Seria: ✓ *Biologie*
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STUDIES CONCERNING THE FACTORS THAT DECIDE THE QUALITY OF RED WINES, OBTAINED IN OLTENIA'S VINEYARDS

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KEY WORDS: Factors, Vocation, High Quality Wines, Controlled Appellation of Origin

ABSTRACT

For each viticultural wine growing habitat from Oltenia-Romania, we established the profile of the predominant soil, and we determined the physical-chemical characteristics of the obtained wines. Using the metodology of multicriterial delimitation in ecological concept of the viticultural areals of obtaining high quality COD products we traced in Oltenia-Romania, the habitats of five names of controlled origin: Banu Maracine, Segarcea, Mehedinti, Dragasani, Samburesti.

INTRODUCTION

There are few the countries, like Romania, that can produce wine of very good quality, but there is a smaller number of capable countries, like Romania, to produce, to the highest level of quality, the entire range of wines that can be made out of grapes – white and red, dry – semidry or sweet – licorice, exceptional muscatel or frothy wines.

The multiple microclimates and types of soil found in the wine-growing regions of Oltenia, but also the complete range of the types of wine (white, red, aromatic), distillate of wine and table grapes and raisins that can be obtained, constitute arguments that Oltenia to be named a true minimalist wine-growing Romania. The wine-growing habitats in Oltenia, have represented and still represent between 15-20% of the national wine-growing patronage, the quality red aromatic wines assuring over 40% of the national balance of wines that belong to this category.

In this paperwork, we wanted to define the wine-growing habitats of Oltenia-Romania, that has vocation for obtaining red quality wines with controlled origin denomination.

MATERIALS AND METHODS

In order to express the oenological vocation of a wine-growing habitat, we established the value of the (A) oenoclimatic aptitude index, which is given by the sum of the temperature degree (T) and the hours of effective sun exposure (I), in the vegetative

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period (01.04-30.09), correlated by the subtraction of the precipitation excess (P-250) at the same period: A=T+I-(p-250)

Catching the most favorable premises for the development of grape maturation, in conditions safe from hygrometric hardness, it was possible by monitoring the climatic characteristics in the months of grape harvesting and wine-making (September and October).

For each wine-growing habitat, there were identified the dominant types of soil and, there were determined the characteristics of composition of the obtained wines, using methods agreed by O.I.V. adopting the multi criteria methodology of quality wines with controlled origin denomination (C.O.D), we defined for the area of Oltenia, five names of controlled origin like: Dragasani, Banu Maracine, Samburesti, Segarcea, Mehedinti).

RESULTS AND DISCUSSIONS

Based on the ecopedoclimatic studies of the Romanian vineyards, these wine-growing areas were included in the wine-growing zones of the European Union (Law 244/2002). The wine-growing habitats of Oltenia-Romania belong to the wine-growing regions of CI(a)-Banu Maracine, Dragasani, Corcova, Samburesti and CII-Mehedinti Severin, Mehedinti-Vanju Mare, Mehedinti-Plaiurile Drancei, Segarcea. Wine-growing habitats that belong to the wine-growing region CI(a) are used mainly to obtain quality wine, especially red and aromatic white ones. The ones that belong to the CII, are used to obtain red wines of high quality.

Based on the oenoclimatic aptitude index (A), there were made hierarchies of all wine-growing spaces of Oltenia-Romania (table 1).

One can notice that the wine-growing habitats of Oltenia belong to different oenoclimatic areas, depending on their geographical placement, but more importantly by the sum of the temperature degrees (T), the hours of sun brightness and the precipitations that were in the period of vegetation (01.04-30.09). To the oenoclimatic area A0, belongs the habitat of Polovragi-Dobrita, the oenoclimatic aptitude index is of de 3978, assuring favorable conditions to obtain quality dry white wines. The wine-growing centers of Tg. Jiu and Ramnicu Valcea, belong to the A2 oenoclimatic area, with a value of the oenoclimatic aptitude index between 4437 and 4500, giving the chance to obtain mainly white wines, and secondly quality red wines.

The great majority of the wine-growing habitats of Oltenia-Romania, belong to the oenoclimatic A3 hill area and A3 meridian hill, that beneficiate of lots of warmth and light, lack of some excess precipitation, long sunny autumns and with no thermal stress. The most elevated values of the temperature degrees and effective sun exposure sums are registered in the wine-growing habitats of Mehedinti. The oenoclimatic aptitude index value reaches quotes between 4627 and 4939, offering the possibility to obtain red wines, white semidry wines, sweet ones, liquory, aromatic wines, of the highest quality.

There can be observed that in the wine-growing habitats of Oltenia-Romania, in the important step of maturing process definition of the grapes (table 2), dominates a favorable time, with moderate temperatures, that do not create difficulties, either by excess, or insufficiency, both to the process of maturation definition and over maturation of the grapes and, to the harvesting and fermentation development during the wine-making process. In their turn, the small precipitation and the quite sunny time, represent also favorable premises for the realization of less depreciated harvests. The hottest month of the year is July, after which, the temperatures begin to decrease, more slowly in august and, faster in September and October, this way creating some of the most favorable premises for the unfolding of grapes maturation, in the conditions of bigger and bigger safety from the hygrometric hardness, the more the skin of the grape gets thinner the more the grape itself gets more vulnerable. Generally, the precipitations also know a decreasing influence, starting with the month of august and decreasing more in September and October, fact that positively contributes to keeping good sanitary state of the harvest, this way preventing mostly the grey grape rot to appear.

The types of soil predominant in the wine-growing habitats of Oltenia are among the most preferred by the vine, deep soils, with sufficient porosity, big tampon capacity, sufficiently well supplied. The soft and hot soils, rich in lime, made out of river gravel are often encountered in the wine growing habitats of Vanju Mare-Orevita, Oprisor and Corcova. The forest red brown ones are dominant in Banu Maracine-Craiova, and the brown soils and red brown forest ones, some averagely podzolite, rich in lime, situated on the river gravel, there are found in the great wine-growing region of Dragasani, where the massive plantation occupies a length of over 60 km, the slopes of 3 rounds of hills parallel to the Oltul.

To Samburesti, where there are obtained the most known red wines like Cabernet Sauvignon of Romania, there are predominant the forest red brown soils, while to Segarcea, on rendzinic-lime soils are produced exceptionally red wines from Pinot Noir.

As a natural consequence of the geographical position, of the climatic characteristics and the very physical-chemical features of the types of soil present in the wine-growing habitats of Oltenia-Romania, there were obtained along the years, veritable red wines (table 3), which distinguish themselves by a subtle delicacy, full of temperament, and the tonality and intensity of the color are two attributes that impose to them a powerful personality.

By aging, because of an ideal equilibrium among alcohol quantity, fix acidity and no reducing extract, it gets a cache typical for the great red wines obtained by sorts of grapes with a rich genetic package for quality, placed in the habitats with big pedoclimatic availability for the forming of the valuable chemical constituents of the grape.

Starting from the oenoclimaic aptitude index there were made hierarchies of all the wine-growing habitats of Oltenia-Romania, superior quality wine producers. In order to determinate, to the parcel level, the favorable habitats for obtaining quality wines with controlled origin denomination, there was used the method of their delimitation. Based on these methodologies we traced in Oltenia-Romania, the habitats of five names of controlled origin (Banu Maracine, Segarcea, Mehedinti, Dragasani, Samburesti) of quality wines, that at present, have also juridical protection (Law no. 244/2002; HG 1134/2004 and Ord. MAPDR 690/2006).

Table 1

Climatic and geographic characteristics of the main wine-growing habitats of Oltenia-Romania and their oeno-climatic capacity

Centers and habitats with wine-growing spaces	Lat. N	Alt. (m)	Average annual temp.	Yearly amount of precipitations (mm)	Sum 01.04-30.09			Index of oeno-climatic aptitude A=T+I-(P-250)	Oeno-climatic area	Quality wines that can be obtained
					Grades of temperature (°C) T	Effective sun exposure in hours I	Precipitation (mm) P			
Polovragi-Dobrița	45°11”	530	9.3	893	2938	1302	513	3978	A0	White dry quality wines
Tg. Jiu	45°02”	210	10.4	816	3233	1450	433	4500	A2	Mainly white wines, secondly red quality wines
Rm. Vâlcea	45°06”	242	10.2	710	3173	1452	411	4437		
Corcova	44°35”	150	10.7	741	3313	1546	374	4682	A3 on hills	Mainly red wines, white wines, semidry, sweet, liquor, aromatic and of superior quality.
Dragasani	44°30”	182	10.8	684	3316	1576	385	4754		
Samburesti	-	260	10.5	682	3226	1536	395	4627		
Drobeta Tr. Severin	44°38”	116	11.6	762	3487	1546	354	4929	A3 meridian hills	
Vanju Mare-Orevita	44°25”	86	11.0	634	3388	1549	309	4878		
Oprisor	-	130	10.7	587	3339	1550	287	4892		
Plenița-Orodel	44°13”	150	10.6	637	3340	1487	338	4762		
Segarcea	45°05”	145	11.2	565	3448	1439	288	4843		
Tâmburești	44°02”	73	10.9	575	3353	1540	312	4805		
Brabova	44°28”	-	10.4	612	3301	1525	312	4764		
Brădești	44°29”	200	10.7	634	3278	1516	336	4702		
Craiova-Banu Maracine	44°19”	195	10.9	543	3403	1574	288	4939		

Table 3.

Physical-chemical characteristics of red wines
(obtained in the main wine-growing habitats in Oltenia-Romania)

Habitat/Type of wine	Physical-chemical characteristics (limits of oscillation)						
	Alcohol volume%	Total acidity g/l (H_2SO_4)	Glycerol g/l	Non reducing extract g/l	Ash g/l	Color intensity $DO_{420}+DO_{520}$	Tonality DO_{420}/DO_{520}
1.Banu Maracine							
Cabernet Sauvignon (1970-1990)	12,6-13,5	4,90-5,00	9-9,9	25,1-28,4	2,0-3,20	1,26-1,38	0,48-0,54
Pinot Noir (1970-1990)	13,4-14,1	3,64-3,95	9,2-10,8	25,0-27,2	2,90-3,10	0,72-0,86	0,78-0,80
2. Segarcea							
Cabernet Sauvignon (1921-1985)	11,62-14,94	3,44-5,05	9,0-17,99	23,74-43,73	1,73-2,91	1,30-1,42	0,94-1,62
Pinot Noir (1920-1985)	14,52-15,45	3,70-5,06	6,9-20,73	24,50-37,41	1,80-2,84	0,34-1,00	1,07-1,86
3.Vanju Mare-Orevita							
Cabernet Sauvignon (1970-1985)	12,8-15,8	4,3-4,5	7,3-11,0	25,2-30,6	2,90-3,80	1,92-2,01	0,58-0,66
Merlot (1970-1985)	12,7-13,0	4,4-4,5	7,8-10,0	27,8-28,9	2,40-3,10	1,47-1,51	0,43-0,56
4. Dragasani							
Cabernet Sauvignon (1990-2005)	11,76-13,64	4,7-4,90	9,0-9,84	22,0-28,90	2,30-2,96	0,86-1,52	0,40-0,64
5. Samburesti							
Cabernet Sauvignon (1990-2005)	12,58-13,76	4,36-5,00	9,0-10,50	27,84-29,40	2,84-3,10	0,89-1,59	0,45-0,69

Table 2.

Climate characteristics of the harvest months of grapes and winery, in the main habitats of wine growing in Oltenia-Romania (average data of 50 years)

Wine growing habitat	September			October		
	Average temp. (°C)	Average precip. (mm)	Sun exposure (hours)	Average temp. (°C)	Average precipitation (mm)	Sun exposure (hours)
Banu Maracine	17,7	37	236	11,9	16	186
Segarcea	17,9	30	214	11,8	20	163
Vanju Mare-Orevita	17,9	31	225	12,1	29	174
Corcova	17,4	39	222	11,8	32	173
Dragasani	17,3	39	239	12,4	29	191
Samburesti	16,6	40	232	11,0	31	188

CONCLUSIONS

1. Oltenia is one of the oldest and famous wine-growing of Romania, especially well known for high quality red and flavoured wins.

2. The long period of the sun shine, the moderated and uniformly distributed precipitations, the big value of temperature degrees summing vegetation period offers the possibility of accumulating in the grape significant quantities of sugars and coloured substances.

3. The prevalent types of soil from the most valued wine-growing of Oltenia are the most drained, which are getting heated fast and they dispose of significant quantities of oxides and calcium carbonate.

4. The composition characteristics and the smell qualities settle the red wins of Oltenia on the highest appreciation rank.

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TOTAL PHENOLS AND ANTIRADICAL ACTIVITY (DPPH) OF RED AND WHITE WINES FROM DIFFERENT REGIONS OF GREECE

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KEY WORDS: wine, total phenols, antiradical (DPPH) activity, effective concentration (EC_{50})

ABSTRACT

In the present research chemical analysis was made in 18 Greek wines, red and white wines, selected from different regions of Greece. The results showed that for all wines the total phenols (presented as Gallic acid equivalents or catechin) varies from 215 up to 3800 ppm. Antiradical activity for the red wines it was found higher with a mean value 4,64 μM, while the antiradical activity for the white wines it was found lower with a mean value 0,42 μM. The effective concentration (EC_{50}), concerning the phenols has a high value for all types of wines. Phenolic antioxidant index was higher for the red wines with values 153 up to 596 and lower for the white wines with values 14 up to 30. We concluded that phenolic antioxidant index it can be used as indicator of antioxidants force of wines.

INTRODUCTION

The grapes, the wine and the other products of grapes are object of many studies because are richly in naturally antioxidants (Halliwell, 1987; Kinsella et al., 1993; Kanner et al., 1994). Particularly rich in phenols, consequently and in antioxidants is the red wine compared to white wine (Frankel et al., 1993; Kinsella et al., 1993; Frankel et al., 1995; Kandaswami et al., 1993; Burda et al., 2001)

Concerning the above, in a laboratory study was examined and compared different methods, of estimate antioxidants and antiradical activity in Greek red and white wines, received from a different origin and produced in a different way (technology), using the methods described by De Gauljas et al., 1999; Fogliano et al., 1999; Simonetti et al., 1997 and Vinson et al., 1995.

MATERIALS AND METHODS

In this study we are included 18 trade Greek wines (both red and white wines). Those wines are from different regions in Greece (Epirus, Thessaly, Sterea Ellada, Attiki and Evia, Table 1) and are characteristics regions wines for the internal and external market.

