules but, at 38 °C the yields are smaller. Powerful and / or cold winds will blow the fibber out of open capsules and cause the contamination with dust.



Graph 1. The evolution of the average temperature during the vegetation period, A.R.D.S. Valul lui Traian

Cumulating temperatures recorded in the period 20.04.-30.10 on each of the three years analysed (2012, 2013 and 2014) in the Valul lui Traian area, we obtained the following results: 2012 – 4804.3°C; 2013 – 4542.4°C; 2014 – 4305.4°C.

From the analysis of the evolution of temperature in the fall period we have found that the first hoar has appeared after every November 10th in each of the analyzed years.

We can therefore say that cotton production is safe from frost.

CONCLUSIONS

Major changes recorded in the evolution of temperature especially contribute to satisfying optimal climate conditions for obtaining secure and economically efficient cotton yields.

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BENEFICIAL ENTOMOFAUNA FROM THE VEGETABLE CROPS AT THE S.D. BANU MĂRĂCINE

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Keywords: *vegetable crops, beneficial species, predators species*

ABSTRACT

From our observation regarding the beneficial species from the „Banu Maracine" vegetable crops, we have identified a number of 23 beneficial species. Most of the insect species identified belonged to the Coleoptera order (7 species), followed by Diptera order (6 species), Hymenoptera order (4 species), Neuroptera (2 species).

They can also be observed beneficial vertebrates from class Amphibia (1 specie) and Reptilia class (3 species).

INTRODUCTION

The vegetable crops from Banu Maracine hosts a serie of harmfull animal species (inevertebrate –insects and vertebrate – birds and rodents), for controling these species annualy there are applied a series of agrotechnical and chemical methods. These measures affect the whole trophic chain, which include as well the parasites and predators that feed on the harmfull species mentioned before.

Classical biological control (natural enemy introductions) has long served as a paradigm for the role of predators and parasitoids in insect herbivore population dynamics, and it is widely held that there is no fundamental difference between successful biological control and the action of native natural enemies 'natural control' (Hawkins A. et all. 1999).

There is an adjustment of harmful populations, natural control, where internal factors of these populations intervene (endogenous factors) as well external factors (exogenous).The endogenous factors are represented by the population polymorphism, which imply the differentiation of individuals from these populations, on special categories phenotypically and genotypically differentiated by the interrelationships between individuals of different morpheme and the functions performed by these morphemes.

Populations exogenous factors are as for other organisms, represented by abiotic factors: physical, chemical, mechanical and biotic ones: predators, parasites, pathogens, also called "natural enemies", antagonists, as well food and competition (Toncea I., 2011)

In this paper we have propose to inventory the beneficial species present in ,,Banu Maracine" vegetable crops ecosystem.

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MATERIALS AND METHODS

Experiments were conducted during April 2014 - July 2015 in „Banu Maracine" vegetable crops ecosystem.

To determine the structure of the beneficial insects species were made collection of material using various means and methods: directly by hand from plants or soil, frame metric, soil surveys and soil surface collected with entomological net, collection with sticky traps for flying insects.

For as little impact on the ecosystem we have preferred to capture images with the camera than to capture live specimens were subsequently removed from their natural environment.

After collecting, the biological material was analyzed and determined with the binocular magnifier glass using the Identification Manual (Panin L., 1951, Chatened du Gaetan 1990, Chinery M., 1998, Godeanu S. P., 2002).

RESULTS AND DISCUSSIONS

There has been identified a number of 23 beneficial species (table no. 1), belonging to 2 classes: ARACHNIDA and INSECTA,

Table 1

Beneficial species identified during research

Crt. no.	Class/Order	Species
1	ARACHNIDA/ACARI	*Typhlodromus spp.*
2		*Amblyseius spp.*
1	INSECTA/ORTHOPTERA	*Mantis religiosa L.*
1	INSECTA/HETEROPTERA	*Orius insidiosus Say.*
1	INSECTA/NEUROPTERA	*Chrisoperla carnea Steph.*
2		*Chrisopa perla Steph.*
1	INSECTA/HYMENOPTERA	*Scolia flavifrons Fabr.*
2		*Vespa crabro L.*
3		*Vespa germanica L.*
4		*Vespa vulgaris L.*
1	INSECTA/COLEOPTERA	*Adalia decempunctata L.*
2		*Adalia bipunctata L.*
3		*Coccinella 7 punctata L*
4		*Carabus cancelatus L.*
5		*Carabus ulrichi L.*
6		*Carabus violaceus L.*
7		*Calosoma sycophanta L.*
1	INSECTA/DIPTERA	*Syrphus ribesii L.*
2		*Syrphus torvus L.*
3		*Episyrphus balteatus De Geer*
4		*Metasyrphus corollae F.*
5		*Scaeva albmaculata Macq.*
6		*Scaeva pyrastri L.*

As it can be observed most beneficial insect species identified belonged to the Order Coleoptera (7 species) followed by the Diptera (6 species) and Hymenoptera (4 species) figure 1.

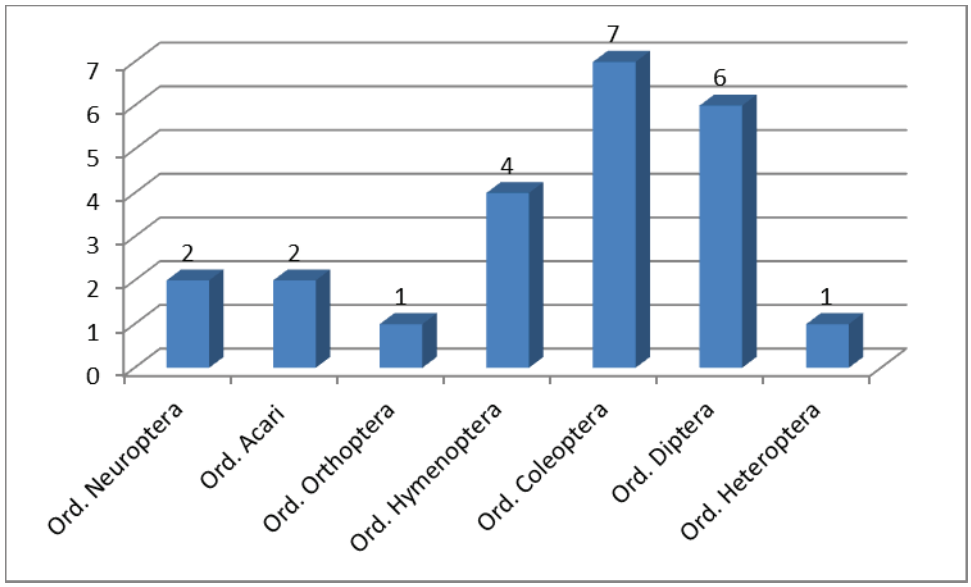

Figure 1. Structure of beneficial species identified during research

Orius insidiosus Say. *Scolia flavifrons Fabr.* *Chrisopa perla Steph.*

Figure 2. Beneficial species identified during research

Adalia bipunctata L. *Coccinella 7 punctata L*

Figure 3. Beneficial species identified during research

They can also be observed beneficial vertebrates from class Amphibia (1 specie) and Reptilia class (3 species), table 2.

Table 2

Beneficial vertebrates identified during research

Crt. no.	Class/Order	Species
1	AMPHIBIA/	*Bufo bufo*
1	REPTILIA/	*Lacerta agilis*
2		*Lacerta viridis*
3		*Natrix natrix*

We have to mention that some harmful species under certain conditions (larval growth, raising fledgeling, etc.) can consume different harmful organism. Such is earwig - *Forficula auricularia*, *Agriotes spp.* adult stage which feeds on small insects and, of corvids and house sparrow that during the fledgeling feeding consume harmful insects.

In anthropogenic agroecosystems human intervention through chemical methods to limit the pest attacks, resulting in serious disruption of beneficial organisms activity having a negative influence, due to direct exposure to pesticide action and indirect action due to the active substance ingested with the prey.

To improve the activity of the beneficial entomofauna in the vegetable crops at the SD Banu Maracine we recommend:

- providing areas for growth and development of predators and parasites
- creating conditions for hibernation in the respective areas
- application of chemical treatments against pests only overcome the economic damage threshold (PED).

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COMPLICATION ASSOCIATED TO TRIPLE PELVIC OSTEOTOMY

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Keywords: *triple pelvic osteotomy, dog, complication*

ABSTRACT

Triple Pelvic Osteotomy (TPO) is a common surgical procedure for treatment of developing hip dysplasia in growing dogs. Since its introduction in veterinary field by Hohn and Janes in 1969, several surgical techniques has been described, but the one currently most used is the Slocum's technique, fixing the rotated ilium with the pre-angled plates. TPO is recommended in youngs dogs with incipient hip dysplasia (grade 1-4) with or without clinical signs but without or only mild degenerative joint changes. Incipient hip dysplasia is evidenced by hip joint incongruity and subluxation of the femoral head with increased inclination of the dorsal acetabular rim (DAR) and joint laxity, with positive Ortolani sign showing a subluxation angle over 10° and a difference between reduction angle and subluxation angle of at least 10°. Most of the potential candidates for TPO surgery are between 5 and end 10 months of age, with better indication in the youngest ones, where bone healing is faster, body weight is lighter, and bone plastic adaptation to the new relationship between acetabulum and femoral head is still possible. Maximum age for the success of the operation is 1 year and 2 months in large dogs: German Shepherd, Romanian shepherd, rotweiler, labrador, Cane Corso.

INTRODUCTION

TPO has several specific complications that are most commonly related to, change position consequence of pull-implant screws, intra- and postoperative massive bleeding, lack of rest after surgery, progressive joint disease (progressive degenerative arthrosis), persistence joint incongruity, reduce abduction and abnormal aplomb, trauma threads regional nerve, narrowing of the pelvic canal (in the case of bilateral TPO) loss of the implant (protrusion).

MATERIALS AND METHODS

We studied clinical cases of pubic osteotomy and the following aspects were taken into consideration.

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Progressive degenerative joint disease. To avoid any complication degenerative joint acetabular TPO should be done when no evidence is found degenerative joints. Subjects with acetabular filling and cartilage damage when degenerative joint changes are accompanied by osteophytes appear severe postoperative osteoarthritis progression. (Tanase and Craciunescu, 2003). Any conditions that require a wheel acetabular cavity with more than 20 will anticipate some degree of osteoarthritis. In adult dogs, and those young people who have completed their growth will not achieve bone remodeling and femoral head acetabular cavity to achieve better congruence. As a consequence of incongruity, forces are not well distributed all over town causing cartilage degeneration and osteoarthritis (Todhunter R.J. & Lust G., 2003). Performing TPO in dogs with joint laxity, without addressing additional surgical procedure may end with a persistent subluxation of the femoral head Hara Y. et al., 2002; Vukašinović Z. et al 2009). There must be no cartilage necrosis at surgery, or degenerative joint disease progresses after surgery (Igna C., 2011).

Figure 1. Metis German Shepherd -7 years


Figure 2. Golden retriever- 3 years


Figure. 3 – Labrador retriever 10 month

Figure. 4 Golden Retriever 9 month

Persistent joint incongruity. Performing TPO in dogs with excessive joint laxity and failure, without addressing it with additional surgical procedures, could not avoid persistent subluxation of the femoral head and damage to the DAR. After surgery Ortolani sign should be negative or minimal; a still positive Ortolani sign is anticipating persistent joint subluxation and degeneration (Fitch R.B. et al. 2003). If the angle is not well calculated and Noel metallic implant is lower grade than the real, non-congruent persists after operatie. In if the angle is more than 4° ligament stretches excessively round and postoperative not provide cushioning joint heads (Sarierler M. et al. 2012).

Reduced abduction and abnormal gait. Rotating the acetabulum more than 20° could cause an limiting leg abduction and damaging the dorsolateral border of the acetabulum; 30° rotation will usually limit hip extension of some degree and will cause sometimes an abnormal gait with the leg carried laterally when advanced. Dogs with limited hip extension can show hyperextension of the hock.

Nerve injury. TPO is an invasive surgical technique and neurological deficits following the procedure are possible, mainly involving the ischiatic, pudendal and obturator nerves. Physical injury of peripheral nerves may result from compression, traction, laceration or contusion. Prognosis depends on the type of damage and degree of dysfunction. In dogs with complete loss of motor and sensory function prognosis is usually poor.

Intraoperative severe bleeding. Great care should be used when drilling the holes for plate fixation to avoid the nerves and the vessels medial to the ilium, particularly the internal iliac artery and vein which lie under the lumbosacral trunk. Injures to this vessels has been reported causing fatal hemorrhage. Drilling holes in the distal ilium should be performed while keeping it lifted cranially over the proximal ilium.

Excessive narrowing of the pelvic canal. Bilateral TPO could cause a 20% reduction of the pelvic width, due to rotation of the pelvis with the procedure; the reduction could be higher if associated to implant failure, to higher rotation degrees and to the thickness of the pubis ramus left medial to the acetabulum; while this narrowing would inhibit delivery in a pregnant beech, requiring cesarean section, reproduction of TPO treated dogs is routinely discouraged. Excessive narrowing of the pelvic canal causing fecal constipation is very rare. Rotate to the outside of the central portion of the hip bone displacement occurs pubic bone inwards and upwards diameters reducing previous pelvic diameters.

Implant failure. The loss of the implant is commonly found when the animal does not ensure a reduction in post-operative movements. The most common cases are found when using metal implants of 40 or 50 degrees most common cases occur by detaching the caudal portion of the implant.

Implant failure may be related to several factors, including poor postoperative care, early weight bearing in bilateral cases, weak holding power of screws in juvenile bone, hyperactive nature of young dogs, body weight and, for a lesser degree, poor surgical technique and material failure. In our study, the hyperactive nature of the dog and the body weight represented the main predisposing factor to implant failure, being more frequent in male dogs.

RESULTS AND DISCUSSIONS

We studied clinical cases presented to the pubic osteotomy was done differently: group A cavity acetabular osteotomy pubic near and lot B at ½ the distance between the osteotomy and acetabular cavity symphysis. In group B the results were favorable. Postoperative aplomb defects were significantly reduced compared to group A.

In group A slight cracks which appeared interested acetabular cavity. In group B were not found above mentioned situation.

CONCLUSIONS

Using plates with 50 degree can lead to uprooting the caudal portion iliac screws palette. Complications in Triple Pelvic Osteotomy may be significantly lowered by proper case selection, good surgical technique and good postoperative care, giving to this procedure an important place in the early treatment of canine hip dysplasia.

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THE ORIGINAL METHOD TO OPTIMIZE OF OSTEOSYNTHESIS TECHNIQUE IN THE SECANT ARCH ASSOCIATED WITH IMMUNOMODULATION

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Keywords: *fixation, fracture, implant metal, immunomodulation*

ABSTRACT

21 cases were selected, cats and dogs distal femoral epiphyseal fracture that method was applied to strengthen Rush modified and applied a semicerclage fracture on the lateral side. Metal semicircle was applied by two penetrations near fault lines in the ends of proximal or distal or if it was reduced in size distal end, distal semi-cerclage was passed by typing the burr spindle.The semi-cerclage reduced in all cases the possibility of giving the opportunity of twisting shaft angles and bone healing carriage of keeping normal. The method is easy to apply, is much less laborious than methods entirely Rush and reduce fracture displacement by turning heads in distal shaft fragment.Postsurgery we initiated an immunomodulatory treatment based on fitoextract.

INTRODUCTION

Intramedullary fixation method is the most commonly used remedy of fractures in small animals. These techniques are adapted from use in humans, and very little research or further development of intramedullary fixation has taken place in veterinary orthopaedics. In contrast to human orthopaedics where the number of appliances is limited only by one's imagination, the devices used in veterinary medicine include only the Steinmann pin, Kirschner wire, Rush pin, Kuntscher nail, the cerclage and semicerclage **(**Durall I. et al. 1993; Slatter D. 1993; Igna C. 2014).

The secant arc of osteosynthesis method (described by Rush) is applied with good results in epiphyseal fractures of the distal femur. The method is laborious and involves addressing fracture in two planes, one lateral and one medial. Some authors simplified method using only lateral approach. This paper considering the advantages and disadvantages of the two methods applied Rush simplified method through a single approach, complemented by a lateral semicerclage (Elefterescu H, 2001; Leau T. 2009)..

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MATERIAL AND METHODS

The imagined method applied the semicerclage to prevent any vicious consolidations in products due to twisting of the distal shaft from the fact that during fracture, ligament lesion can stifle joint and enables modification of normal anatomical angles thus creating a poor aplomb. We also used systemically postsurgical an herbal extract with immunomodulating properties. The effects of the herbal extract under patent had beneficial therapeutic effects that contributed to a corresponding callus and a favourable recovery (figure1and figure 2).

Figure 1.Rx view –epiphyseal fractures of the distal femur

Figure2. Rx view – same case after surgery

Rush fixation method is indicated in fractures of the distal humerus and femur. It is also used to fix fractures in the middle third straight humerus or femur shaft dog. We used osteosynthesis with a single secant arch and semicerclage broochin 21 subjects.

Rush metallic implant method is a brooch round in section with a certain elasticity. It has a loop at one end (hook), and the other end is tapered. The brooch is fixed to the end hook and is inserted into the spinal canal with sharp conical in firm contact with the inside wall of the intramedullary cavity. It is important that brooch elastic bend inside the compact during insertion to not produce a change in the bone axis.

Application spindle shall be: use a brooch with a length of approx. two thirds of the length of the bone. It bends easily brooch for its entire length. Once entered as to follow the intramedullary canal wall; the proximal end of the intramedullary canal widens with a brooch or drill Steinmann (spiral); distal end of the spindle (hook) 45^{o}- 60^{o} bend the longitudinal axis of the femur.

RESULTS AND DISCUSSIONS

The semicerclage uses a metallic wire that are attached to the line of preventing twisting shaft fracture bone fragments. Its application shall be: at the fracture line, with a bit thin, compact bone is penetrating the distal and proximal bone fragments. Metallic wire is inserted, tighten a loop and the end result is cut short and headed to the line of fracture (figure3, figure 4).

Closing the fracture is done respecting the principles of general surgery.

We recommended as postoperative total rest for a period of 3 days, after this period will be gradually resumed activity but without subjecting the animal to sustained efforts (running) and especially the jumps that can compromise the integrity surgery (Tanase A, 2013, Vlagioiu & Tudor, 2012, Ionita L. 2014**)**.

Figure 3. Middle straight fracture in femur

Figure 4. Rx view after surgery

We systemically administered antibiotics and pain relievers for a period of seven days. We also managed phytoextraction with immunomodulatory effects that led to a favorable postoperative recovery of the animals. Metallic implant (brooch) was taken 45 days after the first surgery after a previously radiological control

Rush modified method that we imagined it uses a single brooch in the form of braces to facilitate intervention and reduce bone approached only operator on the side of the limb.

Compared to the classical method of bone fixation and limitation of movement at the site it is deficient in 40% of cases. During the experiment we tried to limit their movements in the fracture, especially those generated by twisting the ligature shaft fractured limb soft tissue with non resorbable monofilament (nylon) or metallic semicerclage. Semicerclage to the two methods has been dropping significantly higher bone ends in the fracture and reduced total movement in the outbreak.

CONCLUSIONS

Application cerclage in place of the two pins was as effective as the classic method described by Rusch but surgery was simplified. The method reduces the time surgical sutures both application and when extracting metal metallic implant.

Following this method have not been reported or noticed changes in joint angles aplomb operated member's changed.

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RESEARCH REGARDING THE DOMINANCE OF SOME THREATENED SPECIES OF LEPIDOPTERA IN THE SITE NORDUL GORJULUI DE VEST DURING 2013 -2014

Ţucă O.A.[1], Stan C.[1]

Keywords*: insect, species, conservation, dominance*

ABSTRACT

In order to define accurate a site of high conservation, during 2013 - 2014 in the the site of comunity importance "Nordul Gorjului de Vest", there have been made some researches regarding the dominance of some Lepidoptera species of community importance listed listed on Annex II of the Habitat Directive and the IUCN Red List of Threatened Species: Callimorpha quadripunctaria P. *Lyceana dispar* Haw., *Colias myrmidone* Esp., *Leptidea morsei* Den &Schif..

INTRODUCTION

Biodiversity is decreasing: unprecedented rates of species' extinctions form a complex response to various humaninduced changes in the global environment (Sala et al., 2000).

As most populations critically depend on the availability of suitable habitats, decrease in habitat quality drives numerical declines in countless species (Tilman et al., 2001, Benton et al., 2003, Chase & Leibold, 2003). Also for butterflies, the availability of suitable habitats frequently appears to be crucially limiting (Thomas et al., 2001, Fleishman et al., 2002, Dennis et al., 2006).

Populations of many species of Lepidoptera are in decline all over Europe, due primarily to habitat destruction and fragmentation (Van Swaay,1999).

In recent decades, climate change has also affected the decline and spatial redistribution of many butterfly species with an observed movement of species northwards (Parmesan, C. , 2006).

In choosing sites to target for protection, conservationists typically look for healthy ecosystems with high biodiversity places with a great number and variety of species. Inventorying all the species living in a given locale is usually impossible, so instead, scientists often turn to what they call bioindicators species, or small groups of species, that when present suggest that a place has high biodiversity.

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MATERIAL AND METHODS

In our research regarding the identification of some threatned species of lepidoptera, we have use the Pollard Transects. The Pollard Transects is a protocol designed to standardize the recording of butterfly observations (Pollard, E. 1977).

The transect protocol involves one observer walking a fixed path at a constant pace, multiple times in a season. Butterflies are counted when they are seen within a prescribed distance from the path, often 2.5 meters on either side of the path, and only when the butterflies are seen in front of, or above, the observer (i.e., no backtracking).

A second person may work with the observer to identify and/or photograph insects spotted by the observer. Transects should not change from year to year and ideally should sample a variety of habitats.

The existence of a gradual sliding from forest vegetation to a transition zone, in order to grasp the possible existence of a faunistic gradient from forest to grassland we have applied the transects method, with transects located on slopes with different orientations.

Samples were made in 2013-2014, every year during April - October.

Dominance signifies the parameter that focused on the importance of a populations within biocoenosis, the role of substance and energy transfer species in an ecosystem.

The dominance of species was calculated using the formula:

$$DA=\frac{nA}{N}x100$$

nA - total number of individuals from A species;

N - total number of individuals of all the species identified in the samples.

RESULTS AND DISCUSSIONS

Between 2013 - 2014 in the site Nordul Gorjului de Vest, we performed research on the conservation status of some lepidopera species of national/community importance listed on Annex II of the Habitat Directive and the IUCN Red List:. *Callimorpha quadripunctaria* P. *Lycaena dispar* Haw., *Colias myrmidone* Esp., *Leptidea morsei* Den &Schif.

Following our investigations, regarding the dominance of some lepidoptea species it come out that in the studied area all the endangered species are dominants species, recorded with values within 5 to 10%:

- *Callimorpha quadripunctaria* P. with an average of 7.91%;
- *Lyceana dispar* Haw. with an average of 9.23%;
- *Colias myrmidone* Esp. with an average of 7.36;
- *Leptidea morsei* Den &Schif. with an average of 8.49%.

According to data collected and processing all the species of national/community importance *Callimorpha quadripuncatria* P., *Lycaena dispar* Haw., *colias myrmidone* Esp., *Leptidea morsei* Den & Schiff. were present in five months of the seven months during our survey period.

Table 1

The dominance of the lepidoptera species of community importance in the Site ”Nordul Gorjului de Vest” during 2013 – 2014

Species	April	May	June	July	August	September	October	Average
	D%	D%	D%	D%	D%	D%	D%	D%
Callimorpha quadripunctaria P.	0	7.24	7.53	8.22	8.43	8.15	0	7.91
Lycaena dispar Haw.	0	9.26	9.83	9.34	9.25	8.48	0	9.23
Colias mymidone Esp.	0	7.13	7.42	7.80	7.22	7.25	0	7.36
Leptidea morsei Den &Schif.	0	8.11	8.24	8.56	8.62	8.92	0	8.49

CONCLUSIONS

During our research in the site of community importance Nordul Gorjului de Vest we have identified four species of lepidoptera of national/community importance listed on Annex II of the Habitat Directive and the IUCN Red List. .

Regarding the dominance of these species we can conclude that all species are dominant species with average values ranged between 7,36% (*Colias myrmidone* Esp.) and 9,23% (*Lycaena dispar* Haw), the other species have presented average values of 7,91% (*Callimorpha quadripunctaria* P.) and 8,49% (*Leptidea morsei* Den & Schiff.).

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RESEARCH REGARDING THE DOMINANCE OF SOME BAT SPECIES OF COMMUNITY IMPORTANCE IN THE SITE NORDUL GORJULUI DE VEST DURING 2013 - 2014

Vlădulescu Carmen*[1], Ciupeanu Călugăru Eleonora Daniela[1], Olaru Luminiţa[1]

Keywords*: bat, species, conservation, dominance*

ABSTRACT

In order to define accurate a site of high conservation, during 2013 - 2014 in the site of comunity importance "Nordul Gorjului de Vest", there have been made some researches regarding the dominance of some bats species of community importance listed in the IUCN Red List of Threatened Species: Myotis blythii, Miniopterus schreibersi, Myotis capaccinii, Rhinolophus ferrumequinum, Rhinolophus hipossideros, Myotis myotis, Myotis emarginatus, Rhinolophus euryale.