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The total phenols were determined with the reagent of Folin-Ciocalteu as described by the method of Singleton and Rossi (1996) with the changes made by Badershneider et al., 1999. The method procedure includes the analysis of 20 μl of an adequately diluted wine added in 1580μl of distilled water, 100µl of the Folin- Ciocalteu and 360 μl of 20% Na_2CO_3. The extinction of this solution was measured at 750 nm on an UV-9200 spectrophotometer. Under the same conditions, a standard curve with gallic acid was recorded and the results were expressed in mg/l gallic acid (GAE).

The antiradical activity of each wine was assessed by the reduction in the content of the stable free radical 2,2-Diphenil-1-picrylhydrazil (DPPH), reacted with polyphenols in the wine, using the method of Brand-Williams. The mechanism of the reaction of phenol antioxidants with DPPH is well studied, the interaction proceeds stoichiometrically and the different colors of the two forms of DPPH and DPPH-H make possible the spectrophotometrical (colorimetric) determination. For this purpose, 50μl of adequately diluted wine were added to 2ml of methanol solution of DPPH with concentration of 6 10-5 mol/l at room temperature. The solution was well homogenized, and after 15 min the extinction of the solution at 515 nm on an UV-2000 unit was measured, Simultaneously, the E0 of a blank sample, containing distilled water instead of wine, was measured. The difference in the extinction values gives the amount of DPPH, which had reacted with polyphenols, and it was calculated using the Brand-Williams equation: $Abc_{515}=12509.(C_{DPPH})-2,58.10^{-5}$

The antiradical activity was expressed in mol DPPH scavenged by the phenol compounds in 1 ml of wine. The effective concentration of phenolic compounds was determined through DPPH and presented the total phenol amount reducing the initial free radical coloration by 50% (EC).

The phenolic antioxidant index (PAOXI) presented in this research as a ratio between the micromolar phenol concentration (as catechin) and EC_{50} for the same units as described by Vinson et al., 1995. The graphic relationship of cross-correlation between the quantity of total Phenols (TP) and antiradical activity (DPPH) were made in Excel. The statistical program Minitab ver. 12 was used for all statistical analysis.

RESULTS AND DISCUSSION

Results of the 18 tested wines, phenolic content are presented in Table 1. Those data (Table 1) shows a large variability of the total wine phenols (215-3800ppm GAE). That is in concept with other researchers concluded that the red wines are richer in total phenols compared to the white wines.

Our data (Table 1) confirmed that the red wines are richer in total phenols compared to white with a mean value of TP= 2212,5 ppm GAE. This result could be explained by a) the different technology used in production of red and white wine, b) the differences in the fermentation process and c) the duration of contact of wine with the seeds of grapes.

An increased content of total phenols in the red wines, from the three tested viniculture regions of Greece, are observed only in the wines from Epirous region made by the varieties Merlot,Cabernet Sauvignon, Cabernet Franc,Vlachiko and Bekari. While the Thessaly region wines, prepared by the varieties Messenikola, Syrah and Cabernet Sauvignon (n. 4, Messenikola) and (n. 6, Chatzimichali), are characterized in this research as wines with the lowest content of phenols (Table 1).

Concerning white wines, the variability of the total wine phenols are from 215 ppm up to 340 ppm (Table 1).

Table 1

Total Phenols for Red and White Wines.

Red wine number (n.)	Wine Trade and (*Region*)	G.A.E..	Katechini	Gallic acid μM	Year, Grape category
		ppm±sdev	μM		
		Red Wines			
n.1	Ktima Averof Ioannina-(*Epirus*)	3800±66	13110	20212	2000 Regional
n.2	Kokkino Veloudo Ioannina-(*Epirus*)	3250±113	11213	17286	1999 Table grape
n.3	Rapsani Larissa-(*Thessaly*)	1850±28	6383	9840	1999 V.Q.P.R.D.
n.4	Messenikola Karditsa-(*Thessaly*)	1050±50	3623	5585	1999 V.Q.P.R.D.
n.5	Ktima Katsaros Larissa-(*Thessaly*)	2350±25	8108	12499	2000 Regional
n.6	Chatzimichali Atalanti-(*Sterea Ellada*)	1200±29	4140	6383	2000 Regional
n.7	Ktima Chatzimichali Atalanti-(*Sterea Ellada*)	2250±38	7763	11968	2000 Regional
n.8	Ktima Charlafti Attiki-(*Sterea Ellada*)	1950±29	6728	10372	2000 Regional
n.9	Panselinos-Rose -(*Evia*)	1150±29	3968	6117	2000 Table grape
		White Wines			
n.10	Zitsa Ioannina-(*Epirus*)	280±15	966	1489	2001 V.Q.P.R.D.
n.11	Orion Ioannina-(*Epirus*)	280±9	966	1489	2000 Regional
n.12	Anchialos Volos-(*Thessaly*)	220±11	759	1170	1999 V.Q.P.R.D.
n.13	Tyrnavos, Larissa-(*Thessaly*)	320±8	1104	1702	2002 Regional
n.14	Nafsika, Anavyssos - (*Sterea Ellada*)	340±7	1173	1808	1999 Table grape
n.15	Megapanos Spata-(*Attiki*)	220±4	759	1170	2001 Regional
n.16	Filaretos (*Attiki*)	225±8	776	1197	2000 Table grape
n.17	Lac de Roche (*Sterea Ellada*)	215±4	742	1144	2001 Table grape
n.18	Ktima Chatzimichali Atalanti-(*Sterea Ellada*)	275±5	949	1463	2000 Regional

Those data presented a higher content of total phenols compared with the Italian and Spanish white wines. While similar in the content of total phenols with Greek white wines, tested in this research, are the white wines from French, Portugal and Hungary (Sato et al., 1996). The antiradical activity [DPPH] of the total phenols of the white wines, examined in this research, is presented in the table 2.

Table 2

Antiradical Activity and EC_{50} for Red and White Wines

Red wine number	Trade	Variety	μmolDPPH /ml	EC_{50} μM Kat.	PAOXI
Red Wines					
n.1	Ktima Averof	Merlot+Cab.Sauvignon + Cab. Franc	6,80±0,10	22	596
n.2	Kokkino Veloudo	Vlachiko + Bekari	5,79±0,10	35	320
n.3	Rapsani	Ksinomavro + Krasato + Stavroto	4,25±0,15	20	319
n.4	Messenikola	Messenikola + Syrah + Cab.Sauvignon	2,49±0,10	23	158
n.5	Ktima Katsaros	Cab. Sauvignon + Merlot	5,16±0,02	33	246
n.6	Chatzimichali	Cab. Sauvignon	2,42±0,10	18	230
n.7	Ktima Chatzimichali	Cab. Sauvignon + Syrah + Grenache Rouge	4,29±0,05	17	457
n.8	Ktima Charlafti	Cab. Sauvignon	3,95±0,02	14	480
n.9	Panselinos-Rose	Grenache Rouge	2,86±0,10	26	153
White Wines					
n.10	Zitsa	Debina	0,49±0,03	32	30
n.11	Orion	Chardoney + Debina	0,38±0,01	50	19
n.12	Anchialos	Roditis + Savatiano	0,83±0,03	55	14
n.13	Tyrnavos	Roditis	0,43±0,01	61	21
n.14	Nafsika	Savatiano + Assyrtiko	0,37±0,01	55	21
n.15	Megapanos	Savatiano	0,26±0,02	43	18
n.16	Filaretos	Savatiano	0,27±0,01	46	17
n.17	Lac de Roche	Savatiano	0,28±0,01	42	18
n.18	Ktima Chatzimichali	Robola	0,48±0,01	38	25

From this (Table 2) it appears that the red wines have higher antiradical activity compared with the white wines, with a mean of 4,39 μmolsDPPH/ml and 0,42 μmols DPPH/ml for the red and the white wines respectively. Overall, in this research, the red wines from the region of Epirus (Ktima Averof, n.1 and Kokkino Veloudo) are wines characterized with highest antiradical activity with 6,80 and 5,79 μmols values respectively (Table 2). Interest presents the red wine (Ktima Katsapos, n.5) that has medium content total phenols 2350 ppm and high antiradical activity 5,16 μmols DPPH. In the white wines the antiradical activity shows a variation from 0,26μmols up to 0,83μmols.

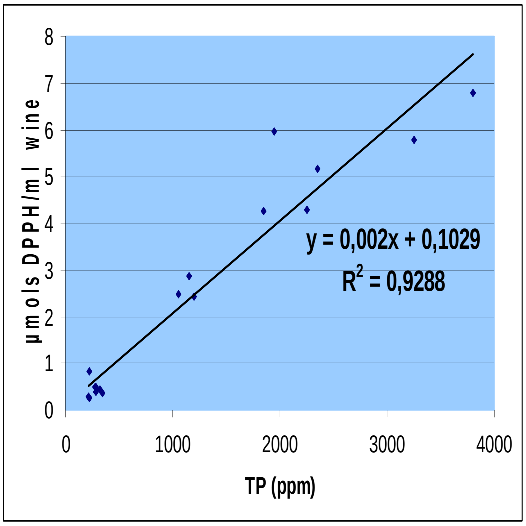

Figure 1. Correlation of Antiradical Activity and Total Phenols (GAE) in the tested wines.

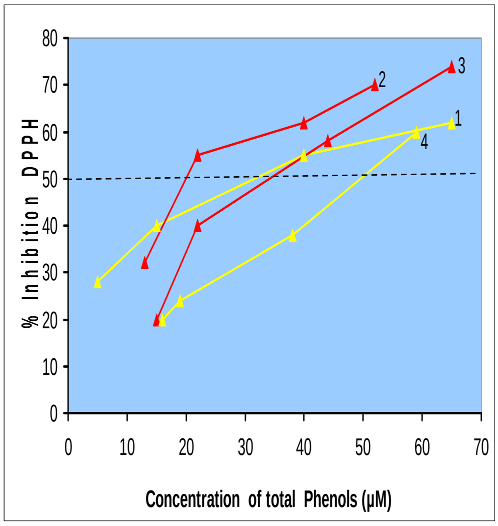

Figure 2. EC_{50} in wines from Epirus
1. Zitsa, EC_{50}=32;
2. Ktima Averof, EC_{50}=22;
3. Kokkino Veloudo, EC_{50}=35;
4. Orion, EC_{50}=50.

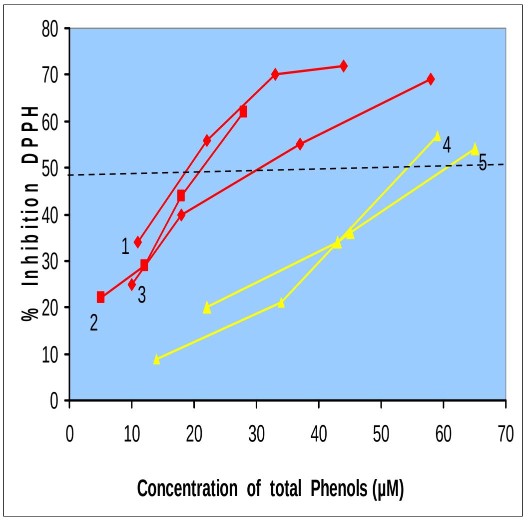

Figure 3. EC_{50} in wines from Thessaly
1. Rapsani, EC_{50}=20;
2. Messenikolas, EC_{50}=23;
3. Ktima Katsarou, EC_{50}=33;
4. Tyrnavos, EC_{50}=61;
5. Anchialos, EC_{50}=55.

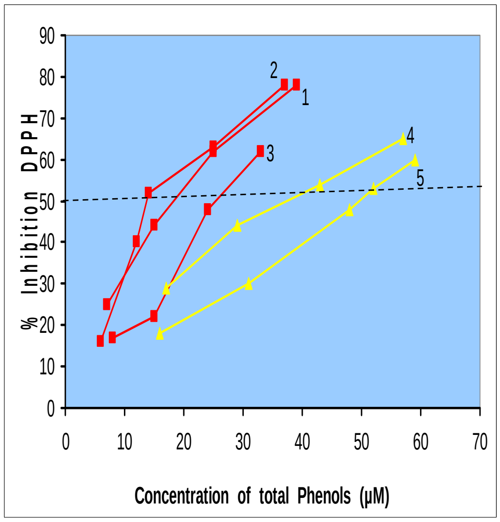

Figure 4. EC_{50} in wines from Sterea Ellada.
1. Chatzimichali, EC_{50}=18;
2. Ktima Chatzimichali, EC_{50}=17;
3. Panselinos, EC_{50}=26;
4. Ktima Chatzimichali, EC_{50}=38;
5. Filaretos, EC_{50}=46.

Generally, in wines is observed a very high value of cross-correlation between antiradical activity and TP with regression equation Y_{DPPH}=0,002.X_{TP}+0,1029 and r^2 =0,9288 (Sato et al., 1996; Frankel et al, 1995; Simonetti et al, 1997)

These researchers but also others agree that for the estimate of the wine antiradical activity, the wine EC_{50} (Fig. 2, 3 and 4) should be known. The red wines have an average EC_{50} =23 and the white an average EC_{50}=47. But in totals red wines are characterized with low EC_{50} values in other words high PAOXI, as the wines presented in this research with numbers n.1, n.3, n.4, n.6, n.7 and n.8 (Table 2). This resulted positive for the contents of free radicals of those wines, same data where presented by Kinssela et al., Hurtado et al., 1997; 1993; Leighton et al., 1998 and Nutall et al., 1999.

In this study only a small number from the white wines have a low EC_{50} value compared to the red wines e.g. the red wine Zitsa (n. 10 in this research).

Overall, from the results presented in this study we can conclude that wine's antioxidant and therapeutic action depends not only from the total content of phenols but also from the composition of individual wine total phenols and of course the climatic and geographic environment factors.

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THE EVOLUTION OF THE INFLORESCENCES IN THE BUD OF THE 4TH ORDER DEPENDING OF VARIETY AND CLIMATIC CONDITIONS, IN THE VEGETATION PERIOD IN 2007, IN THE WINEGROWING CENTER "BANU MARACINE"

Olteanu I., Cismaru Gabriela Adina Maria,
Daniela Cichi, Costea D.C.[1]

KEY WORDS: buid of fruitage, differentiation, inflorescence, sprout

SUMMARY

This work proposes to watch the thoroughgoing study of the aspects watching the inflorescences in buds, in the vegetation period in 2007 (June-September), at the varieties of Riesling Italian, Feteasca neagra and Cabernet Sauvignon, cultivated in the winegrowing area Banu Maracine. It was made a series of studies and observations on the buds, through chronological analyses of the phenomena, watching in dynamics the evolution of the principal reference point stasis.