INTRODUCTION

Bats are a vital part of our native wildlife, accounting for almost a third of all mammal species in Romania and occupy a wide range of habitats, such as wetlands, woodlands, farmland, as well as urban areas. They can tell us a lot about the state of the environment, as they are top predators of common nocturnal insects and are sensitive to changes in land use practices.

The pressures they face - such as landscape change, agricultural intensification, development, and habitat fragmentation are also relevant to many other wildlife species, making them excellent indicators for the wider health of the Romania wildlife.

Romania is home to 28 of the 30 species of bats native to Europe.

In the site of community importance „Nordul Gorjului de Vest" are eight species that are listed in Annex II of the Habitats Directive.

Among the main threats for bats and their habitats in this site are the lack of appreciation by the locals, improper habitat protection, poor awareness of bats and their habitats.

MATERIAL AND METHODS

Adequate inventory efforts are the basis of our knowledge of species diversity at any given site. For bats, a variety of direct capture methods have been developed, among which mist nets and harp traps are the best known. Harp traps are useful for capturing fast-flying, lessagile species that emit high frequency calls and can be used in more restricted

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situations such as the entrance of a cave or within dense vegetation (Wilson et al. 1996, Berry et al. 2004).

Indirect techniques (i.e., ultrasonic detectors) enable the detection of species that are difficult to capture (O'Farrell & Gannon 1999, MacSwiney et al. 2006).

In our research we have used mist nets for different considerents such as:

- they are practical for capturing the slower-flying species, which have a more maneuverable flight and emit lower frequency calls;

- they may be placed at different heights and orientations under a variety of conditions, from open to cluttered spaces, in vegetated areas or water bodies.

The monitoring was conducted in eight locations: Fusteica, Garla Vacii, Pestera cu Lilieci, Pestera Pargavu, Pesterea Tismana, Pestera cu Corali, Pestera Cioarei, Pestera Gura Plaiului.

Dominance signifies the parameter that focused on the importance of populations within biocoenosis, the role of substance and energy transfer species in an ecosystem.

The dominance of species was calculated using the formula:

$$DA=\frac{nA}{N} x100$$

nA – total number of individuals from A species;

N – represent the total number of individuals of all the species identified in the samples.

RESULTS AND DISCUSSIONS

Between 2013 - 2014 in the site Nordul Gorjului de Vest, we performed research on the conservation status of some bats species of community importance under the IUCN Red List: *Myotis blythii, Miniopterus schreibersi, Myotis capaccinii, Rhinolophus ferrumequinum, Rhinolophus hipossideros, Myotis myotis, Myotis emarginatus, Rhinolophus euryale*.

Following our investigations, it come out that in the studied area *Myotis blythii* (18.21%), *Miniopterus schreibersi* (30.37%), *Rhinolophus ferrumequinum* (24.10%) and *Rhinolophus hipposideros* (13,69) are eudominant species, *Myotis myotis* (6.22 /%) is a dominant species, *Myotis capaccinii* (2.05%), *Rhinolophus euryale* (2.73) are subdominant species and *Myotis emarginatus* is recedent species.

CONCLUSIONS

During our research in the site of community importance Nordul Gorjului de Vest we have identified eight species of bats under the IUCN Red List.

Regarding the dominance of these species we can conclude that five species are eudominant *(Myotis myotis, Myotis blythii*, *Miniopterus schreibersi*, *Rhinolophus ferrumequinum* and *Rhinolophus hipposideros)* one is a dominant species (*Myotis myotis)* two species are subdominant (*Myotis capaccinii* and *Rhinolophus euryale)* and one species (*Myotis emarginatus*) is a recedent species.

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Table 1

The dominance of the bat species of community importance in the Site ”Nordul Gorjului de Vest” during 2013 – 2014

Location	Fusteica	Garla Vacii	Pestera cu Lilieci	Pestera Pargavu	Pestera Tismana	Pestera cu Corali	Pestera Cioarei	Pestera Gura Plaiului	Average
Species	D%	D%	D%	D%	D%	D%	D%	D%	D%
Myotis blythii	18.13	18.89	18.15	21.35	19.12	20.92	18.17	19.75	18.21
Minioterus schreibersi	30.64	31.26	30.15	31.53	31.22	33.25	31.21	31.73	30.37
Myotis capaccinii	1.41	-	3.21	-	-	-	1.55	-	2.05
Rhinolophus ferrumequinum	26.44	26.51	23.12	24.12	25.11	23.69	23.45	26.12	24.10
Rhinolophus hipposideros	13.18	16.22	15.20	15.25	17.40	14.25	12.68	16.25	13.69
Myotis myotis	6.21	7.12	6.32	7.75	7.15	7.89	7.25	6.15	6.22
Myotis emarginatus	1.12	-	1.71	-	-	-	-	-	1.41
Rhinolophus euryale	2.87	-	2.14	-	-	-	3.80	-	2.73

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A RESEARCH ON THE QUANTITIES OF O_2 INVOLVED IN THE METABOLIC PROCESSES OF ACETIC BACTERIA, IN A WHITE WINE, WITH AN ALCHOOLIC CONCENTRATION OF 10.5 VOL%

Vlădulescu Carmen[1], Căpruciu Ramona[1]

Keywords*: acetic bacteria, oxygen, viable cells, white wine.*

ABSTRACT

This paper presents the influence of oxygen quantities on the vital metabolic processes of the acetic bacteria, which are present in a white wine (type), with an alcoholic concentration of 10,5% volume.

The quality of wine is influenced, in particular, by its oxygen content. Depending on the concentration of dissolved oxygen, oxidation processes which have a negative effect on the wine may occur:

- *discoloration*
- *presence and multiplication of microorganisms*
- *lack of freshness and flavor*
- *rapid obsolescence.*

INTRODUCTION

The critical role of these oxidation processes having two enzymes is related to cytoplasm membrane: alcohol-dehydrogenises and aldehyde - dehydrogenises. Active site of both enzymes is the external surface of cytoplasm membrane (Saeki et al. 1997).

Oxygen is generally indispensable for the multiplication of acetic bacteria. To multiply and make acetic fermentation, acetic bacteria need more air. It is known that in order to increase the volatile acidity of wine with 1g acid acetic (respectively 0.8 g H_2SO_4) acetic bacteria use oxygen from at least two liters of air.

The determination of different elements and factors in the soil - grapevine - wine system is extremely important for the wine industry, the grape and wine quality, and also for consumer health (Buzatu et al. 2015).

Among other factors of the biotope, the oxygen plays an essential role in the metabolic processes of the microorganisms present in the musts and wine (Ciupeanu Călugăru 2007).

Oxygen can be considered as a main factor limiting the growth of acetic bacteria, which has a strictly aerobe metabolism in which oxygen is used as a terminal electron acceptor during the respiration process (Matsushita et al. 1994).

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There is research showing that, besides oxygen and other compounds there are quinones and pigments in reduced form, which can be used as electron acceptor (Aldercreutz 1986), which shows that acetic bacteria can evolve in both aerobic and in semi aerobe environments (Drysdale & Fleet 1988).

Some researchers (Du Toit et al. 2005) found, for example, that strains of Acetobacter pasteurianus species can survive in a viable state but uncultivated, in the wine where oxygen is not present.

Oxidation of alcohol to acetic acid is the best known feature of acetic bacteria, the oxidation process that occurs in two stages. First, alcohol is oxidized to acetaldehyde which in turn is oxidized in the second stage, the acetic acid. In both reaction steps, the electrons transfers from byproducts are accepted by oxygen.

Taking into consideration that in the oenological practice, for well justified reasons or accidental causes, in the containers in which wine is kept, in various stages of development, it is produced a so-called "empty", the space occupied by the air at the surface of the wine, which may have different volumes, so amounts of oxygen whose share is directly proportional to the size of the gap (air volume) we have carried out the experiments in which we tried to capture the influence of the quantity of oxygen (O_2) on vital processes-metabolic of acetic bacteria, for white wines whose alcohol content is 10.5 vol. % alcohol. The pH value was the same (3.3) and the temperature in the storage room where the wine is kept did not exceed 12^0C.

Influence of oxygen on processes vital-metabolic of acetic bacteria, we sought to capture by increasing the number of viable cells (U.F.C. / l) and as a consequence of their metabolic processes, increasing quantities of acetic acid (g/L H_2SO_4).

When observations and studies were related to white wine (variety) with alcoholic strength of 10.5 vol. % (table 1, graph 1) and the container in which wine was kept was permanently on full, so without the presence of the gap, the number of viable cells as well as the concentration of acetic do not increase. This as a consequence that shows that acetic bacteria did not have the necessary oxygen.

MATERIAL AND METHODS

We followed the activity of bacteria along 60 days from the start of fermentation process.

The material used for the experiments consisted of:

- White wine 10.5 vol. % alcohol, obtained from grapes coming from vineyards Segarcea center.
- Viable cells
- Analytical methods were related to:
    - determination of the gap volume in the container
    - determination of the alcoholic strength of wine
    - determination of acetic acid in wine
    - microbiological examinations.

RESULTS AND DISCUSSIONS

If a white wine assortment, with an alcohol concentration of 10.5 vol.% Alcohol (table 1, graph 1) which was kept in a container that was kept constantly full, so without this gap, it was observed that both the number of viable cells and acetic acid content did not increase.

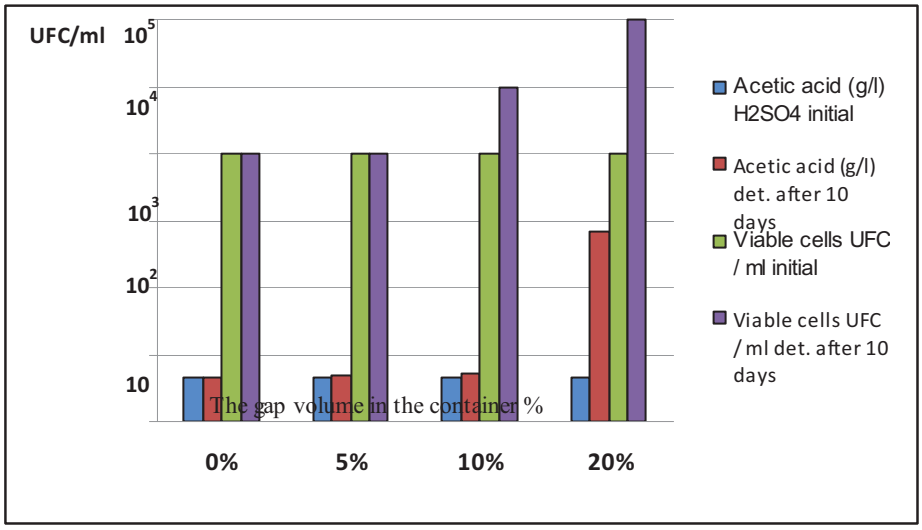
When the gap in the container volume was 5% (table 1, graph 2) increasing in the number of viable cells and acetic content is already found after the first 5 (five) days of wine storage. These increases are even more evident as the duration of storage is greater.

After 60 days of wine storage the number of viable cells increases from 10.3 (initially) to 10.6 (after 60 days). At the same time the quantity of acetic acid in the wine increases from 0.45 g/L (H_2SO_4) at the initial stage to 1.14 g/L (H_2SO_4) after 60 days of storage (Vlădulescu 2010).

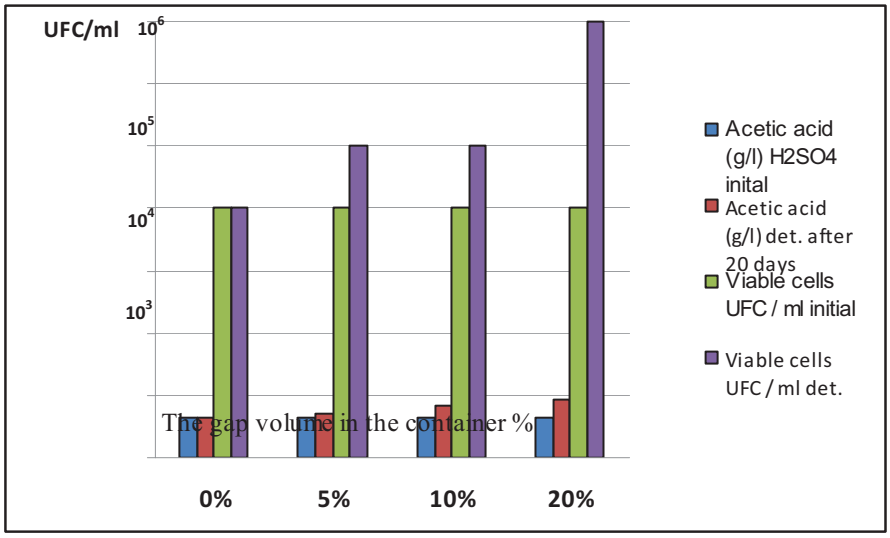
Table 1

The influence of the quantity of oxygen (O_2) on the vital metabolic processes of acetic bacteria, on a duration of 60 days. White wine (variety), 10.5 vol % alchool; pH=3.3; t°=12°C

The gap volume in the container (%)	Acetic acid content in wine (g/L) H_2SO_4	Viable cells UFC /vol	Determination after …….days					
			10		20		30	
			Acetic acid (g/L) H_2SO_4	Viable cells UFC /vol	Acetic acid (g/L) H_2SO_4	Viable cells UFC /vol	Acetic acid (g/L) H_2SO_4	Viable cells UFC /vol
0	0.45	10^3	0.45	10^3	0.45	10^3	0.45	10^3
5	0.45	10^3	0.47	10^3	0.51	10^4	0.67	10^4
10	0.45	10^3	0.52	10^4	0.68	10^4	0.79	10^5
20	0.45	10^3	0.70	10^5	0.83	10^6	0.98	10^7



Graph 1. Influence of oxygen (O_2) on vital-metabolic processes of acetic bacteria, over 60 days. White wine (variety), 10.5 vol% alcohol, pH = 3.3, t °=12° C. (determination after 10 days)



Graph 2. Influence of oxygen (O_2) on vital-metabolic processes of acetic bacteria, over 60 days. White wine (variety), 10.5 vol. % alcohol, pH = 3.3, t °=12° C. (determination after 20 days)

Table 2

The influence of the quantity of oxygen (O_2) on the vital metabolic processes of acetic bacteria, on a duration of 60 days. White wine (variety), 10.5 vol. % alchool; pH=3,3; t°=12°C

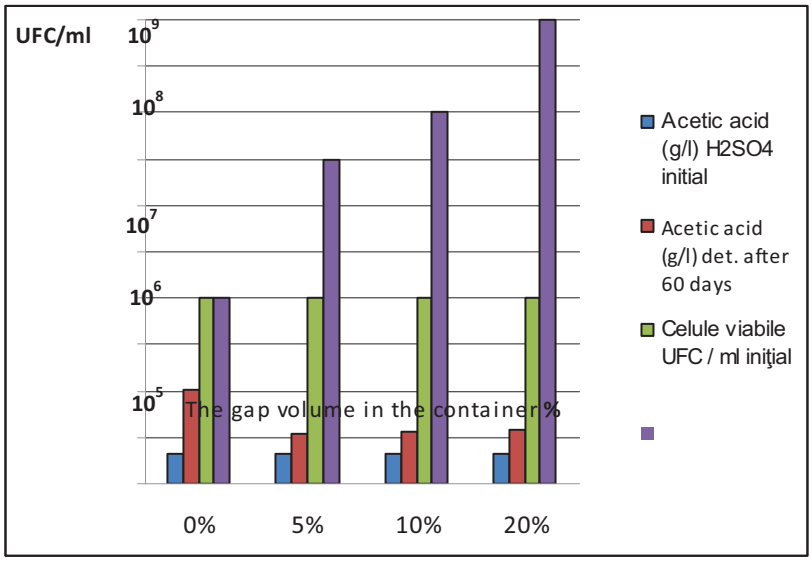
The gap volume in the container (%)	Acetic acid content in wine (g/L) H_2SO_4	Viable cells UFC /vol	Determination after …….days			
			40		**60**	
			Acetic acid (g/L) H_2SO_4	Viable cells UFC /vol	Acetic acid (g/L) H_2SO_4	Viable cells UFC /vol
0	0.45	10^3	0.45	10^3	1.47	10^3
5	0.45	10^3	0.89	10^5	1.14	10^6
10	0.45	10^3	0.98	10^6	1.33	10^7
20	0.45	10^3	1.20	10^7	1.51	10^9

If the container was kept open with a gap volume of 10%, the oxygen increased from 10^3 (initial) to 10^7 U.F.C/ l after 60 days. Therefore, acetic acid content also increased from 0.45 g/L H_2SO_4 as was initially determined at 1.33 g/L H_2SO_4 after 60 days of storage.

The results are amplified when the opening of the container volume was 20%, the highest intake of oxygen carried in our experiments (table 1 and graph 3).

In graph 3, the number of viable cells grows continuously from 10^3 UFC / ml (as were originally) to 10^9 UFC / ml after 60 days an active metabolism of acetic bacteria being

recorded in the presence of such large amounts of oxygen and as a result the acetic acid content of the wine reaches the highest level, 1.51 g/L (H_2SO_4).



Graph 3. Influence of oxygen (O_2) on vital-metabolic processes of acetic bacteria, over 60 days. White wine (variety), 10.5 vol. % alcohol, pH = 3.3, t °=12° C. (determination after 60 days)

CONCLUSIONS

Oxygen can be considered as a main factor limiting the growth of acetic bacteria, which has a strictly aerobic metabolism in which oxygen is used as a terminal electron acceptor during respiration process.

Oxygen is essential for multiplication of acetic bacteria.

Increasing the number of viable cells, the bacteria that accumulate acetic acid and acetic acid in wine are more dependent on the amount of oxygen present in the wine than the alcohol concentration in wine.

The longer the term of wine storage in the presence of oxygen is, the more increases the number of viable cells, and acetic acid content of wine as well.

Using an inhibitor (SO_2) of acetic bacteria activity at doses limited by law has no effect.

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EVALUATION OF THE DIFFERENT FERTILLIZATION LEVELS IN THE PRODUCTIVITY AND CHEMICAL PROPERTIES OF TWO VARIETIES OF ROSEMARY ESSENTIAL OILS UNDER GREEK ENVIRONMENTAL CONDITIONS

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Keywords: *Antioxidant activity FRAP, Fertilization levels, Rosemary, Total phenolics.*

ABSTRACT

In this work, fertilization level effects were studied on plant height, plant length, dry drogue yield, essential oil production, total phenolic content and antioxidant activity of the two varieties of rosemary leaf and essential oil. In terms of dry drogue yield the harvest revealed higher delivery quantities, in the crop without lubrication for both varieties of rosemary. The yield of leaves to essential oil between the two varieties, revealed higher quantities for the rosemary repens regardless of the level of fertilization. Analytically estimated concentration of total phenolics of the Rosemary leaves ranged from 18.18 to 23.78 mg (GAE) g^{-1} dry weight and the antioxidant activity ranged from 8.12 to 12.44 μmols FRAP g^{-1} dry weight. The concentration of total phenolics of the Rosemary essential oil ranged from 443.2 to 658.4 mg (GAE) L^{-1} essential oil and the antioxidant activity ranged from 600 to 1100 mM equivalents to ascorbic acid (AA) L^{-1} essential oil.

INTRODUCTION

Polyphenols are of the most widely spread secondary metabolites in both edible and non-edible plants (Harborne 1980; Macheix et al. 1990). It is known that in the aerobic organisms' free-oxygen and nitrogen-containing radicals (ROS, RNS) are formed.

Strong oxidizers they damage the major biomolecules, thus causing a lot of health disturbances and diseases of the human organism (Halliwell & Gutteridge 2007). Polyphenols can inhibit the reactions of formation or neutralize the formed free radicals (Halliwell & Gutteridge 2007).

Over the last years, many studies have been focused on the evaluation of polyphenols composition and the antioxidant activities of medicinal herbs and spices used as food against various diseases (Waterman & Mole 1994).

In literature, there are numerous results concerning the polyphenols content and the antioxidant activity in plant species, which is mainly due to the application of different determination methods as well as to the various ecological conditions for the growth of the plant (Re et al. 1990, Haslam 1998, Gougoulias 2012, 2014, Gougoulias & Mashev 2015).

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Rosemary belongs to the family Labiate, (Rosmarinus officinalis Labiate). It is an shrub evergreen multiannual (up to 20 years), spriggy, leafy and upright shrub, reaching up the height of 1.5 m, with aromatic dark green leaves and blue blossoms. Full production begins the third year. The collection is indicated at the beginning of flowering, because it has the higher content in essential oil (Marquard et al. 2001).

The purpose of this study is to investigate the productivity and some chemical properties of rosemary and the essential oil in relation to different levels of fertilization.

MATERIALS AND METHODS

Rosemary repens and upright, was cultivated in the Farm TEI of Thessaly on an area of 400 m^2. The planting took place on 13.05.2014 and the harvest on 03.03.2015 at the start of the flowering period when the concentration of essential oils maximized (Marquard et. al. 2001).

The experiment had a randomized block design. Each experimental piece had an area of 16 m^2 with 28 plants and four plants from each treatment were marked for measuring the height and length of plants.

For both rosemary varieties, three fertilization levels were used (without fertilization, 100 Kg N per hectare and 200 Kg N per hectare).

There were four replicates per treatment combination. The leaves and shoots were dried in a dark place at room temperature, finely ground and kept at 4^{o}C.

Preparation of the methanol extracts: 500 mg of the finely ground sample were 2-fold treated by 20 ml 80% aqueous methanol.

At first treatment the samples were incubated for 24 h in the extractant at stirring and the second one continued stirring for 2 h at ambient temperature. The extract was gathered after centrifugation/filtration and the volume was made up to 50 ml with aqueous methanol.

Determination of Total polyphenols (TP): Total polyphenolic content was determined with the Folin-Ciocalteu (F-C) reagent according to the method of Singleton & Rossi 1965) using the microvariant proposed by Baderschneider et al. 1999 and the results were expressed as gallic acid equivalent (GAE) in mg/g dry weight.

Ferric reducing antioxidant power assay (with FRAP reagent). The ferric reducing antioxidant power (FRAP) was estimated according to the method of Benzie & Strain 1999 and was expressed as μmol FRAP reagent/g dry weight and ascorbic acid (AA) equivalent in mM/L essential oil.

Soil samples were analysed using the following methods which are referred by Hesse et al. 1972, Page et al. 1982.

Organic matter was analyzed by chemical oxidation with 1 mol L^{-1} $K_2Cr_2O_7$ and titration of the remaining reagent with 0.5 mol L^{-1} $FeSO_4$.

Inorganic forms of nitrogen were extracted with 0.5 mol L^{-1} $CaCl_2$ and estimated by distillation in the presence of MgO and Devarda's alloy, respectively.

Available P forms (Olsen P) were extracted with 0.5 mol L^{-1} $NaHCO_3$ and measured by spectroscopy.

Exchangeable forms of potassium were extracted with 1 mol L^{-1} CH_3COONH_4 and measured by flame Photometer (Essex, UK).

Statistical analysis: Data analysis was made using the MINITAB (Ryan et. al. 2005 statistical package.

Analysis of variance was used to assess treatments effect. Mean separation was made using Tukey's test when significant differences (P=0.05) between treatments were found.

RESULTS AND DISCUSSIONS

The soil used for the cultivation of the two varieties of rosemary had low content organic matter and low salinity (Table 1).