The differential process of the buds was studied in correlation with the climatic conditions of the year under consideration and the genetically particularities of the analyzed varieties.

MATERIALS AND METHODS

From the accomplished study made in June-September period, through the harvesting of samples at 10 days aisle, it can be noticed that the differentiation of the buds (the evolution of the inflorescences on sprout) it is realized at different period given the variety and climatic conditions, token as aiming point the bud which occupies the 4th position on sprout (tab. 1).

In the year 2007 were taken in research varieties with different biological potential of fertility and productivity, which are: Fetească neagră, Riesling Italian and Cabernet Sauvignon meted in the Banu Mărăcine winegrowing, and the applied technology consisted in the spring and autumn ploughing, superficial works of the soil on the aisle among rows, 2-3 manual weeding by turns, refutably treatments of diseases and pests, green works (strain's sprout weeding, sprout leading and making a mug).

To determinate the differentiation of the buds were cropped sprout in May (before the efflorescence) until October (after the fall of leafs). In each stage were cropped, each variety, three sprout, of different raciness (big=L1, medium=L2, dimly=L3), proceeded from the different vines. Sprout were been shortened to the length of 15 eyes, there to the eyes from this portion were tinned in 4% formol.

Longitudinal sections are achieved with the microtome, precision instrument. The advanced system of samples operates very precise from 0.5 to 99µm (CUT5062 and CUT6062), from 0.5 to 6oµm (CUT4062), made under license ISO 9001 the management for the quality of the system and the differentiation process of the buds was watched

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through the microscope; the sections were settle on the blade in a drop of water or in a blend of water with glycerin, followed by photography. The facts about buds differentiation were represented in charts.

RESULTS AND DEBATES

Table 1

The stages which were reached by the inflorescence from the bud, situated at the 4th lump depending on variety:

Date	Riesling Italian			Fetească neagră			Cabernet Sauvignon		
	Infl. 1	Infl. 2	Infl. 3	Infl. 1	Infl. 2	Infl. 3	Infl. 1	Infl. 2	Infl. 3
15 June	2	0	0	1	0	0	2	0	0
1 July	4	2	0	3	2	0	3	2	0
20 July	5	2	0	4	3	2	4	2	1
1 August	6	5	1	6	5	2	6	3	1
31 August	6	6	3	6	5	2	6	3	1
30 September	6	6	6	6	6	3	6	6	1

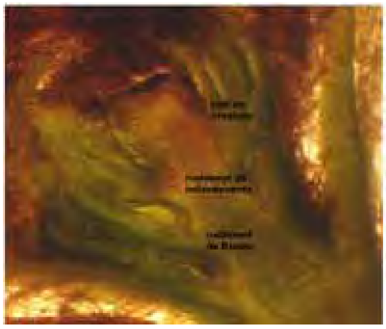

Fig. no. 1: Bud with a inflorescence

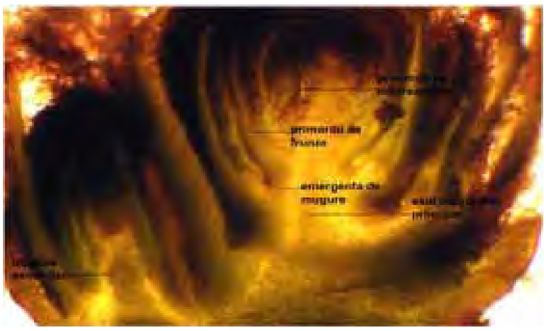

Fig. no.2: Bud with two inflorescences

Fig. no.3: Bud with three inflorescences

At the Riesling Italian variety the first primal (fig.1) appears in the fruitage bud around 15 June ($\sum t^0u$=529,1^{0}C). This evolves apace touching the 5th stage around 20 July ($\sum t^0u$=1036,1^{0}C); respectively 6th stage around 1 August. The second primal (fig. 2) appears in bud around 1 July ($\sum t^0u$=726,8^{0}C), reaches 5th stage at 1 August ($\sum t^0u$=1238,3^{0}C), and 6th stage around 31 august ($\sum t^0u$=1638,2^{0}C). the third primal (fig.3) appears later, around 1 august and reaches 6th stage at September 30 ($\sum t^0u$=1707,9^{0}C), (fig. 4).

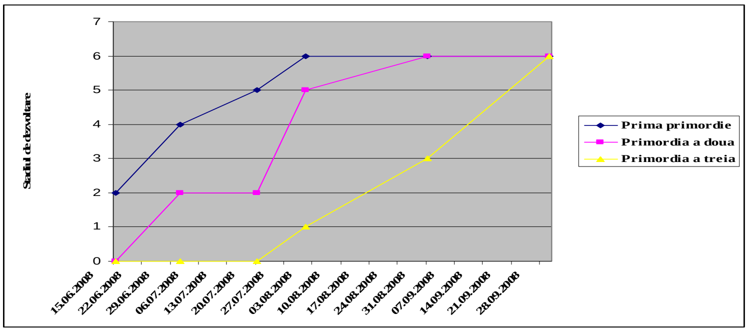

Fig. 4. Inflorescence's evolution in bud of 4th thanage given the climatic conditions, in vegetation period 2007 at the Riesling Italian variety

At the Fetească neagră variety the first primal appears around15 June, reaching the 6th stage at august 1st. The second primal is forming at 1 July, reaching the 6th stage later, 30 September, and the third primal, appears at July, and reaches only the 3rd stage at 30 September, (fig. 5).

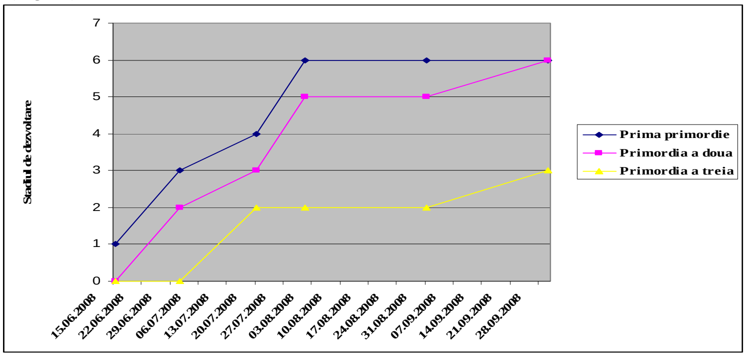

Fig.5. Inflorescence's evolution in bud of 4th thanage given the climatic conditions, in vegetation period 2007 at the Fetească neagră variety

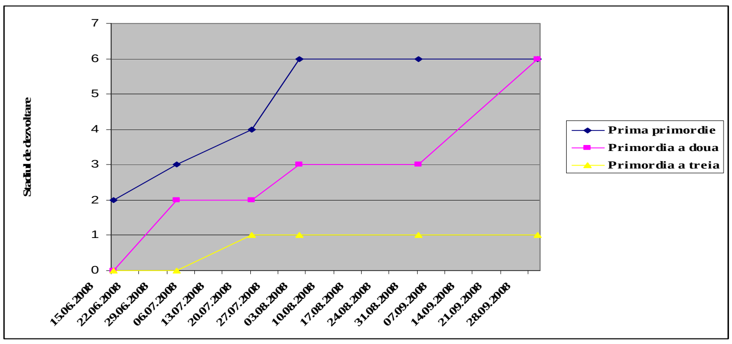

Fig. 6. Inflorescence's evolution in bud of 4th thanage given the climatic conditions, in vegetation period 2007 at the Cabernet Sauvignon variety

At the Cabernet Sauvignon variety the first primal appears around15 June, reaching the 6^{th} stage at 1 August. The second primal is forming later, 1 July, evolving slower reaching the 3^{rd} at 31August. The third primal, appears at 20 July and remains at the 1^{st} stage (fig. 6).

CONCLUSIONS

On the base of the obtained results and presented hereinbefore, were been detached the following conclusions:

1. The beginning of the process of differentiation of the buds were surprised at the beginning of June, to all three varieties 15 June (before the blossom) noticing the beginning (stage 1) of the first primal formation of inflorescence, at the 4-7, 10-11 lumps, at Riesling Italian variety; 5-6, 11 at Fetească neagră variety and at 4-5, 10-11 at Cabernet Sauvignon variety;
2. The second primal appears in the second part around 1 July and the third primal of inflorescence at the 20 July;
3. the all three varieties token in study, the first primal reaches 6^{th} stage at 1 august, second primal at 31 September; only at the Riesling Italian variety the third primal reaches 6^{th} stage at 30 September, at the Fetească neagră and Cabernet Sauvignon varieties weren't noticed 6^{th} stage at the third inflorescence;
4. At the Fetească neagră varieties the third primal reaches 3th stage at the 4^{th} lump, and Cabernet Sauvignon variety at the 5^{th} lump, 11 stage 3.

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APPEARANCES CONCERNING THE DIFFERENTIATION THE BUDS OF FRUITAGES TO SOME KINDS OF VINE

Olteanu I., Cismaru Gabriela Adina Maria,
Daniela Cichi, Costea D. C.[1]

KEY WORDS: buid of fruitage, differentiation, inflorescence, sprout

SUMMARY

This work proposes to stand out the way the differentiation of the buds of fruitages to vines, with a direct role in the adhibition of the growing works and fructification. In the winegrowing plantations, the application of correct technologies (cuttings, operations in green), assures optimal conditions for the growing and the development of the plants, in the aim of utilization of the potential of productions to maximum. The differences were watched to what concerns the molding of the inflorescences depending on variety to the beginning of 2008 facing the end of the vegetation period in 2007.

MATERIALS AND METHODS

In the year 2007 were taken in research varieties with different biological potential of fertility and productivity, which are: Fetească neagră, Riesling Italian and Cabernet Sauvignon meted in the Banu Mărăcine winegrowing, and the applied technology consisted in the spring and autumn ploughing, superficial works of the soil on the aisle among rows, 2-3 manual weeding by turns, refutably treatments of diseases and pests, green works (strain’s sprout weeding, sprout leading and making a mug).

To determinate the differentiation of the buds were cropped sprout in May (before the efflorescence) until October (after the fall of leafs). In each stage were cropped, each variety, three sprout, of different raciness (big=L1, medium=L2, dimly=L3), proceeded from the different vines. Sprout were been shortened to the length of 15 eyes, thereto the eyes from this portion were tinned in 4% formol.

Longitudinal sections are achieved with the microtome, precision instrument. The advanced system of samples operates very precise from 0.5 to 99µm (CUT5062 and CUT6062), from 0.5 to 6oµm (CUT4062), made under license ISO 9001 the management for the quality of the system.

The process of differentiation of the buds was watched through the microscope; the sections were settle on the blade in a drop of water or in a blend of water with glycerin, followed by photography.

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RESULTS AND DEBATES

Through the realization of rubricate about the buds of fruitages to the three varieties which were taken in study, were catch the following stages of a inflorescence (fig. 1, 2, 3, 4, 5, 6, 7, 8- original photo):

Fig. 1: Stage 0

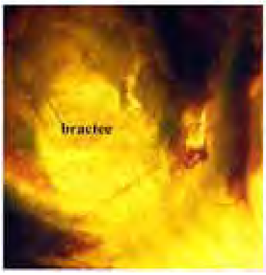

Fig. 2: Bracte formation

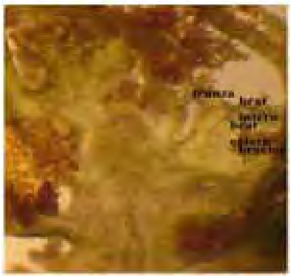

Fig. 3: The individualization of the inflorescence's arms

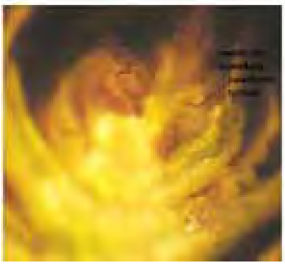

Fig. 4: The formation of the secondary and tertiary ramifications

Fig. 5: The purpose of secondary ramification

Fig. 6: The purpose of tertiary ramification

St.0. There aren't detected organs (fig.1)- in bud are only primordial foliaceus.

St.1. The beginning of the formation of first organs, to the meristem level has been detected a large and roundly swell, followed by his disengagement like a oblong structure, with the formation of the arms of bracte (fig. 2).

St.2. The individualization of two arms of the inflorescences from the primordial divagation to the formation of two arms almost equivalent: - intern arm almost by meristem and extern arm (second bracte), (fig. 3).

St.3. First clue of evolution through inflorescence is been individualized through the enlargement of internal arm, the arch is more or less large, which notifies the formation of the secondary ramifications. On the internal arm, the tertiary ramifications will be formed, with the appearance of a massive globular local to the bract's armhole of secondary order (fig. 4).

St.4. Secondary ramifications become visible and their number combs progressive, and on the secondary base ramifications starts the formation and finalization of the tertiary ramification, slack oblong each part of these (fig.5).

St.5. This correspond the stage in which the tertiary ramifications are known. The present inflorescences are closed to the primordial inflorescences from the bud in the period before winter. Floral buttons are formed starting with the secondary and tertiary ramifications (fig. 6).

St.6. The formation of floral buttons. During formation of the floral buttons it is noticed an active growth of bracte which are constituted in primordial of inflorescences. (fig. 7 şi 8).

Fig. 7, 8: The formation of floral button

The formation stages of the inflorescence presented hereinbefore were surprised different, to the end f the vegetation period 2007 (when varieties were in the ripening grapes faze), depending variety, it can be noticed from the following table (table no. 1).

At the Riesling Italian variety the first primal touches the 6 stage to the 4-7 lumps, 10-12; second primal to the 4-7 lumps, and to the third primal at the 4-5 lumps. The Fetească neagră variety has in the 6^{th} stage to the first primal at the 3-6, 11-12 lumps, at the second primal to the 4-6 lumps, and to the third primal is reached only the 3^{rd} stage. The Cabernet Sauvignon variety, has the 6^{th} stage reached at the first primal at the 3-5, 11-12 lumps; at the second primal to the 4-5, 11 lumps; and to the third primal is reached only the 3^{rd} stage (table 1).

Table 1

The stage of the differentiation of the fruitages buds at 30 September 2007

Eye degree	Riesling italian		Fetească neagră		Cabernet sauvignon	
	No.	Stage	No.	Stage	No.	Stage
1	1	1-4	1	1-4	1	1-2
2	1	1-4	2	1-5 1-4	1	1-2
3	2	1-4 1-5	2	1-6 1-4	3	1-6 1-3
4	3	1-6 1-6 1-6	3	1-6 1-6 1-3	3	1-6 1-6 ***1-1***
5	3	1-6 1-6 1-6	3	1-6 1-6 ***1-1***	3	1-6 1-6 ***1-3***
6	3	1-6 1-6 ***1-3***	3	1-6 1-6 ***1-2***	2	1-5 1-3
7	3	1-6 1-6 1-2	2	1-5 1-4	1	1-3
8	1	1-5	2	1-4 1-3	1	1-3
9	1	1-5	2	1-4 1-3	1	1-3
10	2	1-6 1-4	2	1-4 1-3	2	1-5 1-3

11	1	1-6	2	1-6 1-2	3	1-6 1-6 1-3
12	2	1-6 1-4	2	1-6 1-3	2	1-6 1-3
13	2	1-5 1-3	1	1-3	2	1-3 1-1
14	1	1-3	1	1-3	1	1-2

No.- inflorescences number from the fruitage;

Stage- developmental stage of the inflorescences

In the beginning of the 2008, it has been noticed changes in the differentiation of the fruitages buds, different varying with varieties so: Riesling Italian variety, at the 6th lump, the third primal reached 6th stage of developing given the 3rd stage, how it was in September 2007; Fetească neagră variety, third primal at the 5 and 6 lumps, reaches 6th stage, given the 1st stage at the 5 lump and 2nd stage at the 6th lump, how it was in September 2007; Cabernet Sauvignon variety, third primal at the 4 and 5 lumps reaches 6th stage, given the 1st stage at the 4 lump and 3rd stage at the 5th lump, how it was in September 2007.

To the rest of the lumps weren't noticed modifications given September 2007.

CONCLUSIONS

- At the end of 6th stage by developmental of inflorescences in fruitages buds is reached at the Riesling Italian variety to the 4,5,6,7,10,11,12 lumps; to the Fetească neagră at the 3,4,5,6,11,12 lumps, and at the Cabernet Sauvignon variety at the 3,4,5,11,12 lumps;
- From 30 September the development of the inflorescences in bud didn't registered any changes, the obtained results in the vegetation period (2007) being the same with the one from the rest period;
- At the beginning of 2008 it had been noticed differences looking the evolution of the inflorescences in fruitages buds given September 2007;
- In march 2008 in buds is noticed the third primal at the 6th lump at the Riesling Italian variety, 5,6 at the Fetească neagră variety, at the 4,5 lump at the Cabernet Sauvignon variety;
- Three primal of inflorescences has been noticed at the 4, 5, 6 lump at the Riesling Italian variety; 5, 6 at the Fetească neagră variety; 4,5 at the Cabernet Sauvignon variety.

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STUDIES REGARDING THE DELIMITATION OF THE AREALS WITH VOCATION FOR OBTAINING HIGH QUALITY WINES HAVING CONTROLLED ORIGIN DENOMINATION IN DRAGASANI VINEYARD

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KEY WORD: Controlled Appellation of Origin, High Quality Wines, Vocation, Climate, Soil

ABSTRACT

Dragasani vineyard is considered, honestly speaking, hospodar vineyard of Oltenia, where were the origins ancient vineyards of Banii Craiovesti and Buzesti Brothers. Many plantations slopes of three rows of hills parallel with river Olt, being situated on brown and brown - reddish forest soils, some of them medium podsol, rich in limestone, situated on alluvial gravel. In a special manner are recognized by special quality of aromatic wines of Tamaioasa Romaneasca of Dragasani and of Sauvignon. Also, red wines like Pinot Noir and Cabernet Sauvignon have been always noticed.

INTRODUCTION

Multiple microclimates and soil types met in the wine-growing regions of Oltenia, but also a complete scale of wine types (white, red, aromatic, distilled of wine) and the table grapes and raisins, are arguments that Oltenia should be named a veritable wine-growing Romania, in miniature. On the basis of long studies that were realized, the wine-growing habitats have been established, having vocation to obtain quality wines, with the controlled origin denomination.

"In a wonderful scenery and very harmonious were mentioned Dragasani, since are known in the world. The delicate essence of health and joy, which Dragasani gave under the form of a durable wine, slightly sparkling and with an incomparable attractive reflex, served at spreading the most luminous figures of the past: aristocracy if, generals of Romanian army, Mircea cel Batran, Mihai Viteazu, as well as the most dreaded outlaws and pandours that released Tudor. Who passes by the water of Olt, upwards of Dragasani, will be discovered with piously in front of this magnificent and unique temple of the country (I.C. Teodorescu, 1940)".

Wines from Dragasani, on occasion of universal expositions from Paris since 1867, 1889, 1900, at expositions from Milano since 1908 and from Gand since 1912, received gold medal and honor diplomas, to which are added the 300 medals, among the most brilliant ones, obtained in the period 1959-2006, on occasion of great national and international contests from Montpellier, Ljubljana, Freiburg, Tbilisi, Sofia, Budapest, Bucharest and so on.

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Certain springs of foundation of this vineyard are not known, nor names of some important properties from away past. They speak about Mircea cel Batran, Mihai Viteazu, Matei Basarab, but more in buckwheat and possession documents and services realized to monasteries, about personal properties nothing is known (Popa A. and colab. 2007-2008).

Quality wine is the one that carries the origin denomination, of geographical place and possesses superior sensor characteristics of wines for current consumption, relevant through a perfect harmony between sensorial characteristics. Color id clean and alive, the taste is delicate, full and velvety, the body (alcohol necessary for preservation) enough contoured, a developed fine bouquet, non reducing extract (dry), abundant. Its chemical composition is much ample, richer and harmonious.

MATERIALS AND METHODS

Origin denomination is not only a indication of origin, but takes into account the originality characteristics generated by practicing some traditional technologies of production, in that region. An origin denomination can not be denominated unless the wine that will have it has a name that results from qualitative characters determined by the following factors: natural factors, whose role is predominant (geographical position, relief, neighborhood, climate, nature of the soil, species, type), which allow the definition of a production area which must be delimited, human factors, regarding cultivation technologies of the grape, wine-making. The following aspect must be taken into account: *wine quality is based legally on delimitation of the geographical area, as main natural factor that determines it, realizing its action.*

Substances situated in the chemical composition of grape and which decide the chemical composition of wine are in a great number (some hundreds) and all participates at the creation of the multitude of the sensorial characters that are placated, melt and give, at the end, essential components in definition of characters regarding smell, or which decide the type, nature, intensity and beautifulness of the color, especially at red and rose wines. Some of these components of grape are in greater proportion (sugar, organic acids), other in smaller proportions (substances tanant - coloring) and in the end, other, even if in greater number, are in very small proportions (aromatic substances).

Long time researches, realized in the vineyard Dragasani (here, since 1935, operates the first resort of viti - wine researches from Romania, in conformity with conceptual ecologic model), lead to obtaining an impressive volume of experimental information based on which was realized the methodology of multi criteria delimitation of the areas with vocation to obtain quality wines with name of controlled origin (Condei Gh. and colab. 2004).

RESULTS AND DISCUSSIONS

The results of the scientific researches realized in the past 50 years allowed us, applying the methodology of multi criteria delimitation of the wine-growing areas, to delimit the areal of producing wines with name of controlled origin Dragasani, which belongs to the following localities from district Vâlcea and Olt (fig. 1 Vl and Ot County): Dragasani (Barsanu, Capu Dealului, Zarneni, Zlatarei, Valea Caselor), Sutesti (Sutesti, Mitrofani, Verdea), Prundeni (Prundeni, Calina, Zavideni), Orlesti (Orlesti, Silea, Procopia), Creteni (Creteni, Mrenesti, Streminoasa, Izvoru), Amarasti (Amarasti, Nemoiu, Palanga, Padina, Meresesti), Glavile (Jarostea, Glavile), Madulari (Madulari, Baisoara, Mamu), Susani (Susani, Usurei, Ramesti, Stoiculesti), Maciuca (Oveselu, Maciceni, Zavoieni, Botorani, Bocsa, Maldaresti), Tetoiu (Tetoiu, Tepesti), Fartatesti (Giulesti, Fartatesti, Dejoi, Seciu), Stanesti (Stanesti, Linia Dealului), Valea Mare (Valea Mare, Pietroasa, Delureni, Margineni), Iancu Jianu (Iancu Jianu), Carlogani (Carlogani), Strejesti (Strejestii de Sus, Colibasi), Plesoiu (Schitu din Deal). Geographic and climatic elements, predominant soil types and their profile are presented in table 2 and fig. no. 2.

Main characteristics of white and red wines mentioned in the Record of wines (tab. 1) mentions the vocation of this wine-growing area to obtain semi aromatic high quality wines (Sauvignon), aromatic (Tamaioasa Romaneasca) and red (Pinot Noir).

Depending on the accumulation of the main chemical components of the grape, with determinant implication on quality of wines, corroborated with the level of grapes production, was established the maximum production of grapes, admitted for cultivation on quality categories (tab.4), characteristics of composition for wines at putting into consumption (tab. 3).

At present moment are in entire development the research works regarding delimitation of wine-growing areal, as part of vineyard Dragasani, up to the level of lawn and plot of land, with vocation to obtain superior quality wines having the controlled origin denomination (D.O.C.).

Follow - up we present the delimitation of favorable areal to obtain quality wines with name of controlled origin in vineyard Dragasani- Lawn Dealul Olt. The predominant soil type in this areal is Cambic-eu-mezobazic-pseudorendzinic, very different as fertility along slope (fig. 2). Besides establishing the soil types and main physical - chemical characteristics that they have during four wine-growing years, we have observed the grapes production, its quality, but also the chemical composition and olfactory - tasty characteristics of wines obtained at level of area of the slope, identifying, this way, the perimeters with the most selected vocation for quality. A part of results obtained are presented in tables 5,6 and 7.

Composition characteristics and olfactory- tasty characteristics of Sauvignon wines (tab. 5) obtained from grapes gathered in the superior and middle third of the slope, give then the right to be a part of the gallery of great wines with a special application towards obsolescence, when their quality is amplified and can remain constant during many years. Also, in these areas of the slope, we frequently meet the phenomena of botrytization of grapes, a very important thing, met in few places in the country or even in the world, where are obtained wines COD-Î.B.

Wines resulted from grapes obtained in the inferior third of the slope, even of quality, do not exceed the level that is a part of the category COD- Gathered at Full Maturity.

A relative similar situation we meet in case of wines of Tamaioasa Romaneasca (tab. 6) obtained from grapes gathered in the superior and middle third of the slope. Through proportions o chemical components that we have, but especially through rapports that will be established between them, wines of Tamaioasa Romaneasca are of a rare refinement, have great personality, typical fragrance, that can not be mistaken, this is the reason for which, at organoleptic appreciation, have received maximum score.

Wines of Cabernet Sauvignon obtained from grapes gathered in the superior and middle third of the slope, have an increased alcoholic potential, abundant non reducing extract, sufficient color and bright tonality, so they can belong to category COD- Gathered late. In the inferior third of the slope, there can be obtained at most wines with COD-CMD.

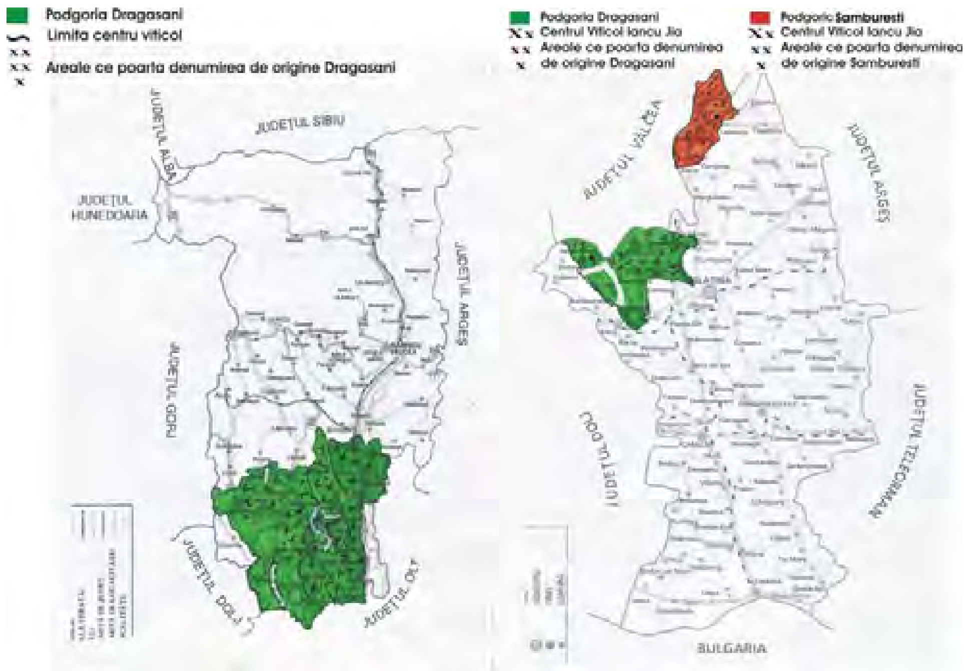

Fig. 1. Territorial limits of Dragasani (green) and Samburesti Vineyards (red) from Oltenia-Roumania. Left side-viticultural areals from Olt County; Right side-viticultural areals from Valcea County.

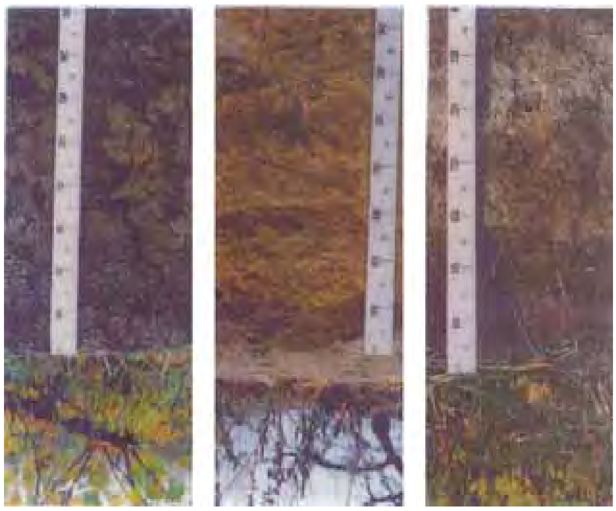

Fig. 2. Soil profiles from Dragasani Vineyard.