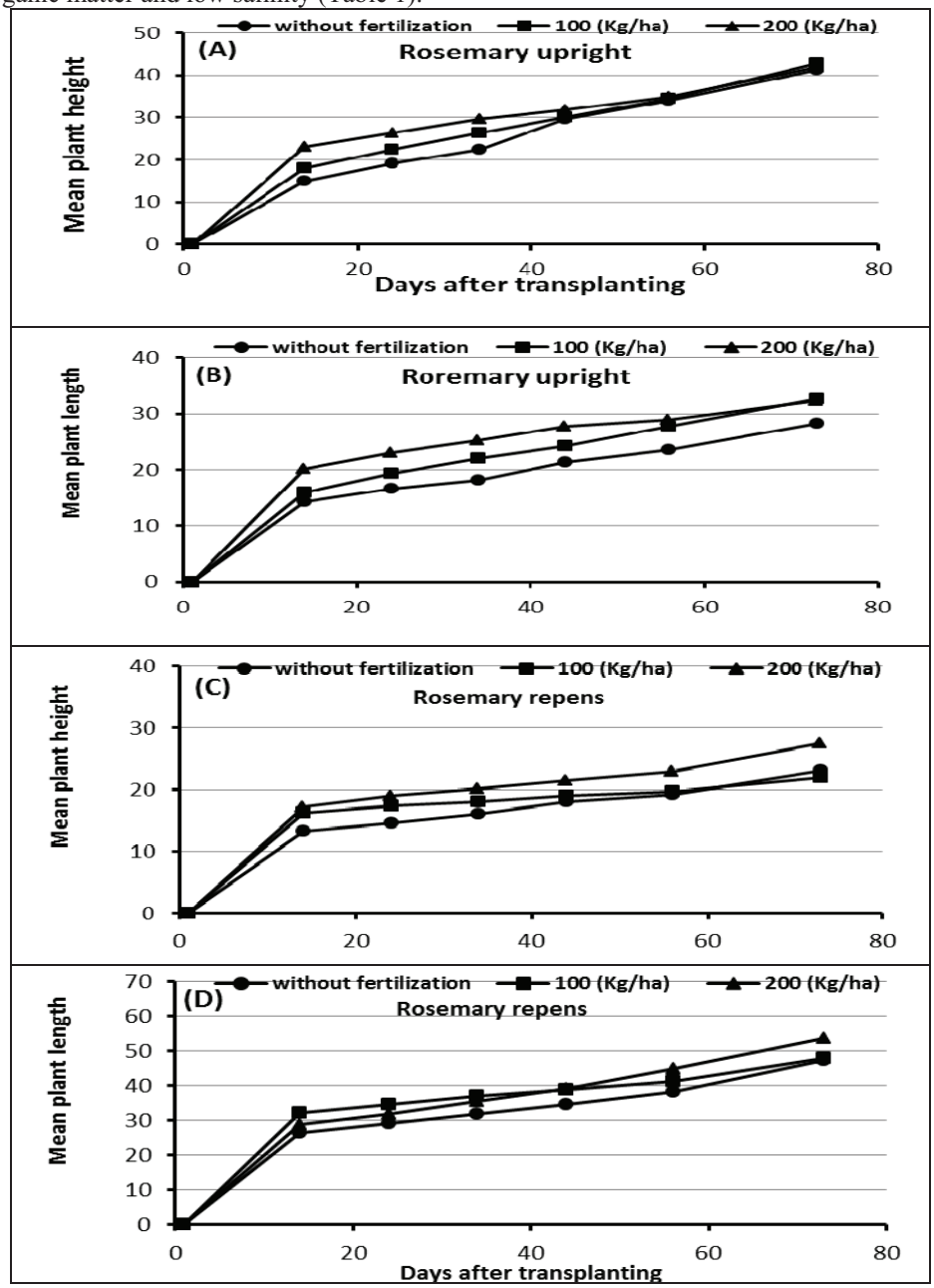

Figure 1. Mean variation in plant height and plant length in the two varieties of Rosemary: without fertilization, with 100 Kg fertilization (N)/ha and 200Kg fertilization (N)/ha. The height concerns the most central peak, while the length is the size of the plant on the planting line

In rosemary upright growth rate, the mean plant height (Fig. 1) during the first 15 days from the initial crop was greater in the treatment which used 200 Kg fertilization nitrogen/ha, but after 45 days the mean plant height did not show a statistically significant difference relative to the fertilization levels ($p > 0.05$).

In rosemary repens growth rate the mean plant height during the first 15 days from the initial crop was greater in the treatments which used 100 and 200 Kg fertilization (N)/ha compared to treatments without fertilization, but after 45 days the mean plant height was greater in treatments with 200 Kg fertilization (N)/ha compared to the two other treatments ($p <0.05$).

The means plant length, of the rosemary upright throughout the duration of the cultivation, was higher in treatments with fertilization compared to with treatment without fertilization ($p <0.05$).

On the contrary, the mean plant length of the rosemary repens, during all the treatments showed no statistical difference throughout the duration of the crop ($p> 0.05$).

During the first harvest, dry drogue yield for each plant (Table 2) of rosemary upright or of rosemary repens had the following order: without fertilization>with fertilization 100 Kg (N)/ha > with fertilization 200 Kg (N)/ha, ($p < 0.05$).

Table 1

Chemical properties of soil samples

Property	Soil depth (0-25) cm	
	Before transplanting	After harvest
Texture	Loam	Loam
pH (1part soil:5parts H_2O)	7.81 ± 0.16	7.82 ± 0.16
Electrical conductivity, extract (dSm^{-1}) (1part soil:5parts H_2O)	0.11 ± 0.01	0.10 ± 0.01
Organic matter (%)	0.93 ± 0.05	0.77 ± 0.04
N-inorganic (mg kg^{-1})	44.8 ± 4.07	41.3 ± 3.44
K-exchangeable (mg kg^{-1})	373.3 ± 7.45	314.5 ± 7.86
P –Olsen (mg kg^{-1})	13.1 ± 1.87	10.2 ± 1.46
$CaCO_3$ (%)	0.63 ± 0.07	1.04 ± 0.12

Data represent average means and SE deviation. (n)=4

Essential oils yield (Table 2) of the rosemary upright is higher in treatments without fertilization (0.70 ml/100g dry mass) when compared to the treatments with fertilization.

In contrast, essential oils yield of the rosemary repens, did not show statistically significant differences in the various treatments (1.80 ml/100 g dry mass), ($p>0.05$).

Also, the essential oils yield of the rosemary repens was higher than the essential oils yield of the rosemary upright in all treatments.

From all the treatments of the experiment, the rosemary upright without fertilization showed the highest content in total phenols, equal to 23.78 mg GAE /g dw, while the rosemary repens which used 200 Kg fertilization (N)/ha showed the least total phenolic content, equal to 18.18 mg GAE /g dw.

Also, antioxidant capacity FRAP (Fig. 2) in rosemary upright was higher in treatment without fertilization (equal to 12.44 μmol FRAP/g dw) relative to the treatments which used 100 Kg and 200 Kg fertilization (N)/ha respectively.

Table 2

Dry drogue and essential oils yield of Rosemary leaves, first year harvest

	Rosemary upright		Rosemary repens	
Treatments	Dry mass (g) / plant	Essential oil (ml) / 100 g dry mass	Dry mass (g) / plant	Essential oil (ml) / 100 g dry mass
without fertilization	158.3 ± 14.39	0.70 ± 0.04	153.6 ± 16.17	1.80 ± 0.09
100 Kg fertilization (N) / ha	126.9 ± 12.67	0.40 ± 0.03	128.6 ± 13.97	1.80 ± 0.10
200 Kg fertilization (N) / ha	61.5 ± 5.78	0.50 ± 0.03	71.4 ± 6.81	1.70 ± 0.10

Data represent average means and SE deviation. (n)=4

At the rosemary repens the antioxidant capacity FRAP was higher in the treatment without fertilization and in the treatment which used 100 Kg fertilization (N)/ha compared to the treatment which used 200 Kg fertilization (N)/ha. Also, all the treatments of the rosemary upright had higher values FRAP than all the treatments of the rosemary repens.

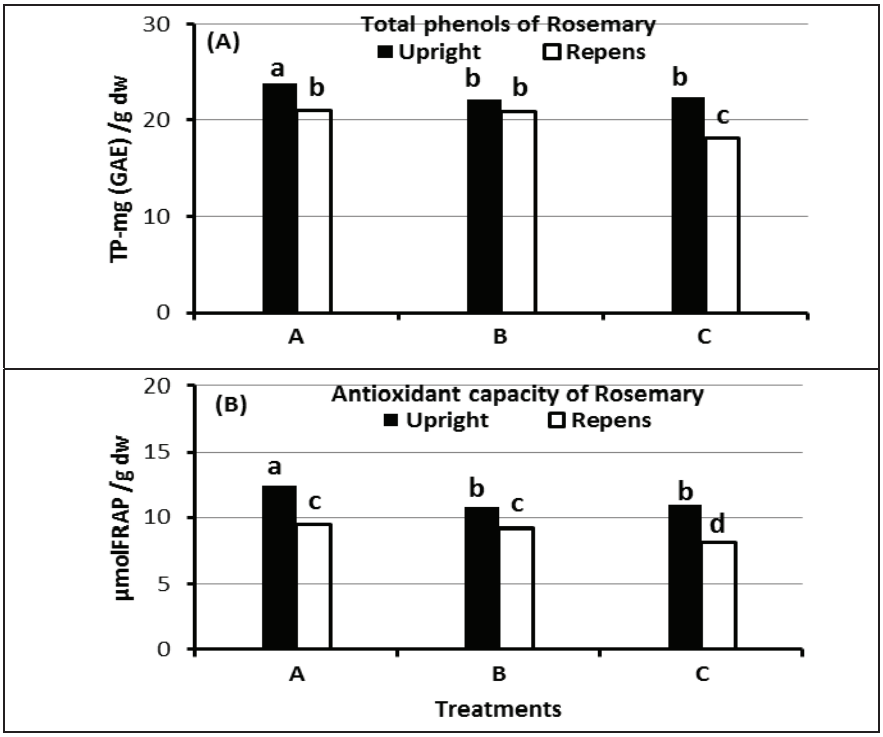

Figure 2. Total phenolic content (A) and antioxidant activity FRAP (B) of the Rosemary leaves according to variety and fertilization level. A: without fertilization; B: 100 Kg fertilization (N)/ha and C: 200 Kg fertilization (N)/ha. The letter above each bar gives differences between treatments according to Tukey's test (P=0.05).

Between the two varieties of rosemary with different treatments, the essential oil of the rosemary upright (Fig. 3) without fertilization showed greater content in total phenols, while the essential oil of the rosemary repens without fertilization showed the less content in total phenols.

The antioxidant capacity FRAP of the essential oils of rosemary (Fig. 3) which was measured in equivalents ascorbic acid was higher in the treatments of rosemary upright compared to the respective treatments of the rosemary repens.

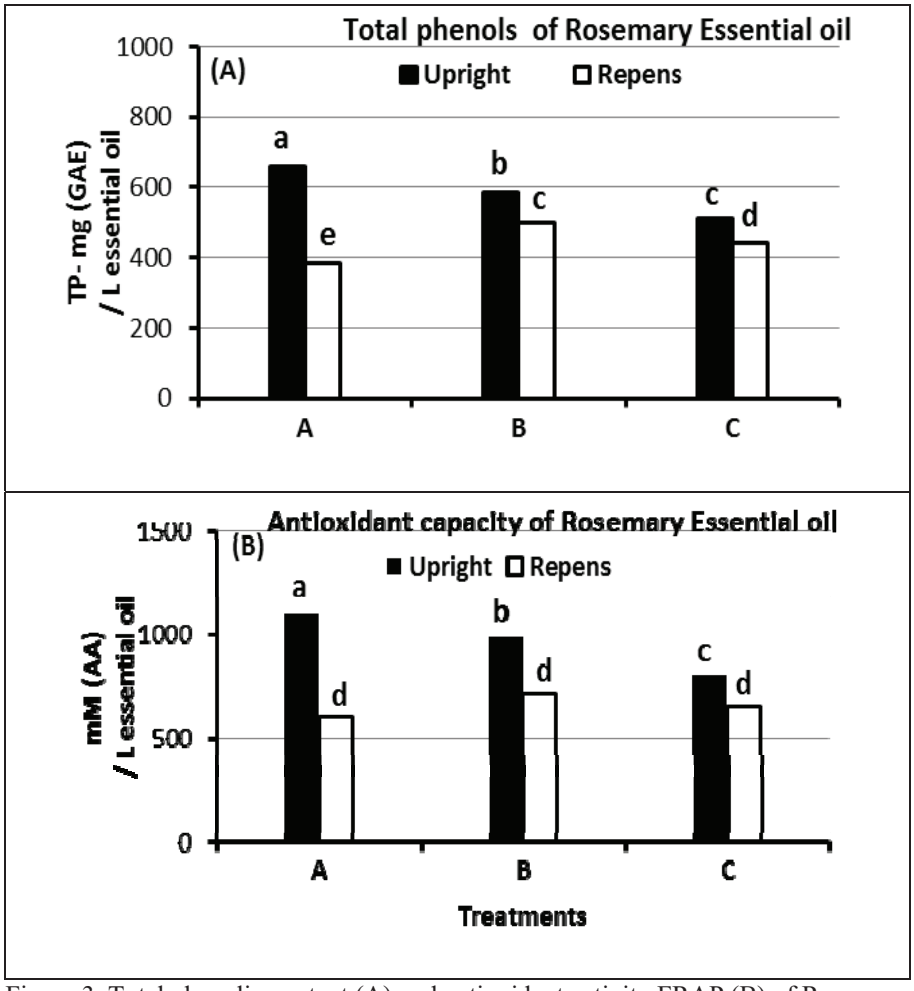

Figure 3. Total phenolic content (A) and antioxidant activity FRAP (B) of Rosemary essential oil according to variety and fertilization level. A: without fertilization; B: 100 Kg fertilization (N)/ha and C: 200 Kg fertilization (N)/ha. The letter above each bar gives differences between treatments according to Tukey's test (P=0.05)

CONCLUSIONS

The comparative study of the total phenol content and antioxidant capacity FRAP of the two varieties of rosemary (Rosemary Upright and Rosemary Repens), grown under the environmental conditions of Thessaly reveals their dependence on the variety and quantity of lubrication.