Predominant soil types are: - preluvosol calcic eroded (Brown argilic pseudorendzimic eroded); preluvosol eroded scheleton –like (Brown argilic eroded); typical phaeziom (Cernoziom levigat); pelic faeoziom (Pseudorendzimă levigată); calcareous rogosol (Regosol rendzimic).

Table 1.

Main physico-chemical characteristics of Tamaioasa Romaneasca, Sauvignon and Pinot Noir wines from Dragasani

Type of wine	Physical-chemical characteristics (limits of oscillation and *average*)						
	Alcohol volume%	Total acidity g/l (H_2SO_4)	Glycerol g/l	Non reducing extract g/l	Ash g/l	Color intensity $DO_{420}+DO_{520}$	Tonality DO_{420}/DO_{520}
Tamaioasa Romaneasca	11,9-17,3 **14,5**	3,4-5,4 **4,3**	7,0-11,6 **9,5**	23,4-37,6 **29,1**	1,8-3,3 **2,5**	-	-
Sauvignon	11,9-14,4 **13,5**	3,3-5,5 **4,0**	7,0-11,2 **9,0**	23,2-28,5 **26,7**	1,9-3,3 **2,1**	-	-
Pinot Noir	12,7-16,4 **14,3**	2,64-5,63 **4,55**	9-11,9 **9,3**	19,2-39,5 **26,8**	1,76-3,66 **2,62**	0,72-0,86 **0,81**	0,78-0,80 **0,79**

Table 2.

Geographic and climatic characteristic of wine growing habitats having controlled origin denomination Deagasani

Wine growing habitat	Nordic lat.	Altitude (m)	Average temperature/ year (°C)	Average precipitation/ year (mm)	Sum 1.IV-30.IX			Oenoclimatic aptitude A=T+I-(P-250)
					T Temperature degrees (°C)	I Insolation (ore)	P precipitations (mm)	
Dragasani -Dealul Olt	44°30’	182	10.8	684	3316	1576	385	4754

Tabel 3.

Quality category, types of specie s and types of wines having controlled origin denomination Dragasani

Crt. no.	Quality category, types of species and types of wines	Wine type		Wines' characteristic at the consumption moment			
			Sugar's content of beans at maturity g/l min	Obtained alcohol %vol. min	Sugar rest g/l	Non reducing extract g/l min	Color intensity (D.O. 420 + D.O. 520, cuv. 1cm).
1	I COD-CIB Wines Tamaioasa Romaneasca, Sauvignon,	Semidry	240	13,5	4-12	21	-
		Semisweet	240	13,5	min 12	21	-
		Sweet	240	11,0	min.50	21	-
2	II. COD-CT Wines Tamaioasa Romaneasca, Sauvignon, Pinot gris, *white assortment*	Dry	220	12,5	max. 4	21	-
		Semidry	220	12,5	4-12	21	-
		Semisweet	220	12,0	min. 12	21	-
	Cabernet sauvignon, Pinot noir, Merlot, *red assortment*	Dry	213	12,5	max. 4	23	Cab. Sauvignon 4,000 Pinot noir, 3,600 Merlot, red assortment 3,800
		Semidry	220	12,5	4-12	23	
		Semisweet	220	12,0	min. 12	23	
1	III. COD-CMD Wines Tamaioasa Romaneasca, Sauvignon, Fetească albă, Chardonnay, Pinot gris, Feteasca Regala, Riesling italian, Cramposie selecționată, *white assortment*	Dry	187	11,0	max.4	19	-
		Semidry	192	11,0	4-12	19	-
		Semisweet	200	11,0	min. 12	19	-
2	Cabernet Sauvignon, Pinot noir, Merlot, Fetească neagră, Novac, Negru de Dragasani, *red assortment*	Dry	187	11,0	Max. 4	21	Cab. Sauvignon, Novac, Negru de Dragasani 3,800 Merlot, red assortment 3,600 Pinot noir, 3,400.
		Semidry	192	11,0	4-12	21	
		Semisweet	200	11,0	min. 12	21	

Table 5.

Composition and aroma-flavor characteristics of Sauvignon wines
obtained in Dealul Olt-Dragasani wineyard

Determination	Wines resulted from grapes:											
	From the superior third of the slope				From the middle third of the slope				From the inferior third of the slope			
	Harvest year											
	2002	2003	2004	2005	2002	2003	2004	2005	2002	2003	2004	2005
Obtained alcohol min % vol.	13,88	14,23	13,41	11,52	13,41	13,64	13,41	10,94	12,47	12,94	12,82	10,88
Total acidity g/l (H2SO4)	4,53	4,27	4,35	5,32	4,82	4,43	4,46	5,66	4,83	4,55	4,58	5,90
Volatile acidity g/l (H2SO4)	0,30	0,35	0,33	0,29	0,35	0,30	0,32	0,30	0,37	0,30	0,35	0,37
Non reducing extract g/l	24,60	24,90	24,50	27,90	24,27	24,27	24,20	21,20	23,81	24,00	23,10	21,05
Ash g/l	2,54	2,84	2,55	2,30	2,49	2,50	2,30	2,34	2,40	2,33	2,29	2,00
Glycerol g/l	8,97	10,50	8,80	8,00	8,70	10,00	8,60	7,64	8,40	9,00	8,20	7,56
Organoleptic determination 1-20 points system	19,00	19,50	19,00	17,50	19,00	19,40	19,00	17,00	18,00	18,50	18,00	17,00

Table 6

Composition and aroma-flavor characteristics of Tamaioasa Romaneasca wines
obtained in Dealul Olt-Dragasani wineyard

Determination	Wines resulted from grapes:											
	From the superior third of the slope				From the middle third of the slope				From the inferior third of the slope			
	Harvest year											
	2002	2003	2004	2005	2002	2003	2004	2005	2002	2003	2004	2005
Obtained alcohol min % vol.	13,52	14,58	13,29	11,52	13,29	13,88	13,00	11,00	12,82	13,41	12,58	10,58
Total acidity g/l (H_2SO_4)	4,98	4,63	4,69	5,22	4,87	4,73	4,85	5,43	4,95	4,84	4,86	5,65
Volatile acidity g/l (H_2SO_4)	0,28	0,33	0,29	0,35	0,37	0,26	0,29	0,34	0,29	0,34	0,30	0,33
Non reducing extract g/l	23,42	24,50	23,30	21,95	23,00	24,10	23,10	21,87	22,80	23,00	22,80	21,47
Ash g/l	2,36	2,47	2,38	2,20	2,34	2,42	2,30	2,22	2,29	2,30	2,30	2,20
Glycerol g/l	9,75	10,20	9,60	8,70	9,50	9,75	8,20	8,20	9,00	9,20	9,00	8,00
Organoleptic determination 1-20 points system	19,00	19,75	19,00	17,50	19,00	19,40	18,70	17,30	18,00	18,50	18,00	17,00

Table 7.

Composition and aroma-flavor characteristics of Sauvignon wines obtained in Dealul Olt-Dragasani wineyard

Determination	Wines resulted from grapes:											
	From the superior third of the slope				From the middle third of the slope				From the inferior third of the slope			
	Harvest year											
	2002	2003	2004	2005	2002	2003	2004	2005	2002	2003	2004	2005
Obtained alcohol min % vol.	13,29	13,64	12,94	11,76	12,70	13,05	12,82	11,64	12,35	12,70	12,47	11,05
Total acidity g/l (H_2SO_4)	4,93	4,80	4,70	5,39	4,95	4,86	4,80	5,65	5,00	4,97	5,10	5,73
Volatile acidity g/l (H_2SO_4)	0,35	0,36	0,29	0,28	0,31	0,33	0,27	0,37	0,33	0,28	0,34	0,38
Non reducing extract g/l	27,90	28,90	28,40	22,00	27,30	28,40	28,10	21,95	26,60	27,00	27,50	21,30
Ash g/l	2,82	2,96	2,88	2,30	2,82	2,96	2,91	2,30	2,70	2,69	2,78	2,10
Glycerol g/l	9,62	9,84	9,00	9,20	9,30	9,49	8,70	7,99	9,00	9,10	8,50	7,51
Anthocyans mg/l	796	812	750	600	786	808	740	584	750	790	710	570
Color intensity $DO_{420}+DO_{520}+DO_{620}$	1,456	1,520	1,420	0,862	1,447	1,500	1,400	0,850	1,300	1,367	1,350	0,840
Tonality DO_{420}/DO_{520}	0,580	0,640	0,520	0,400	0,570	0,610	0,500	0,375	0,550	0,580	0,450	0,370
Organoleptic determination 1-20 point syst.	18,70	19,00	18,40	17,40	18,20	18,50	18,30	17,10	17,80	18,00	17,70	17,00

Table 4.
Admitted grapes production for obtaining wines having Controlled Origin Denomination Dragasani

Crt. No.	Types of species	Maximum accepted grapes production at harvest on quality category (q/ha)		
		COD-*CIB* *(Harvest at the ennoble of beans)*	COD-*CT* *(Harvest late)*	COD-*CMD* *(Harvest at fully maturity)*
1	Tamaioasa Romaneasca, Sauvignon,	60	70	80
2	Pinot gris, Cabernet Sauvignon, Pinot noir	-	70	80
3	Chardonnay	-	-	80
4	Merlot	-	80	100
5	Riesling italian, Cramposie selecționată, Novac, Negru de Dragasani	-	-	100
6	Feteasca Regala	-	-	120

CONCLUSIONS

1. Vineyard Dragasani is one of the oldest and famous of Romania.
2. Scientific research made in the past 50 years allowed the application of the methodology of multi criteria delimitation of the wine-growing areal belonging to vineyard Dragasani, with a special vocation to obtain wines of superior quality with name of controlled origin.
3. Wines of Tamaioasa Romaneasca and Sauvignon, through composition characteristics and olfactory - taste characteristics can occupy the highest quality stages (COD-CT or COD-ÎB).
4. The wine-growing lawn Dealul Olt proved to offer only in the superior third and the middle one of the slope, wines of superior quality with the name of controlled origin, belonging to the highest quality stages.
5. For the wine-growing areal of the vineyard Dragasani it is necessary to be realized the delimitation until the level of lawn and plot of land, of the areal s of vocation to obtain superior quality wines with name of controlled origin.

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THE ECOCLIMATIC CHANGES IN THE VITICULTURAL AREA OF NORD-EASTERN MOLDAVIA

Liliana Rotaru[1]

KEY WORDS: global reheating, green house effect, septentrional vineyards, grapevine

ABSTRACT

The reheating total of the climate put out of order the natural evolution of the factors within the framework of the wine ecosystems: be became more still torrid and drynesses , the autumns longer and wet and the winters shorter and with the extreme temperatures. Records more frequents alternation of the periods of drynesses prolong with the excessive periods rainesses and umides. The consequences have are for the vines are obvious: prolonged the active period of vegetation, and the physiologic vine entree unprepared rest of winter. The atypical autumns climatic carry out to the defection maturation of the grapes, these poorly have in components natural these which gives the quality of the wines. In this work followed the evolution of the climatic factors in the vineyards septentrionale in Moldavie (Iasi, Cotnari, Husi), over one 60 years period (1896-1955), comparative to the values record in last 10 years (1898-2007). To establish it the influence of dereglations on the vegetative cycle of the vine have follows principal wine type of vines cultivated in these areales wine, the unfolding of the phenophases, the quantity and the quality of production of grapes.

INTRODUCTION

The total warming of the climate put out of order the evolution of the natural factors within the framework of the wine ecosystems: the summers became increasingly more torrid and drier, the longer autumns, the shorter and seldom excessive winters, the periods of dryness increasingly more frequent, and the excessively rainy wet periods. The consequences for the vine are obvious: the vegetation lengthened, and the vine enters in winter always more slightly prepared: hot summer dayss of August and the first part of " September; warm" the grapes and block the accumulation of sugars, the maturation of the grapes being made " forced" , the grapes are impoverished in the natural components which give the quality of the wines (primary education flavours, polyphenols, hydroxides etc) (Becker *et al.,* 1992).

There is modification of the spectral composition of the light, in favour of radiations U.V much more aggressive for the vine; consequences, blocking of the enzymatic mechanisms of formation of the compounds polyphenolic in the grapes. Increased the CO2 concentration in the atmosphere with approximately 30%, newcomer

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with 350 ppm (in volumes) compared to 270 ppm that it represented in 1958 and probably it will double until 2050; consequences, the increase in the leaf aera of the vine and the weakening of resistance to the dryness (Riou, 1994).

MATERIAL AND METHOD

In the wine-growing zone of of Romania, located between the geographical coordinates of 46°31' - 47°35' northern latitude and 27°28' - 27°36' longitude is one followed the evolution of the climatic factors in the vineyards located in the septentrional zone of of Moldavie, namely, Iaşi, Cotnari and Huşi, over one 60 years period (1896-1955), and for the comparison, one retained the values of the climatic factors of last the 10 years period (1998-2007), and that in order to surprise the disordered states which occurred in the wine ecosystem of the ecosystems.

At the same time, one followed the unfolding of the phénophases of vegetation at principal wine grape type of vines, to be able to determine the disordered states of the climatic factors up to what point influenced the vegetative cycle of respective type of vines.

RESULTS AND DISCUSSIONS

The characteristics of the climate of Romania are due to its geographical position and the air circulation of the terrestrial atmosphere. Thanks to its geographical position, at the zone the interpenetration of the masses of tropical air with that of polar origin, the climate of Romania is under the direct influence of the great systems barrels which act as Europe:

- the anticyclone of the Azores, located in the south-west of Europe, characterized by a pressure high barrel and which influences the territory of Romania all the year;
- the Siberian anticyclone, located between Carpates and the extreme North-East of Europe, constitutes another center of pressure high barrel and acts with preponderance during the cold season;
- the Icelandic cyclone, located at the north of the Atlantic Ocean, constitutes a basic center pressure, which acts in a surface limited in summer and much broader in winter;
- Mediterranean depression, located in the central basin of the Mediterranean east another center of low pressure which acts as winter.

The specific relief of Romania and especially the presence of Carpates, with altitudes which exceed 2500 m, make that the influence of these centers of pressure barrel is sectoral on the climate of Romania. Also zones of the North-East of Romania, being especially under the action of the Siberian anticyclone, are characterized by rigorous winters, with negative temperatures which sometimes go down until - below from the limit from resistance from the vine, and of the hot summers, deprived of precipitations, or sometimes excessively rainy (Barbu, Cotea, 2002).

The vine is a plant whose life cycle is one longest, among the crop plants. Also the climatic modifications more deeply affect the biology of type of vines. Another characteristic consists in the fact that it is able to provide products very different from/to each other, thanks to the multitude of the type of vines which one cultivates, differences which are maintained from one year to another. The total warming of the climate caused many disordered states in the wine ecosystems, type of vines being obliged to modify their annual cycle of vegetation, with generally negative consequences on the quality and the quantity of the production of grapes, including wines which result from it.

In general, one attends with an increase in the temperatures, the stressing of the deficits of precipitations and a prolongation of the growing period, within the framework of the wine ecosystems. Analysis of the wine ecosystems taken being studied, one noted what follows (tab. 1): The total warming of the climate occurred with +0,2 - 1°C, the active heat balance for the vine increased by +111,9 - 191°C, the real insolation was prolonged with +33,3 - 74,5 hours, the value of the Huglin index increased with +135 - 206, the deficit of precipitations was accentuated, newcomer with - 12,1 - 77,3 liters of water/m^2.

Though the vine consumes great quantities of water, during the years of dryness it suffers from it less than the annual plants, thanks to its radicular system which explores a great volume of ground of the deep layers, in which there is a great water reserve. In addition, the vineleaves are characterized by a considerable force of suction of this water of the ground (17,2-25,8 atmospheres).

Table 1

Values of the bioclimatic indices in the wine-growing zone of of Romania followed during one 60 years time, compared to the 10 last years (1998-2007)

Bioclimatic indices	Vineyard of Iași 200 m alt. average			Vineyard of Cotnari 350 m alt. average			Vineyard of Huși 120 m alt. average		
	Period 1896-1955 (60 years)	Period 1998-2007 (10 years)	Noted disordered states	Period 1896-1955 (60 years)	Period 1998-2007 (10 years)	Noted disordered states	Period 1896-1955 (60 years)	Period 1998-2007 (10 years)	Noted disordered states
Annual average temperature (^{0}C)	9,6	9,8	+0,2	9,0	9,3	+0,3	9,5	10,5	+1,0
Average of the monthly minimas in the air (^{0}C)	-22,1	-23,8	+1,7	-23,3	-24,1	+0,8	-22,4	-23,9	+1,5
Average of the monthly maximas in the air (^{0}C)	35,7	36,2	+0,5	34,6	35,9	+1,3	35,8	36,8	+1,0
Total heat balance (^{0}C)	3717	3893,8	+176,8	3508	3685	+177	3693	3884	+49
Active heat balance (^{0}C)	3224	3335,9	+111,9	3103	3216	+113	3212	3275	+191
Useful heat balance (^{0}C)	1374	1446,5	+72,5	1320	1376	+56	1382	1455	+73

Real insolation in the per. of vegetation (no. hours)	1496,4	1529,6	+33,2	1438,5	1489,5	+51	1438,6	1513,1	+74,5
Total annual precipitations (mm)	517,8	498,6	-19,2	525	510,2	-14,8	523	501,9	-21,1
Total precipitations in the per. of vegetation (mm)	335,5	301,9	-33,6	409,4	332,1	-77,3	321,6	309,5	-12,1
Relative humidity of the air (%)	70	68	-2	73	70	-3	68	66	-2
Length of the growing period (no. days)	185	187	+2	180	184	+4	183	186	+3
Real solar index	1,81	2,21	+0,20	1,89	2,05	+0,16	1,98	2,20	+0,22
Hydrothermal coefficient	1,40	0,91	-0,49	1,31	1,03	-0,28	1,19	0,98	-0,21
Wine bioclimatic index	7,77	9,03	+1,26	6,05	7,84	+1,79	7,15	8,60	+1,45
Index of the oenoclimatic aptitude	4634,9	4813,6	178,7	4382,1	4623,4	+241,3	4332	4728,6	+396,6
Index of Huglin	1795	1953	+158	1685	1891	+206	1824	1959	+135

However, the prolonged dryness affects the plantations of vine of the north-eastern zone of Moldavie. The effects are: low strength of the stocks, concretized in thin and insufficiently ripe vine shoots at the majority of type of vines; more reduced production, grapes remaining small with small grains; the accumulation of sugars is blocked, and in the plantations several stocks are desiccated (Cotea and al, 2005).

Table 2

Unfolding of the phenophases of vegetation at principal grapevine varieties in the wine-growing zone of NE of Romania

Varieties	Vineyard/period	Budding	Flowering	Maturation of the grapes	Falls of the sheets
Fetească albă	Iasi (1896-1955)	23-26 IV	5-10 VI	20-25 IX	20-25 X
	Iasi (1998-2007)	16-28 IV	1-10 VI	15-25 IX	25-28 X

	Cotnari (1896-1955)	24-28 IV	5-12 VI	24-28 IV	19-24 X
	Cotnari (1998-2007)	22-25 IV	3-8 VI	20-25 IX	23-27 X
	Husi (1896-1955)	23-26 IV	3-7 VI	15-18 IX	22-29 X
	Husi (1998-2007)	20-24 IV	1-7 VI	12-16 IX	23-28 X
Fetească regală	Iasi (1896-1955)	14-20 IV	3-10 IV	19-24 IX	23-27 X
	Iasi (1998-2007)	12-16 IV	1-6 VI	15-23 IX	26- 29 X
	Cotnari (1896-1955)	16-26 IV	3-10 VI	15-25 IX	19-24 X
	Cotnari (1998-2007)	13-23 IV	1-7 VI	12-18 IX	20-25 X
	Husi (1896-1955)	12-17 IV	31 V-5 VI	13-18 IX	18-25 X
	Husi (1998-2007)	10-15 IV	27 V-5 VI	10-17 IX	23-28 X
Aligoté	Iasi (1896-1955)	17-24 IV	3 -12 VI	20-27 IX	20-26 X
	Iasi (1998-2007)	15-26 IV	31 V-9 VI	18-25 IX	24-28 X
	Cotnari (1896-1955)	19-26 IV	5-12 VI	21-29 IX	20-24 X
	Cotnari (1998-2007)	16-20 IV	1- 10 VI	18-25 IX	23-28 X
	Husi (1896-1955)	15-20 IV	1-10 IV	18-24 IX	18-24 X
	Husi (1998-2007)	13-17 IV	27 V - 5VI	15-20 IX	23-27 X
Muscat Ottonel	Iasi (1896-1955)	15-23 IV	4-15 VI	20-26 IX	17-24 X
	Iasi (1998-2007)	13-20 IV	2-12 VI	25-30 IX	20-28 X
	Cotnari (1896-1955)	17-25 IV	5-12 VI	22-28 IX	15-23 X
	Cotnari (1998-2007)	15-20 IV	1-8 VI	23-26 IX	22-26 X
	Husi (1896-1955)	13-18 IV	31 V-6 VI	17-24 IX	18-26 X
	Husi (1998-2007)	10-15 IV	27 V-4 VI	15-21 IX	20-28 X

The disturbances which occur in the unfolding of the phénophases of vegetation of type of vines for the grapes with wines cultivated in the part of the North-East of Romania indicate: prolongation of the growing period of some 2 weeks; the release of the phénophase of flowering in a shorter interval after the vine entered in vegetation, of 42-56 days; the entry forced of the grapes during the time of maturation, since flowering until maturation it does not last more than 97-120 days (tab. 2)

The economic consequences which result from it are: inconstant productions of grapes from one year to another; less accumulations of sugars in the grapes, because of the pedological dryness which blocks the sugar surge in the sheets (tab. 3), and the grapes are lower in chemical compounds which ensure the quality of the wines (polyphenols, primary education flavours), which reflects negatively on the quality of the products obtained.

Table 3

Quantity and quality of the production of grapes for grapevine varieties, in the zone of NE of Romania

Varieties	Vineyard/period	Average production on stock (kg/stock)	Production calculated for the hectare (t/ha)	Sugars (g/l)	Total acidity (g/l H_2SO_4)
Fetească albă	Iasi (1896-1955)	3,1-4,4	11,7-16,3	183-214	4,1-4,9
	Iasi (1998-2007)	2,9-4,1	10,7-15,1	174-205	4,5-5,2
	Cotnari (1896-1955)	3,3-4,1	12,2-15,1	186-215	4,3-4,7

	Cotnari (1998-2007)	3,0-3,6	11,1-12,9	176-200	4,6-5,3
	Husi (1896-1955)	2,7-4,1	9,9-16,8	180-205	3,9-4,5
	Husi (1998-2007)	2,7-3,5	7,3-12,2	177-194	4,3-5,0
Fetească regală	Iasi (1896-1955)	3,3-4,9	12,4-18,1	170-197	4,3-5,4
	Iasi (1998-2007)	2,8-4,1	10,3-15,1	165-190	4,8-5,8
	Cotnari (1896-1955)	3,2-4,5	11,8-20,2	172-196	4,5-5,0
	Cotnari (1998-2007)	3,0-4,1	11,1-15,1	166-189	4,4-5,6
	Husi (1896-1955)	3,4-5,0	12,5-25,0	175-206	4,3-5,8
	Husi (1998-2007)	2,7-4,3	7,3-18,5	164-198	4,6-5,3
Aligoté	Iasi (1896-1955)	4,4-5,3	16,3-19,6	160-185	4,5-5,8
	Iasi (1998-2007)	4,1-4,8	15,1-17,7	150-180	4,5-6,1
	Cotnari (1896-1955)	4,3-5,0	15,9-18,5	163-189	4,2-5,7
	Cotnari (1998-2007)	3,8-4,6	14,1-17,0	158-184	4,5-6,3
	Husi (1896-1955)	4,1-5,1	15,1-18,9	166-194	4,4-5,1
	Husi (1998-2007)	3,6-4,6	13,3-17,0	158-184	4,7-5,9
Riesling italian	Iasi (1896-1955)	2,5-4,1	9,4-15,4	179-208	4,2-5,2
	Iasi (1998-2007)	2,1-3,5	7,8-12,9	170-201	4,4-6,5
	Cotnari (1896-1955)	2,3-3,8	8,5-14,1	177-210	4,5-5,5
	Cotnari (1998-2007)	2,0-3,4	7,4-12,6	170-189	4,9-5,9
	Husi (1896-1955)	2,9-4,5	10,7-16,6	185-213	4,2-5,1
	Husi (1998-2007)	2,0-3,3	7,4-12,2	174-204	4,6-5,8

CONCLUSIONS

1. In all the vineyards of of Romania the total warming of the climate is felt, which, year after year, causes disordered states in the wine ecosystems. Were accentuated the periods of dryness and the summers torrid which negatively influence the course of the cycle of vegetation at type of vines.

2. The dryness became a weather phenomenon which affects in great measurement the wine plantations, in all the vineyards. Consequently, it is increasingly more necessary to create understocks resistant to the dryness, adapted to the characteristics of écoclimat of the septentrional vineyards.

3. It is noted that the total warming led to the prolongation of the growing period at type of vines; the grapes use early a process of forced maturation, and because of the periods of dryness which frequently settle during the summer, the accumulation of sugars is weak. The productions of grapes become inconstant, from one year to another and are not always of good quality.

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THE AGROBIOLOGICAL AND TECHNOLOGICAL VALUE FOR VICTORIA GRAPEVINE VARIETY IN VINEYARD AREA OF IASI

Liliana Rotaru[1]

KEY WORDS: the Victoria grapevine variety, vineyard of Iaşi, agrobiological and technological value

ABSTRACT

The table grape variety Victoria, constitute one of the most valuable Romanian creation. It was obtain at SCDVV Drăgăşani in follow hybridation Cardinal x Afuz Ali, and his meeting hetherosis character (Victoria Lepădatu and colab., 1978). It meet a very large spreading in other countrys, greats cultivators of table grapes: Italy, Spain, Portugal, where is it prove his especial quality. In this paper, the authors present the behaviour of table grape Victoria in area ecoclimatic condition of Copou vineyard, where it constitute one of most valuable variety, which allows obtain greats and best quality productions in NE of Moldavia area.

INTRODUCTION

The variety of Victoria consumption grapes is one of the most valuable Romanian creations. It was obtained at SCDVV Drăgăşani following the hybridation of the varieties Cardinal *x* Afuz Ali and has the character of heterosis (Victoria Lepădatu and colab., 1978). It has widely spread in other countries, which are great producers of consumption grapes, such as Italy, Spain, Portugal, where it proved its special quality.

In Romania this variety has been recently introduced in most vineyards whose production objective is to obtain varieties of consumption grapes. This paper is meant to outline the behavior of the Victoria grape variety in the ecoclimatic conditions of the Copou Iasi Viticultural Center, one of the most valuable varieties, which enables the obtaining of extensive and high quality productions in the North-Eastern zone of Moldavia, the area of the Copou viticultural center, together with other important creations obtained at SCDVV Iasi, such as the Gelu and Paula varieties.

MATERIAL AND METHOD

The study was performed in the Copou viticultural center, at SCDVV Iasi, in a plantation with the Victoria variety, grafted on the mother plant Berlandieri *x* Riparia Selection Oppenheim-4. On the plantation, the vines are directed on semitall stems, bilateral cord, with cutting in crop chains (taps 2 eyes + cord 5-6 eyes), with the attribution of a cutting load of 40-45 eyes per vine. The observations and calculi were performed in the period 2006-2007 and focused on: the resistance of the variety to frost, the development of

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the vegetation phenophases, grape fertility and productivity, resistance to diseases and damages, quantity and quality of the grapes production.

RESULTS AND DISCUSSIONS

The Iasi vineyard meets many of the habitat conditions for vine, in relation to the support factors (litho-morpho-pedologic), as well as to the external ones (bioclimatic). The main climatic indexes: the duration of the vegetation period 170-180 days, the annual average temperature, 11.3 degrees Celsius in 2006 and 11.7 degrees Celsius in 2007, the global thermal situation 3700-3800^{0}C, the active thermal situation 3200-3350^{0}C, the useful thermal situation 1400-1500^{0}C, the real insolation 1400-1500 hours, the sum of annual rains 500-550 mm; in 2006 and 2007 the vegetation periods were of only 196-206 mm. In the study years, the absolute minimum value –25.1 C, was registered in the month of December of 2006, and the maximum value reached 42.3°C in August 2007.

Consequently, in this vineyard one can grow vine varieties with a medium vegetation period, with moderate requests in relation to temperature and humidity, good resistance to frost, except for the years with climatic accidents.

The losses of buds during the winter. In the years with a normal thermal regime the Victoria variety (figure 1) registers losses of the main buds, the losses of buds exceed 24.9% and the application of compensation cutting is necessary in order to obtain a normal production of grapes.