The results obtained show that the best sources of polyphenols with antioxidant capacity FRAP is the leaves of the rosemary upright, cultivated without fertilization. However higher yield in the dry drogue/ plant, was observed in the cultivation of the rosemary upright without fertilization and in the cultivation of the rosemary repens, without fertilization.

Essential oils yield of the Rosemary leaves was higher in all the treatments of rosemary repens compared to the treatments of rosemary upright.

Nevertheless, the essential oil of rosemary upright showed the best source of polyphenols with antioxidant capacity FRAP, particularly in treatment without fertilization.

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RESEARCH ON NUTRITIONAL-METABOLIC ADAPTATION IN COWS IN THE TRANSITION PERIOD

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Keywords: *transitional period, metabolism, ketosis, hypocalcemia*

ABSTRACT

The transitional period of cows defines the pass from pregnancy to lactation, including calving; is crucial not only for the future milk production of the animal, but also for its ability to maintain a healthy status. Clinical and paraclinical monitoring elucidated a part of a "metabolic disorder" specific to this period. By blood analysis performed we intended to evaluate metabolic status of the cows, explaining adaptation to this period.

Efforts focused mainly on increasing milk production line led to productive operational records but economic performances are correlated with important metabolic nutritional disorder (subclinical ketosis, paresis). Difficult to diagnose and often asymptomatic (stress, reduced fertility, low fat milk), metabolic disorders disturb the balance of economic performance. They are the consequence of reducing the nutritional spectrum in order to maintain homeostatic limits, as reflected in our results: high levels of proteins and urea and low levels of calcium and phosphorus.

INTRODUCTION

Cattle have socio-economic, biological and ecological importance: they provide a large amount of animal products of certain importance for household consumption and for industry. Cattle provide 96% of the total amount of milk consumed in the world, 33% of the meat and 90% of good quality heavy leather, which is used in manufacturing. Meat and meat products are important sources of energy, protein, minerals, vitamins, essential amino acids necessary for proper functioning of the human physiological mechanisms for maintaining health.

It can be estimated that an animal under normal conditions of use, can provide the optimum level of meat for 6-8 people and milk for 10-15 people. A liter of milk has nutritional value equivalent to 600 g beef, 750 g veal, 400 g pork, 500 g fish, 9 eggs, 100 g cheese, 125 g bread, 100 g honey, 1400 g apple, 2400 g cabbage.

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Cattle produce large quantities of manure - 8-12 tons / LU providing 70% of the organic fertilizer used in agriculture (one bovine gives 100 kg nitrogen per year, 20-30 kg phosphorus and 80-90 kg potassium).

The evolution of productivity is due to unconventional methods of reproduction, such as artificial insemination and embryo-transfer allowing contribution to the next generation with more individuals having higher genetic qualities.

A main contributor to the evolution of cattle breeds is nutrition, particularly nutrition-enriched feed comprised of various species, also improved themselves for maximum productivity. Efficient metabolism of energetic macromolecules derived from plant biodiversity, the selection of individuals with high yields of milk and meat, improved breeding technologies are fundamental factors that led to the creation of modern cattle breeds with great productive performance (Ionita 2014).

"The transition period" of cows, as it is called this passage (from 3 weeks before calving to 3 weeks after birth) is crucial not only for the future of the animal milk production, but also for its ability to maintain health status; it is the most difficult period of productive life of cows (Jorritsma 2002, Ingvartsen 2006).

Nutrition is one of the most important factors which determine a smooth transition from pregnancy to lactation state in cows.

General condition of the cow during the transition from pregnancy to maximum lactation state (8-10 weeks after birth) is not only conditioned by nutrition. There are other factors, called "risk factors", whose effects must be minimized in order to exacerbate synthesis functions, processes that will strengthen defense system against microbial agents.

MATERIAL AND METHODS

Casework under study differentiated depending on the physiological state, during the transition, 3 weeks before calving until three weeks after calving, considered very stressful period during a productive dairy cow life.

The success and profitability of dairy farms are synonymous with intelligent management of the farm. In the farm where we conducted experiments there is a software that allows monitoring the activity, production and health of dairy cows, which is downloaded to the central computer during milking.

For research we have established experimental protocols which consisted of grouping cows in physiological batches. Cows were monitored clinically (observation charts), biological samples (blood) were collected and the results were interpreted in the epidemiological context.

RESULTS AND DISCUSSIONS

In strengthening animal health, production and reproduction performances, feed is an important pillar. Metabolic disorders (ketosis, milk fever, acidosis) are, besides infections, among causes that temporary remove cows from production. Unconventional diet resulted in lower intake of vitamins, protein and mineral simultaneously with enrichment in carbohydrates. Only a good farm management, especially of the feeding and maintenance, prevents diseases based on metabolic disorders in dairy cattle.

Adaptation diseases are also facilitated by using feed that lends itself to automation (technological trailers), endorsed by the cows, hindering correct performance of rumination.

Through a rigorous selection they were created highly productive lines of individuals, ignoring yet the obtainment of copies adapted to process efficiently unconventional feed. It is one of the productive chain-intensive omissions that lead to

disordered metabolism of animals stimulated to increase production, but metabolic or nutritional diseases liable.

A valuable indicator of correlation between the biological potential of animals with breeding technology is the nutritional-metabolic status, profile (Eicher 2003).

Metabolic test has to be considered as part of the complex clinical and laboratory examinations of the livestock (Ghergariu 1995; Ioniță et al. 2011).

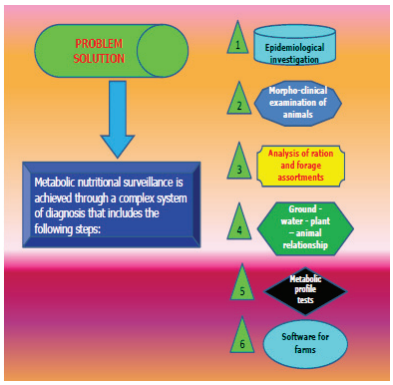

Figure 1. Complex diagnostic system in nutritional and metabolic diseases (after Ioniță L. et al. 2011)

In terms of etiopathogenesis, nutritional and metabolic diseases in animals can evolve in stages as follows:

-Stage of energy disorders, elusive and only through alternative and complementary methods;

-Stage of nutritional disorders, which can be highlighted based on biochemical tests;

-Stage of nutritional disease that encompasses clinically symptoms;

-Stage of metabolic disease that can be a complication of the nutritional disease

In our research we have conducted a thorough epidemiological investigation that sought to identify the main risk factors involved in nutritional and metabolic disorders.

Metabolic test was designed by Payne et al. (1970) to monitor the metabolic health status and comprises: determination of glucose, inorganic phosphorus, calcium, magnesium, sodium, potassium, albumin, globulin, hemoglobin etc.; further the profile was expanded to include non-esterified fatty acids determination and beta-hydroxybutyrate (Goff 2000; Jorritsma 2002, Kida 2002, 2003).

In order to obtain an initial test, values obtained from 6 laboratories were getting together. Each parameter included in the metabolic profile has an important role in animal health because of the negative impact of an element deficiency; toxicity etc. could have on the health status.

Basically, for this metabolic profile test we conducted measurements in 3 physiological categories included in the transitional period. We present data on the variation of blood biochemical parameters investigated by us (table 1).

The analysis of data comparing to physiological values showed hypoglycaemia, moderate hyperproteinemia (increased albumin and decrease of gammaglobulins), increase in urea, hypocalcemia and hypophosphoremia. The most important changes are registered in cows at 5 - 7 days postpartum and 30 days postpartum.

Table 1

Changes in blood biochemical parameters in cows during the transition period

Category (mean)	Glucose	Proteins	Albumins	Globulins	Urea	Ca	P
	mg/dL	g/dL	g/dL	g/dL	mg/dL	mmol/L	mmol/L
Physiological value	62±12	7.6±0.6	3.4±0.5	4.2±0.1	30±10	9.5±0.57	6.1±0.55
Cows 5-7 days antepartum	40.76	7.48	4.1	3.38	37.28	2.86	1.66
Cows 14 days postpartum	47.04	7.78	3.9	3.88	51.86	5.37	2.97
Cows 30 days postpartum	48.72	8.14	4.4	3.64	48.94	5.32	4.36

Blood sugar levels in ruminants are lower than in other species because they do not absorb glucose from food and they are lower in adult bovine animals than in calves. Hypoglycemia occurs in dairy cows with ketosis and newborn calves that have diarrhea, sepsis or are malnourished.

The protein in blood is in a dynamic equilibrium with the proteins of the liver and in other tissues. The liver is responsible for the biosynthesis of albumin, coagulation factor protein, the enzymes and a-1, -2 and β globulins, etc.

High blood urea arise where there are differences between energy and protein fractions from the rumen. They lead to the formation of excess ammonia that is absorbed through the rumen wall. Hence, it is directed to the liver where it is converted to urea (this is because it is less toxic for the animal). This process is done with additional energy.

Hypocalcemia, the most important aspect of this transition period is a hidden "disease". Only 2% of hypocalcaemia are expressed clinically; hypocalcaemia is in generally subclinical and may reach up to 45% of the effective. Because of this, it is quite difficult to diagnose it. The diagnose of hypocalcemia in a herd is done by analyzing serum calcium in multiparous cows at 12 to 24 hours after birth. The level alarm occurs if the percentage of positive results (≤8,0mgl / dl) exceeds 30%. Serum calcium and phosphorus levels are interrelated and influenced by homeostatic mechanisms and plasma pH.

CONCLUSIONS

To overcome this transitional period, we propose the following:

-monitoring body status;

-administration of the best quality feed during the transition period;

-administration of hyper-energetic rations, especially insulinogenic to stimulate the emergence of the first cycle in the first 60 days after calving;

-monitoring the metabolic profile for balancing energy-protein rations;

-optimizing minerals in preparation of calving.

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Seria: ✔*Biologie*
✔*Horticultură*
✔*Tehnologia prelucrării produselor agricole*
✔*Ingineria mediului*

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150 DE ANI DE LA NAŞTEREA PROFESORULUI IOAN HĂŞEGANU, PRIMUL PREŞEDINTE AL SOCIETĂŢII DE HORTICULTURĂ DIN ROMÂNIA

Glăman Gh.
Preşedintele Societăţii Române a Horticultorilor

Majoritatea dintre dumneavoastră cunosc că Societatea Română de Horticultură (S.H.R.) a luat fiinţă în anul 1913. Amănuntele începutului le regăsim în cuvântarea rostită de Charles Faraudo, în faţa foştilor membrii a Societăţii de Horticultură din România (S.RH.), denumire luată la înfiinţare, care s-au reunit în ziua de 10 octombrie 1963 pentru a sărbătorii 50 de ani de la înfiinţarea societăţii şi a comemora şi a aduce un pios omagiu celor dispăruţi între timp.