In the years when the minimum absolute temperatures decrease under the resistance limit of the variety (2006), the losses of buds exceed 24.9%, thus requiring compensation cutting in order to obtain a normal production of grapes.

Figure 1. - Victoria grapevine variety

The development of the vegetation phenophases (table 1). Function of the climatic conditions of the year, it has been noticed that the Victoria variety enters in vegetation in the second half of April, being protected from the danger of late spring frost (15 April), and the blossoming occurs in the first decade of the month of June. The ripening of the grapes takes place at the end of July, when the grapes reach maturity, in the second decade of the month of August, according to the second epoch.

The vegetation period ends with the ripeness of the twigs and the fall of the leaves, phenophases that are strongly conditioned by the climatic regime of the area of the Iasi vineyard; for the Victoria variety, these phases take place after October 15, with the appearance of the first autumn frost.

Table 1

The development of the vegetation phenophases at Victoria grapevine variety in the Iaşi vineyard (years 2006-2007)

Years	Budding	Flowering	Ripeness of the grapes	Maturation of the grapes	Falls of the sheets
2006	24.04	5.06	31.07	18.08	20.10
2007	20.04	1.06	26.07	15.08	25.10

The fertility and productivity of the grapevive variety (table 2). The Victoria variety is characterised by medium fertility and increased productivity, due to the size of the grapes.

The percentage of fertile twigs varies between 60% and 70%. The values of the fertility quotas were: c.f.a 1,00-1,05, c.f.r. 0,64-0,69, which indicates the fact that a single inflorescence forms on a twig, in average, and consequently, the application of the green rate setting operation is not necessary.

The productivity of this variety is very high, due to the weight of the grapes, which is of approximately 400 g. The values of the productivity indexes were: i.p.a. 427,45-513,45, i.p.r. 282,20-312,96.

Table 2

The fertility and productivity of the Victoria grapevive variety in the Iaşi vineyard (years 2006-2007)

Years	The percentage of fertile twigs	C.f.a.	C.f.r.	The average weight of the grape (g)	I.p.a.	I.p.r
2006	60	1,05	0,64	400	513,45	312,96
2007	65	1,03	0,68	415	427,45	282,20
Average	*62,5*	*1,04*	*0,67*	*407*	*470,45*	*298,52*

Resistance to diseases and damages (table 3). The appreciation of the level of resistance was performed according to the O.I.V. norms, with the help of descriptors. We analyzed the behavior of the variety in relation to biotic and abiotic factors. It was observed that the Victoria variety presents a good level of resistance to the grey rot of the grapes, medium tolerance to manna and mildew. Under the aspect of tolerance to damages, the Victoria variety has medium tolerance to the attack of grape moths and sensitivity to spiders, especially to the red spider. It has medium resistance to drought and is a little more sensitive to frost.

Table 3

Resistance to diseases at the Victoria grapevive variety in the Iaşi vineyard (years 2006-2007)

Years	Resistance of manna		Resistance of mildew		Resistance of grey rot	
	levels	grapes	levels	grapes	levels	grapes
2006	5	4	5	6	3	4
2007	6	5	5	5	3	4

Quantity and quality of grapes production (tabel 4). The Victoria variety has a very increased productivity capacity, of over 20t/ha, and with a percentage of 83% of merchandise production; the quantity of traded grapes was of about 16-17t/ha.

Table 4

Quantity and quality of grapes production at the Victoria grapevive variety in the Iaşi vineyard (years 2006-2007)

Years	The average weight of the grape (g)	Weight of a 100 berries (g)	Production		Percent of the merchandise production	Sugar accumulations (g/l)	Total acidity (g/l H_2SO_4)	Glucoacidimetric index
			kg/stock	t/ha				
2006	400	640	5,1	19,3	84	170	4,0	42,50
2007	415	715	6,2	23,0	82	160	4,8	33,33
Average	*407*	*678*	*5,6*	*20,7*	*83*	*165*	*4,3*	*38,06*

From the analysis of the table it results that the Victoria grape has very big grapes, this feature being less influenced by the climatic conditions of the year and by the agrotechnical level applied at the plantation.

From a qualitative perspective, the Victoria variety has sugar accumulations within the specific limits of consumption grapes 165-170 g/l, with total acidity of the must, balanced with 4,3 g/l H_2SO_4, so that the value of the glucoacidimetric index approaches the optimum value of 38.06.

CONCLUSIONS

- In the ecoclimatic conditions of the Iasi vineyard, the Victoria variety can be cultivated with good results, since it reacts very well under the temporal aspect, and registers large and high quality productions.
- The introduction of the Victoria variety in the category of consumption grapes of the Iasi vineyard brings diversity to the grapes variety and enables the consumption of these varieties for a longer period of time.
- Due to medium resistance to frost and drought, when setting up new plantations one must give special attention to the growing surface and exclude those lands with high frequency of climatic accidents or with long periods of drought during the summer.

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STUDIES ON THE BEHAVIOUR OF VARIETY *GOLGEN STEFANESTI* IN VINEYARDS STEFĂNESTI AND BANU MARACINE

Camelia Popa[1], Daniela Cichi[2], Cezarina Necula[3]

KEY WORDS: *blossom, crispy,blooming, such diseases, variety*

ABSTRACT

The activity of viticulture improvement from the last years at the National Research and Development wanted to get new varieties, more productive and to give more quality. These ones should resist to the main diseases and pests. The studies started in 1995 at NRDIBH Stefanesti and that materialized by the homologation in 2007 of the Stefanesti Golden table grapevine. The new creation come out from the controlled hybridization tests between Beautiful White x Augusta. For the adjusting determination at the different pedoclimatic conditions, the variety is studied in two growing centres from Dolj and Arges

INTRODUCTION

By the interspecific and intraspecific method of the hybridization (for the table varieties) has been obtained a rich fund of varieties, hybrid top matches for table grapes, pointing to complete or replace other varieties. In 2007 the Stefanesti Golden (Beautiful White x Augusta) variety was homologated for table grapes that, beside a pleasant appearance shows high resistance to the specific diseases.

Regarding the setting on soil of the new creation is necessary their testing on: the ecological adjustment in different cultural arias, the bio productive behaviour (the agro biological potential), the quality (technological potential) depending on the ecological and the agro fit-technical offer. The recent variety set on the Official list of the varieties can bi found in two representative viticulture arias from Muntenia and Oltenia. In these two experimental ranges have been made determinations regarding, the checking of the specific genetic potential of the analyzed viticulture, material of the agro biological and technologic characteristics, but also of the stability of the amphelografic characteristics in different pedoclimatic conditions.

MATERIAL AND METHOD

The Stefanesti Golden was studied from the adjustment at different climatic condition point of view. The reason was to find out the variability of the main characteristics and the heretical hand over. The studies were made on the table grapevine variety, named Stefanesti Golden (1st and 2nd images) that was homologated in 2007.

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During 3 years of studies many determinations were regarding the ampelographic, agro biological and technological characteristics, comparing to the witness varieties: Pearl Csaba, Augusta, Chasselas Dore. The observation was made in the two growing districts: Stefanesti and Banu Maracine-Craiova, where the Stefanesti Golden was planted between 1996 and 2004.

Fig.1 şi 2. Variety *ŞtefăneştiGolden*

RESULTS AND DISCUSSIONS

Analyzing the climatic date (the air temperature, the air average, humidity and the quantity of rain) recorded in the Stefanesti growing district, between the years 2006-2008 and their influence on the quality and quality elements of the grapes, there were obtained the following results:

The breeding capacity of the Golden Stefanesti, Csaba Pearl, Chasselas Dore and Augusta was influenced by the climatic conditions during the analysed productivity of these years. Thus, between the years 2006-2008 Chasselas Dore were recorded superior values, regarding the shoot viability (89%), resulting that it is a variety with the biggest freezing resistance.

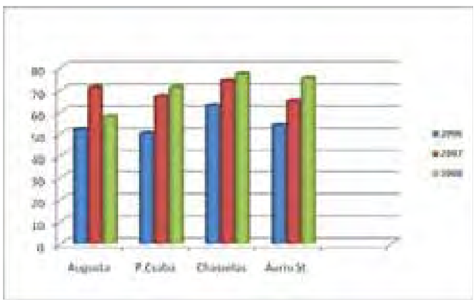

Fig. 3.The shoote fertility (M 2006-2008)

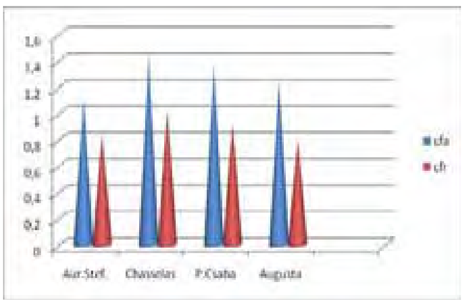

Fig. 4.Fertility values (M2006-2008)

Determining the fertility values we can estimate the way that the analysed varieties is fertile and the way they resisted to the bad weather conditions during the winters.

The fertile shoots rate and the fertility values were determinate (cfa, cfr). As we can see in 3rd and 4th diagrams, the Stefanesti Golden had a high fertility, close o three witness varieties. This fact proves that this variety acts from this point of view, as every known variety. The quality of the table grapes manifests by average weight of one cluster (5th diagram), the weight of 100 berries, gluco-acidimetric index. Regarding the „berry weight”, analysed the grapes table varieties had high values. Only in 2007 the long drought determined a slower growing. In the good years for the viticulture, the weight of this grape variety passes 7g, a value not other met at the table grapes.

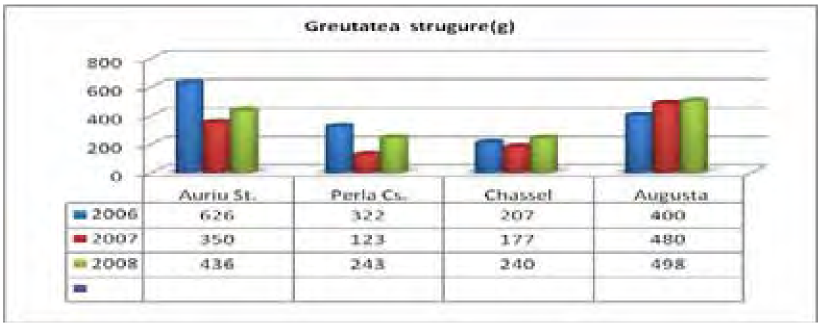

Fig. 5. Averrage weight of grapes

The index „weight of a grape”, the variety records the average weight of 500g.There are viticulture years when the Stefanesti Golden weight can overtake the Augusta productivity. We need to emphasis the discreet taste of Muscat of this variety and also the very crispy consistence of its pulp.

The average of the sugar content from the must varies at the table varieties from 130g/l(Augusta) to 154g/l Chasselas Dore). The golden type, damage a very early ripening (30.07-5.08), accumulated 150-160g/l sugar that correspond to acidity of 3-3,5g/l H_2SO_4.

Analysing the production on the vine in the table grapes category, we can see that the new variety weights a average production of 4,5-5kg/vine, value that puts it between Csaba Perle (4,4 kg/b) and Augusta(7,2kg/b). Because of the reason that, in the growing district of Banu Maracine, the Stefanesti Golden was planted in 2004 and made fruits on 2007, two years of fruits were no table to be conclusive to analyse the quality of the grapes. The tests limited to the vine of the main fen phases. The maturation of the shoots texture is a complex characteristic that is realised dynamically by depositing in the texture of the reserve substances.

The maturation corresponds to a bunch of transformations that make the passing from herby estate to a wooden one. According to the calendar, in the specific technological conditions of the Banu Maracine centre, the maturation begins in the first part of august and lasts 60-70 days. The maturation level (definite by on optimum level of reserve substances) determines freezer resistance of the shoots, cords and wood.

Variability	Total shoot lenght (cm)	Maturation lenght (cm)	Unmaturation lenght (cm)	Unmaturation shoot procent
Csaba Perle	81,7	45	30,7	37,57
Golden Ştefăneşti	84	45	39	46,42

Fig. 6. Growing Characteristics of the shoots
of some vines recently introduced in Banu Maracine Center Range

Analysing the obtained results we can easily see that the fastest growing in the young population was at the Golden Stefanesti shoots total average length of 84 cm. the next one is Csaba pearl (81.7 cm) (Diagram 7).

Looking after the dynamic evolution of the starch content from the cords during the vegetative rest, it was seen at all the varieties, a diminution of the starch. It was different depending on the climatic conditions as the metabolic particularities of the varieties. The highest starch content from the cords texture was recorded at Csaba Pearl (5.60%) and Golden (5.20%).

CONCLUSIONS

The Stefanesti Golden made between 2006-2008 nice grapes (the cluster's weight 530 g and the grape weight 4.7g). They weren't affected by the specific diseases (mann, rottenness, mildew). The varieties that proved to be valuable from the point of view of: freezing resistance, diseases, early maturation and special qualitative characteristics, nice commercial appearance. The vine had a good maturation at Stefanesti and Banu Maracine, and the shoots viability dropped at 80%.

Because of the early maturation of the variety, it is recommended its testing in different growing arias.

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FETEASCA NEAGRA 6 STEFANESTI – A NEW CLONAL SELECTION FOR RED WINES CREATED AT STEFANESTI

Ion Radulescu, Camelia Popa, Anca P. Onache[1]

KEY WORD: variety, clonal selection, such diseases, grapes quality

ABSTRACT

Many grapevine varieties from our day culture do not have economic value, and others degenerate in the same time with their heterogenic multiplication. The Feteasca Neagra variety was cloned for the genetic stabilisation and the fastening of their valuable productivity and quality characteristics. At the National Research and Development Institute for Biotechnology in Horticulture Stefanesti, Arges, was selected the clone Feteasca Neagra 6 St. After it has passed through 3 specific stages of clone selection scheme it was homologated in 2007. This clone proved to be superior from the point of view of the quality and quantity to the base variety

INTRODUCTION

The clone selection, suitable for the vegetative multiplication is the only way to avoid the grapevine degeneration. The variety that was cloned is one of the elements that make the pride of Stefanesti Growing District. This variety is Feteaca Neagra.

For the clone selection there are three important stages:
the selection in the positive field, the selection of the clones in the mother plantation and their fast multiplication; the comparative study of the selected clones regarding the productivity potential, the quality characteristics of the grapes and wines, sanitary testing;
the good clones multiplication, their recording at ISTIS and their homologation. As a result of clone selection, a new one - Feteasca Neagra 6, was obtained and homologated in 2007

The clone selection of the vine was a preoccupation for many researchers Hustfeld B. (1942), Breider O. (1968), Bădițescu, Damian, etc. who obtained many clones from the main varieties in the culture of Romania: Sauvignon 24 şi 20, Chardonnay 25, Merlot 17, Pinot Noire 35, etc.