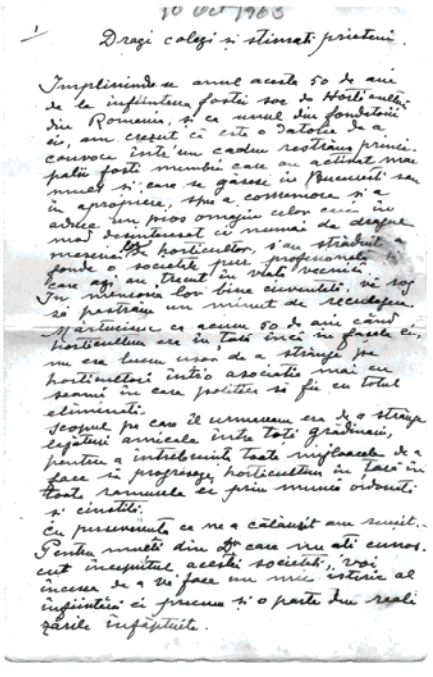


Foto 1

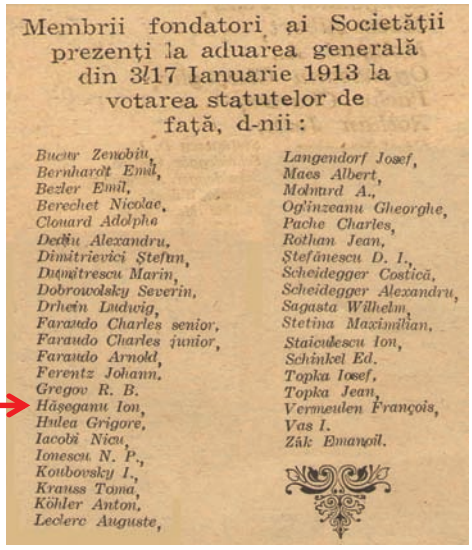
Redau câteva rânduri din această cuvântare (Foto 1), făcând menţiunea că textul integral se regăseşte în lucrarea „*Monografia Societăţii Române a Horticultorilor (1913-2013)”.*

Cum am spus, începutul nu a fost deloc uşor deoarece toţi aşteptau ca societatea să facă minuni şi a trebuit ca Preşedintele Societăţii I. Hăşeganu să pună toată verva lui de comedian povestind fel de fel de snoave pentru a atrage din când în când întrunirea membrilor. De altfel, la acea epocă horticultorii fiind necunoscuţi, aveau nevoie de a fi introduşi şi sprijiniţi de persoane simandicoase. Bietul Hăşeganu, din fire timid în astfel de împrejurări, m-a luat cu dânsul să-l însoţesc; dar timiditatea mă cuprindea şi pe mine care eram mai tânăr şi neobişnuit cu aşteptările în anticameră.

De câte ori aveam să mergem împreună trebuia, conform obiceiurilor din acea epocă, să fim îmbrăcaţi protocolar cu redingotă, guler înalt, cravată neagră, ghete de lac şi mănuşi. Ne vorbeam înainte parcă repetam o piesă de teatru sub direcţia lui Hăşeganu, care începea şi eu terminam. Ceea ce ne încuraja era faptul că peste tot am găsit pe lângă bucuria de a vedea o grupare nouă de muncitori horticultori şi o bunăvoinţă de a satisface solicitările noastre, de altfel foarte modeste.

Toate societăţile nonguvernamentale au fost interzise prin Legea naţionalizării nr. 119/1.07.1948, art. 1. Întâlnirea s-a ţinut, practic, în condiţii de ilegalitate, în casa lui Anton Dimitrievici, mulţi ani membru în conducerea S.H.R.

Lista celor 25 de participanţi: Dl. Anton Dimitrievici, Dl. Coracin, Dna. Ştefan Dimitrievici, Dl. Teodor Constantinescu, Dna. Anton Dimitrievici Jr., Dl. Emil Brudariu, Dl. Anton Dimitrievici Jr., Dl. Brudariu – fratele Dl. Ernest Grinţescu, Dl. Manole Bulboacă, Dna. Ernest Grinţescu, Dl. Mişu M. M. Georgescu, Dl. Vlad Manoliu, Dl. C. Faraudo, Dl. Prof. I.C. Teodorescu, Dna. E.C. Faraudo, Dna. I.C. Teodorescu, Dl. S. Mantopol, Dl. Prof. Dimofte, Dl. Marin Turcu, Dna Dimofte, Dl. Vena Topka, Dl. Manilici. Dl. Costel Constantinescu, Dna. Manilici.


Membrii fondatori ai Societăţii prezenţi la aduarea generală din 3/17 Ianuarie 1913 la votarea statutelor de faţă, d-nii:

Bucur Zenobiu,
Bernhardt Emil,
Bezler Emil,
Berechet Nicolae,
Clouard Adolphe
Dediu Alexandru,
Dimitrievici Ştefan,
Dumitrescu Marin,
Dobrowolsky Severin,
Drhein Ludwig,
Faraudo Charles senior,
Faraudo Charles junior,
Faraudo Arnold,
Ferentz Johann,
Gregov R. B.
Hăşeganu Ion,
Hulea Grigore,
Iacobi Nicu,
Ionescu N. P.,
Koubovsky I.,
Krauss Toma,
Köhler Anton,
Leclerc Auguste,
Langendorf Josef,
Maes Albert,
Molnard A.,
Ogl'inzeanu Gheorghe,
Pache Charles,
Rothan Jean,
Ştefănescu D. I.,
Scheidegger Costică,
Scheidegger Alexandru,
Sagasta Wilhelm,
Stetina Maximilian,
Staicudescu Ion,
Schinkel Ed.
Topka Iosef,
Topka Jean,
Vermeulen François,
Vas I.
Zăk Emanoil.

Foto 2

Alţi 7 membrii nu au putut participa scuzându-se prin scrisori, astfel: prof. dr. Alexandru Borza, Teodor Cocalcu, fraţii Alexandru şi Dumitru Stroe, Mihai Costetzki (în spital), Grigore Constantinescu (plecat la Iaşi) şi Louis Faraudo (refugiat în Elveţia). Scrisoarea originală se regăseşte în arhiva S.R.H., prin bunăvoinţa domnului Marcel Faraudo, azi cetăţean argentinian, fiul lui Louis Faraudo şi nepot al lui Charles Faraudo. Fac precizarea că a fost prezent la cele de-al XI-lea Congres Horticol, organizat de societatea noastră cu prilejul sărbătoririi centenarului, în ziua de 29 octombrie 2013.

Începuturile au fost făcute de 41 de horticultori fondatori, care au votat primele *Statute* la 3/13 februarie 1913 (Foto 2).

Odată cu votarea primelor Statute, a fost aleasă şi conducerea societăţii, după cum urmează: prof. Ioana Hăşeganu – preşedinte, prof. Dumitru I. Ştefănescu – vicepreşedinte şi Charles Faraudo jr. – trezorier. (Foto 3)


Preşedinte
Prof. Ioan Hăseganu


Vicepreşedinte
Prof. D.I. Ştefănescu
(1882-1926)


Trezorier
Charles Faraudo Jr.
(1882-1980)

Foto 3

În această perioadă de început, au reuşit ca în anul 1915 să organizeze prima noastră *Expoziţie de flori*, în localul Tinerimii artistice. De la manifestare avem în arhivă un album de fotografii, ca urmare a donaţiei doamnei Monica Vlad. Aveau să urmeze alte 11 expoziţii horticole în perioada 1922 – 1936. Cea de a XII-a Expoziţie Horticolă, a avut loc între 31 octombrie şi 4 noiembrie 1936 şi a fost ultima din acea perioadă, ca urmare a crizei internaţionale şi a războiului. După reînfiinţarea societăţii în anul 1991, sub titulatura de *Societatea Română a Horticultorilor* s-a reluat tradiţia, cea de-a XIII expoziţie, realizându-se la Murfatlar, în anul 1993 cu prilejul sărbătoririi celor 80 de ani de la înfiinţarea societăţii. Ulterior, aşa după cum ştiţi, din cinci în cinci ani S.R.H. a organizat atât Congrese Horticole cât şi expoziţii.

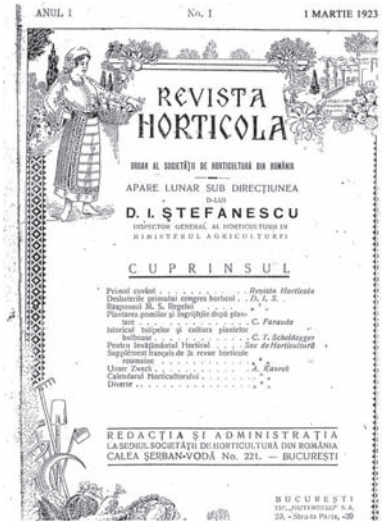
În anul 2013, cu prilejul împlinirii a 100 de ani de înfiinţarea societăţii, s-a organizat în Aula Magna a Academiei de Ştiinţe Agricole şi Silvice, cele de-al XI-lea Congres Horticol şi cea de-a XVI-a expoziţie horticolă, pentru sărbătorirea centenarului. Cu acest prilej, Preşedintele României Traian Băsescu a ţinut o apreciată cuvântare şi a acordat S.R.H. distincţia *Meritul Agricol*. Facem precizarea că este a doua distincţie de acest nivel, prima fiind acordată de Regele Ferdinand în anul 1928, cu prilejul jubileului de 25 ani de la înfiinţarea societăţii.

Foto 4
Preşedintele de onoare al SRH, prof. dr. doc. Nicolae Ştefan,
primind în numele Societății Ordinul "Meritul Agricol"

Revenind la Ioan Hăşeganu şi activitatea sa pusă în slujba horticulturii şi S.H.R.. Cu tot efortul, datele de care dispun, cel puţin până astăzi, sunt relativ puţine. Acest lucru se datorează şi faptului că organul de presă al S.H.R. – **Revista Horticolă** a apărut în primul său număr în martie 1923 (foto 5), din această cauză datele privind activitatea societăţii între 1913 şi 1922 fiind reduse.

Din numărul 181 al revistei, în articolul „*Cu ocazia jubileului Societății de Horticultură”*, aflăm despre nemulţumirea preşedintelui *Ioan Hăşeganu* privitoare la activitatea societăţii şi cu integritatea morală unanim recunoscută, a considerat că este că este mai bine „*...să lase preşedinţia pe seama horticultorilor* ***proprietari de întreprinderi grădinăreşti*** *astfel a urcat pentru un timp la preşedinţie Dl. Jean Rothan, horticultor cu vază şi cu reputaţie...”*

Din păcate, nici din articolul citat şi nici din alte surse, nu am putut stabili perioada în care Jean Rothan (Foto 6) a fost preşedinte. Îl regăsim în lista membrilor fondatori. Ştim


ANUL I — No. 1 — 1 MARTIE 1923

REVISTA HORTICOLA

ORGAN AL SOCIETĂŢII DE HORTICULTURĂ DIN ROMÂNIA

APARE LUNAR SUB DIRECŢIUNEA D-LUI

D. I. ŞTEFANESCU

INSPECTOR GENERAL AL HORTICULTURII ÎN MINISTERUL AGRICULTURII

CUPRINSUL

Primul cuvânt . . . . . Revista Horticolă
Deschiderea primului congres horticol . . D. I. Ş.
Răspunsul M. Ş. Regelui . . . . .
Plantarea pomilor şi îngrijirile după plantare . . . . . C. Faraudo
Istoricul bulgărelor şi cultura plantelor bulboase . . . . . C. T. Scheletzger
Pentru învăţământul Horticol . . . Soc. de Horticultură
Supplément français de la revue horticole roumaine . . . . . .
Unser Zweck . . . . . A. Kaserer
Calendarul Horticulturistului . . . . . .
Diverse . . . . . .

REDACŢIA ŞI ADMINISTRAŢIA LA SEDIUL SOCIETĂŢII DE HORTICULTURĂ DIN ROMÂNIA CALEA ŞERBAN-VODĂ No. 221. — BUCUREŞTI

BUCUREŞTI

Foto 5

că este creatorul *Parcului din Mamaia*, că avea cea mai frumoasă florărie din Bucureşti în Piaţa Regală şi că era furnizorul de flori tăiate al Casei Regale.

După necazurile provocate de marea criză economică şi de pierderea mai multor membrii pe front în primul război mondial, lucrurile încep, încet, încet, să se aşeze în ţară. În anul 1922 horticultorii s-au regrupat ca urmare a eforturilor depuse de trezorierul societăţii Charles Faraudo. Acesta a şi fost ales preşedinte în anul 1922. Ioan Hăşeganu a acceptat funcţia de vicepreşedinte, funcţie onorată în perioada 1922 – 1926, an în care ca urmare a unor probleme de sănătate, s-a retras şi a fost numit preşedinte de onoare. În locul lui, a fost ales vicepreşedinte *Ion Păsculescu – Buftea*, proprietarului renumite pepiniere de la Buftea.

Dar cine era Ioan Hăşeganu? S-a născut la data de 15 octombrie 1865. A absolvit Şcoala Superioară de Agricultură de la Herăstrău (1882 – 1885), ocupând locul 3. Ulterior a absolvit Conservatorul de Artă Dramatică din Bucureşti (1885 – 1888). Ca urmare a talentului său actoricesc a debutat şi jucat în mai multe spectacole pe scena Teatrului Naţional din Bucureşti. Din cauza unei boli la plămâni, a fost nevoit să renunţe la cariera de actor, întorcându-se la prima dragoste, horticultura. Primeşte o bursă şi pleacă în Franţa, unde timp de 3 ani urmează cursurile vestitei Şcoli de Horticultură de la Versailles (1889 – 1892). Întors în ţară este numit Şef al grădinii Mogoşoaia a principelui Bibescu, unde îşi va desfăşura activitatea până în anul 1896. În acest an, Ministerul Agriculturii îl avansează inspector general. În anul 1914 este numit Şef al Grădinilor Publice din Bucureşti, care până la reorganizarea lor în anul 1923, în Casa Grădinilor Publice din Capitală, unele erau în adiministrarea M.A. altele aparţinând de Primăria capitalei. La nou înfiinţata instituţie Ioan Hăşeganu a fost numit director. Preşedinte al Consiliului de Administraţie a fost numit generalul Livezeanu.

Foto 6

În paralel cu activitatea de organizare şi conducere, Ioan Hăşeganu a avut o atracţie deosebită spre educarea tinerilor, spre o horticultură în care ei folosindu-se de noile cunoştinţe să-şi profitabilizeze exploataţiile. Stă mărturie *Şcoala de ucenici* înfiinţată de el, pe cheltuială proprie, la Grădina Mogoşoaia, de pregătirea cărora s-a ocupat personal începând din anul 1902.

De aici, până la activitatea didactică nu a mai fost decât un pas. Şcoala de Silvicultură de la Brăneşti (lângă Bucureşti) îl solicită să susţină Cursul de **Horticultură**, pe care îl onorează în perioada 1905 – 1911. În anul 1911 este rugat să preia *Conferinţa de Horticultură la Şcoala Superioară de Agricultură de la Herăstrău***,** pe care o va servi în chip strălucit până la sfârşitul vieţii (1926), în 26 ianuarie 1927 survenind decesul marelui Horticultor.

Foto 7

Meritele sale didactice, dar şi de organizator şi conducător sunt recunoscute în anul 1925, an în care a fost numit director al nou înfiinţatei *Şcoli de Horticultură de Gradul II de la Băneasa, Bucureşti* (şcoală medie). Pe scheletul şi în localul acesteia s-a înfiinţat în anul 1948 cu prilejul reorganizării învăţământului, Facultatea de Horticultură din Bucureşti. Adăugăm aici că pentru înfiinţarea unei şcoli superioare de Horticultură, Societatea de Horticultură din România a militat încă de la cel de-al doilea Congres al său (26 -28 august 1923), problema fiind reluată cu fiecare prilej, făcându-se nenumărate intervenţii. De altfel Ioan Hăşeganu, Dumitru I. Ştefănescu, Charles Faraudo au fost permanent printre cei care au cerut, susţinând cu date şi informaţii, necesitatea unei şcoli care să aducă horticultura românească pe o nouă treaptă şi care să poată să rezolve profesionist cererea tot mai mare de produse horticole, mai ales în oraşele în continuă dezvoltare. Lipsurile de produse horticole atât pentru armată, cât şi pentru populaţie din timpul celui de-al doilea război mondial, aveau să constituie un semnal de alarmă serios pentru oficialităţi, care în sfârşit au aprobat înfiinţarea acestei prime şcoli medii. În sediul acesteia se află azi Institutul Naţional de Cercetări pentru Mecanizarea Agriculturii. În faţa clădirii se află profesorului Dumitru I. Ştefănescu, care în calitatea sa de director al nou înfiinţatei *Direcţii de* Horticultură (1925), a alocat în bugetul direcţiei primele sume pentru începerea lucrărilor. Din păcate importurile de aproape 600 de milioane de euro din anul 2014, demonstrează că nici azi problematica horticulturii nu este tratată serios de politicieni şi guvernanţi. Se pare că e o problemă care din păcate s-a transmis în timp. Îmi aduc aminte că în anul 1986 am avut o lipsă de varză de toamnă de circa 7-8 zile, Ceauşescu a aflat şi chemându-mă mi-a spus textual: „... ce dracu tovarăşe Glăman nici legume nu avem...” L-am informat că nu legumele lipsesc şi că deja s-a remediat problema verzei. Dar mentalitatea e că pot să lipsească altele, dar nu legumele, m-a surprins neplăcut. Ion Hăşeganu, împreună cu colegii săi din S.H.R.: Dumitru Ştefănescu, Ernest Grinţescu şi Charles Faraudo au fost numiţi de Ministerul Agriculturii să întocmească ***Programa Şcolară*** pentru această nou înfiinţată unitate de învăţământ. Din păcate boala necruţătoare a făcut ca la conducerea atât de doritei Şcoli să nu poată fi decât în perioada 1 octombrie 1925, până în ziua neagră de 26 ianuarie 1927.

Foto 8

Cu toate că era extrem de ocupat, a fost printre promotorii şi conferenţiarii de la **Cursurile practice de Horticultură**, organizate de S.H.R. pentru bucureşteni, în condiţii de voluntariat,

începând din anul 1924 (12 conferinţe pe an). Cursurile teoretice se ţineau de regulă în Pavilionul Regal, din Parcul Carol I, iar cele practice în stabilimentele de vârf ale membrilor S.H.R., în zilele de duminică (Foto 7).

Profesorul Ion Hăşeganu a avut şi o bogată activitate publicistică, mai ales în organul de presă al S.H.R. „Revista Horticolă" (Foto 5) dar şi în celelalte reviste cu profil agricol dintre care amintim: Revista Câmpul, Revista Agricolă Viticolă Horticolă, Revista Horticolă Economică şi Financiară, ş.a. A scris cursurile de horticulutură pentru cele trei unităţi de învăţământ la care a conferenţiat.

Cartea „*Grădina de legume*", publicată în două ediţii 1902 şi 1912 (Foto 8), avea să fie mult timp lucrarea de bază pentru toate şcolite de profil din ţară. Să nu uităm că prin Legea învăţământului din anul 1901, lege care poartă numele profesorului Spiru Haret, s-au înfiinţat şcoli cu profil horticol, s-au introdus noţiuni de învăţământ agricol în şcolile primare din mediul rural, în cele normale care pregăteau învăţători, în seminariile ce pregăteau preoţii, care în majoritate urmau să slujească în bisericile din mediul rural şi chiar în unele licee, în care s-au înfiinţat catedre de agronomie. Tot din anul 1902 s-a înfiinţat corpul *învăţătorilor publici ambulanţi*, care ţineau cursuri în zilele de duminică şi sărbători legale, după un program bine stabilit. Pentru toţi lucrarea lui Ion Haşeganu a fost un preţios şi recunoscut îndrumar. Noi, după peste 100 de ani ce avem în materie de consultanţă? Ce avem în pregătirea practică practică de nivel mediu.

Mentorul horticultorilor de la începutul secolului XX, Ioan Hăşeganu, avea să-şi părăsească familia şi prietenii la numai 62 de ai, în seara zilei de 26 ianuarie 1927 (ora 23), după o scurtă şi grea suferinţă. Corpul defunctului a fost depus la Biserica Mavrogheni, iar înhumarea a avut loc în ziua de 29 ianuarie 1927, orele 2 p.m. la *Cimitirul Sf. Vineri***.**

Adânc întristaţii, Elena, soţie, Ionel şi Aurelia, fiu şi noră, Eugeniu, fiu, Niculae şi Elena Băilescu, frate şi cumnată cu copiii, Samuil şi Paraschiva frate şi soră, Eleonora Abodi, soacră, precum şi familiile, Cionca, Abodi, Karl Weinlich, I. Wackernell, Pfeiffer şi Huyer, au nemărginita durere de a aduce la cunoştinţă încetarea din viaţă a preaiubitului lor

Ion Hăşeganu

Consilier Agronom, Profesor la Şcoala Superioară de Agricultură. Directorul Şcoalei Medii de Horticultură din Bucureşti

Săvârşit în ziua de 26 Ianuarie a. c., orele 11 seara după o scurtă şi grea suferinţă, în etate de 62 ani.

Corpul defunctului se află depus în Biserica Mavrogheni (str. Monetăriei-Şosea), unde se va oficia Serviciul religios în ziua de Sâmbătă 29 Ianuarie, orele 2 p. m., după care cortegiul va porni la Cimitirul Sf. Vineri.

Aceasta ţine loc oricărei alte înştiinţări. 2f

Foto 9

Amănuntele sunt preluate din anunţul publicat de soţia sa Elena, împreună cu familia, în ziarul *Universul* din data de 27 ianuarie 1927. În acelaşi ziar au fost postate mai multe anunţuri privitoare la trecerea în nefiinţă a acestuia, dintre care am reţinut, pe cele ale: Societăţii de Horticultură din România, Şcolii Superioare de Agricultură din Bucureşti, profesorii şi elevii Şcolii Medii de Horticultură din Bucureşti, Casei Grădinilor Publice din Capitală, Societatea Funcţionarilor Ministerului Agriculturii şi Domeniilor ş.a.

Regretul pentru pierderea celui ce şi-a închinat viaţa afirmării horticulturii şi horticultorilor s-a putut constata şi din marele număr de foşti prieteni, colegi şi elevi care l-au însoţit pe ultimul drum în tragica zi de 29 ianuarie 1927. La catafalc au rostit emoţionate cuvinte de despărţire Subsecretarul de Stat în M.A.D. *Busuiocescu* şi preşedintele S.H.R. *Charles Faraudo*, care cu lacrimi în ochi i-a aşezat pe sicriu o frumoasă coroană de flori, din partea colegilor. Au rostit pioase discursuri şi E. Grinţescu, Constantin Sandu Aldea, N. Iacobescu, Cl. Chiriţoiu, N. Dăscălescu, Cristofor I. Gheţu, Staicu Irimia şi Generalul Livezeanu. Am preluat din ***Revista Horticolă*** nr. 49 (martie 1927), extrase din 5 cuvântări, pe care le găsiţi redate integral în lucrarea mea „Monografia Societăţii Române a Horticultorilor (1913 – 2013)," din care redau aici numai câteva rânduri din acestea, din motive de spaţiu.

Crescut în aspra școală a muncii, Hășeganu n'a ştiut ce e odihna.

Ca profesor de horticultură era strălucit. Vorba lui caldă, colorată, vioaie, prindea atenția auditoriului și convingea. Lecțiile lui erau o desfătare, iar aplicațiile pline de învățături bune cum e plin fagurul de miere.
Ca om Hășeganu era de o desăvârșită cinste, discreție și gingășie: el n'a jignit pe nimeni nici odată.
Și de aceia amintirea lui va rămâne în sufletele noastre ca o dulce mireasmă de câmp.
Constantin Sandu Aldea, ***Directorul Şcolii Superioare de Agricultură de la Herăstrău, în trei mandate: 1908 – 1911, 1911 – 1914; 1919 – 1927***
Pe sicriul tău, iubite Hășeganu, aduc omagiile întregii horticulturi românești, care pierde pe bunul său sfetnic, iar Societatea de Horticultură din România îți va păstra o eternă amintire și roagă pe Bunul Dumnezeu să întărească sufletele acelora din sânul cărora te-ai despărțit.
Charles Faraudo, ***Preşedintele Societății de Horticultură din România***
Ne-a învățat să iubim și să îngrijim pomii și florile „prieteni reci, dar sinceri" după cum le spunea și iată acum florile recunoscătoare, îl petrec ca și noi la ultimul locaș, iar pomii îți vor pleca coroana lor în semn de doliu, plângându-și florile de zăpadă pe mormântul său.
Staicu Irimia, ***Profesor al Şcolii Medii de Horticultură de la Herăstrău***
Iubite Hășeganu, acum când dispari pentru totdeauna dintre noi, întregul personal al Casei Grădinelor Publice din Capitală, pe care l-ai condus cu atâta pricepere și bună voință un lung șir de ani, prin mine, își ia ultimul adio de la tine și te asigură că vor păstra pe veci în inimile lor imaginea ta bună, sinceră și neprețuită și roagă pe Bunul Dumnezeu să te așeze în ceata drepților, căci numai acolo meriți să stai.
Generalul Livezeanu, ***președintele Casei Grădinelor Publice din Capitală***
Peste groapa în care doarme Ion Hășeganu, vă rog să nu puneți banalele și oribilele coroane de hârtie și mătase colorată; ar fi o povară prea grea pentru sicriul acestui amant al florilor. Ba, nici flori naturale.
Aruncați peste lutul proaspăt numai sămânța regretelor voastre.
Sunt încredințat că, din fundul mormântului, Hășeganu va face să răsară în primăvara apropiată cele mai magnifice varietăți pe cari un botanist le-a visat vreodată... Era așa de meșter!
George Raneti, ***ziarist „Universul"***

Ziua de astăzi să o considerăm ca un pios omagiu adus primului președinte al Societătii de Horticultură din România, si să încercăm fiecare să-i aducem cinstirea cuvenită prin activitatea noastră.

Seria: ✓*Biologie*
✓*Horticultură*
✓*Tehnologia prelucrării produselor agricole*
✓*Ingineria mediului*

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