MATERIALS AND METHODS

The identification, the selection and the making of the valuable selected clones from the varieties that we mentioned before, was made in some plantations of 20 and 25 years old with good fit-sanitary state. Before these tests it was made a very strict positive selection.

The selection was made having recommended foundations: fit-sanitary stare, the power of growing, the grape production and its quality.

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To compare the selected clone's performance it was used as a witness, the average of the positive selection of every variety. In the 3rd year of the selection the vines that were not productive and did not maintain the quality required were eliminated.

In the same time with the study of the selected clones in the mother plantation was done the multiplication of the best ones by pruning and cuttings for setting up comparative and testing plantations. The three growing districts were set on between 1988 and 1996, on the middle third (1996) and the superior third (1988) of a 10-12% slope south orientated.

The used mother plant for pruning was Kobber 5 BB and the spaces between plants was 2.5m between rows and 0.9m between vines on a single row (4445 vines/ha). The vines were cut Guyot style on semi stem, holed on stakes with 3 double wires. The soil is coluvial brown, sandy-clay, with average quantity of phosphor and potassium, low carbonadoed, with low acid pH (6.2 – 6.4).

The research results were compared with the averages obtained for all the selected clones from the same variety.

The selected clones from the comparative field was multiplied by pruning on the Berlandieri x Riparia Kober 5BB mother plant, giving out 200 pruned vines that were planed on the testing range for the first time. This was the last stage of the clone selection in the Stefanesti Growing District.

RESULTS AND DISCUSSIONS

Climatic conditions. All the obtained results after the determinations were influenced by the climatic conditions between the studied years 2005 – 2007, when the selected clones were studied in the comparative and in the testing plantations. The climatic conditions from these years are characterised by a low quantity of rain, especially in the critical times of growing and maturation of the grapes and by big differences of the temperature during summer and winter time. The heliothermic, hidrothermic and bioclimatic index had good values recorded in the admitted limits for viticulture.

The red wines were studied inside of the improvement lab 20 selected clones, in three comparative fields, in the same time with the testing field of the Feteasca Neagra variety. From their physical and chemical analyses, in the three production years (2005 – 2007) on the testing range, it came out that the superior results of the average had many selected clones, with not too many differences. Thus, the clone 6 St. was homologated.

The main morphological characteristics. The rosette is fluffy, red-greenish. The top of the young shoot is light green, with intense anthocyanic pigmentation, general distributed. It has a big density of the smooth hair. The adult leaf is an average size, 5 – lobes, greenish colour, with an open petiole sinuses and the base in a U shape. The upper lateral sinuses are the same. On the inferior part of the limb is smooth hair with an average density. The cluster is big with a conic – cylinder shape, one axial, bi-winged. The grape is small, round, thick peeled, bluish-black colour, covered with a thick bloom. The pulp is colourless, smooth, and juicy, with a specific taste. The vine is elliptical, yellowish.

Physiological characteristics. The powers of the vine, the relationship with the mother plant, its behaviour to the attack of the pests are almost the same with the Feteasca Neagra variety. It is free of the main diseases.

The top-notch clone fertility is good, having 60% fertile shoots with absolute fertility values 1.09, and for the relative one of 0.57. The productivity index are superior to the witness having values of 210 for the absolute one and 110 for the relative one.

The average mass of a grape is 193 g (comparing with the witness – 166g), and the mass of 100 grapes is also bigger with 20 g to the witness.

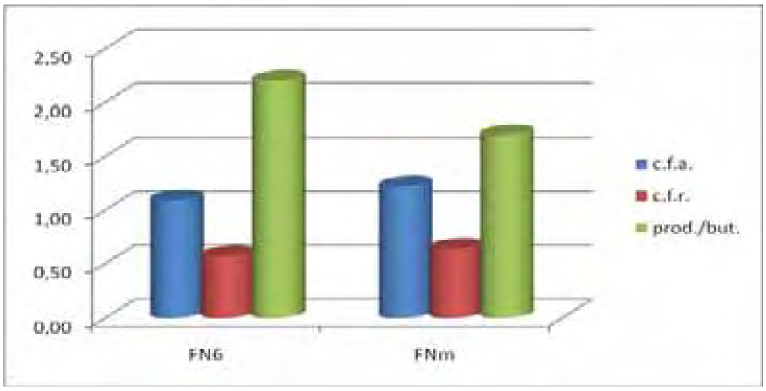

Fig. 1 - Diagram1. Physiological characteristics of the Feteasca-Neagra 6 St. Top-notch clone

The average production of grapes of the Feteasca Neagra 6 St Selected Clone.

For the years 2006 -2008, the clone outruns the witness Feteasca Neagra with 70% making 2.2 kg/vine (comparing to 1.7kg.vine for the witness) and a production of 10 tones/ha.

The sugar content and the acidity of the must, the structure index, the composition index and the efficiency index of the grape are almost the same to the Feteasca Neagra variety (diagram1).

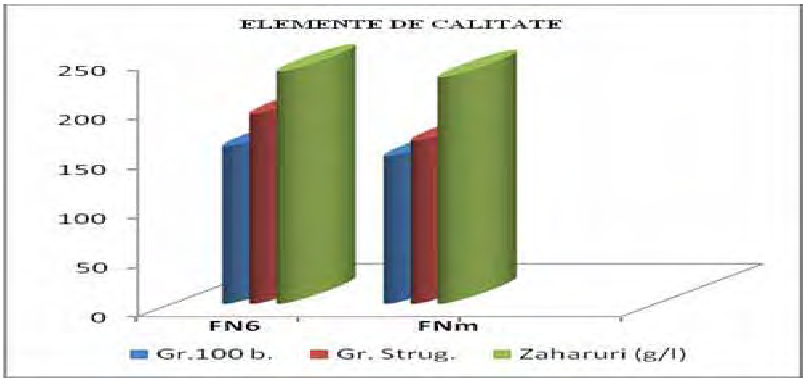

Fig. 2 - Quality elements.

Physical-chemical characteristics of the obtained wines from the Fetesaca Neagra 6St. selection.

Comparing to the climatic conditions of the production years, from the Feteasca Neagra were obtained red wines, with origin controlled type with alcoholic potential of 14.8%volume. In the years with favourable climate (2006), the wines were well balanced, reach in extract.

Tabel 1

The main composition characteristics of the wines

No.	Clone selection	Alcool %vol.	Total acidity (g/l)	pH	Unreduction extract	Colour intensity
1.	Feteasca Neagra 6 St.	11,5	4,9	3,5	29,0	8,5
2.	Witness	10,9	5,5	3,5	28,3	5,9

CONCLUSIONS

1. From quality and quantity point of view, the selected clone proved to be superior to the variety that was selected from.
2. The sugar accumulation potential corresponds to the quality varieties.
3. The selected clones can replace successfully the Feteasca Neagra variety.
4. The obtained wine after the vinification of the selected clone Feteasca Neagra 6 St. meets all the characteristics of a quality wine, fact that can lead to the vinification of this one in big quantities.

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PHYTOTHERAPEUTICAL METHODS FOR PREVENTING AND CONTROLLING THE PATHOGENS IN THE ECOLOGICAL TOMATOE CROPS

Ion Tița, Adriana Streinu[1]

KEY WORDS: ecological culture, nettle cold soaking , infusion, alcoholic extract, conversion period

SUMMARY

In the experimental plot, located at INCDBH Stefanesti Arges, on an ecological tomato culture, there have been obtained remarkable results with the following products applied simply or in combinations: nettle cold stipeeng of Urtica dioica (1 kg plant), infusion of Equisetum arvense (1 kg plant), alcoholic extract 2% from minced leaves of Rhus typhyna (1 kg plant), wet housemade soap (150 gr.) infusion of Dryiopteris filis mas (1 kg plant), dissolved in 10 litres water. The treatments have been performed preventively and curative at an interval of 5-7 days until the riping period of the crop. The extracts had insecticide effects on aphids, tetrachnide spiders and other insects, repellent for snails, zools as well as for the larvae of specific pests of hothouse cultures ans stimulative for the growth and development of tomato plants. The use of the respective mixture ensured a healthy foliage over the whole period of vegetation of tomato and greenpepper cultures. In the case when insect attacks have been recorded, an additional tratment of concentrated extract of Rhus typhina leaves combined with wet soap administered only on affected plants an don the soil around them.

INTRODUCTION

The ecological cultures can be stimulated in the vegetative growth and phyto-sanitary protected by means of preventive methods and/or by using a diversified range of biological preparations obtained through the extraction of active substances from wild plant.The obtaining of the biopreparations consists of:

- to reap the plants;
- to dry and/or to mince the used organs;
- to make ready the biopreparations

There have been used as methods of extracting the active principles: infusion, decoction, maceratul and the alcoholic extract.

The economic aspect of the ecological agriculture is very delicate taking into consideration that the benefit recorded is low on certain plots especially during the conversion period. The research assumes the role of finding the ideas and technologies which can transform the ecological cultures into productive and profitable cultures so that the ecological agriculture does not contribute to the deepening of the world food supply crisis. Thus, the other principles of the sustainable agriculture are not realizabile.

[1] Institutul Național de Cercetare-Dezvoltare pentru Biotehnologii în Horticultură Ştefăneşti Argeş

MATERIAL AND METHODS

The biological material tested was represented by the Pablo undetedermined growth variety, with tolerance at *Phitoftora infestans*. Plants from the local spontaneous flora have been used in the extraction of active principles (volatile oils, taninns, fluoro-glucidic substances, organic acids, phyto-hormons, toxialbumins, auxins, mineral salts) having a repellent, bacteriostatic, fungicide, acaricide, insecticide effect for the pathogens and a stimulative one for the growth and fruit-bearing for the cultivated plants, and wet housemade or potassium soap as insecticide-acaricide.

The working method. The experimental model was represented by the randomized blocks with the following experimental variants:

- V1 non-treated witness
- V2 the use of extracts having a repellent şi stimulative effect (nettle cold soaking of *Urtica dioica*)
- V3 the use of extracts having stimulative, repellent and fungicide effects (nettle cold soaking *Urtica dioica* + infusion of *Equisetum arvense*)
- V4 the use of mixtures having stimulative, repellent, acaricide and insecticide effects (nettle cold soaking *Urtica dioica* +infusion of *Equisetum arvense*, horse tail and tanner's sumach)

During the experiment the following aspects have been analyzed:

- the growth speed of tomato plants;
- the average production on plant and on the experimental variant;
- the symptoms of the attack of the pathogens;
- the maintaining of the pathogen populations below the economic harmful level;
- the degree of efficiency of the tomato cultures during the ecological conversion.

RESULTS AND DISCUSSIONS

The experimental plot has been located in the vegetable hothouse being in the second year of the ecological conversion and classical hothouse tomatoes technology has been applied. The control of the specific pests has been performed by treatments with extracts from diluted plants,repeated at an interval of 7-8 days.

The concentrated extracts have been obtained as it follows:

- the nettle cold steeping (*Urtica dioica*) has been obtained from 1 kg of minced green plant , covered with 2 l of warm water, soaked in the hothouse during 48 hours; the liquid was filtered, and the vegetal remainder was pressed lightly in a calibrated recipient from which quantities ca be taken for diverse dilutions;

- the infusion of horse tail (*Equisetum arvense*) has been obtained from 1 kg minced green plant, boiled in 2 l of water, during 3-4 minutes and left to soak 24 hours, then the liquid is filtered, the vegetal remainders are pressed and the liquid is put in a calibrated recipient;

- the infusion of fern (*Dryoperis filix-mas)* has been prepared from 1 kg of minced fresh leaves, boiled in 2 l of water, during 3-4 minutes; the preparation is cold soaked 24 hours, is filtered, and the vegetal remainder is lightly pressed for an appropriate recuperation of the active substances;

- the infusion of tanner's sumach (*Rhus Typhyna*): 1kg of minced leaves is boiled in 1 l water for 3-4 minutes, is cooled , an alcoholic solution 1 l 10% is added, then is left to soak for 24 hours; is filtered and pressed very lightly;

- the housemade soap (150 g housemade soap, grated and minced) is dissolved into 2 l of hot water.

The quantities of 2 l extract, prepared as above can be used immediately or can be stored in a cool place for 6-7 days. Before using them, the concentrated extracts are diluted with water at 1/5.

According to the aim the diluted solutions can be administered as such or in combinations, preventively sau curatively.

1. The analysis of the growth speed during the vegetation period

The use of the plants extracts influenced the growth speed and the productivity of the plants according to the complexity of the mixtures formed when performing the phyto-sanitary treatments. Thus, the growth has been more intense at the variants where mixted extracts were used since, besides the repellent, insecticide and/or fungicide effects, the products also contain organo-mineral compounds, auxins, amino-acids which stimulates both vegetative growth of the plants and the fruit development.

The above presented diagrams show that during the first vegetation phase the difference of 9 cm between V1 and V2, of 6 cm between V3 and V1, and of 12 cm between V4 and V1 are conclusive for the aim of the experiment (table 2).

During the second phase of vegetation the differences are even more obvious, due to a larger foliage surface, through which additional quantities of organic nutrients are absorbed from the used extracts.

The culture presented a healthier and better developed foliage at V3 and V4 where complex treatments have been used as it can be seen in figure 1.

Figure 1.

2. The maintaining of the pathogen populations under the economic harmful level has been achieved by prevention methods (the destruction of the intermediary host plants of certain common pathogens, the removal of the leaves and plants presenting strong symptoms of atack, the control of the ecological factors etc.) and by curative methods (treatments with the biological products presented above).

The more complex the extract combination, the healthier and better developed the foliage of the plants. The identification of the pathogens has been performed by visual and laboratory analyses of the samples taken periodically both from the leaves presenting symptoms and the apparently healthy ones. According to the obtained results the date of the future treatment is anticipated as well as the type of the extracts to be used.

3. Economic and financial results

The productivity of the plants and the economic efficiency of the experimental variants have been summarized in the table 1.

Table 1

Economic-financial indicators for the ecological tomato culture in the demonstrative plot

Nr.	*Finacial specification*	*Varianta*			
1.	Experimentale variants	***V1***	***V2***	***V3***	***V4***
2.	Seeds	15	15	15	15
3.	Pots / jiffy	6,0	6,0	6,0	6,0
4.	The labour	81	81	79	71
5.	Biopesticides and other consumptible materials	11,3	11,8	12,6	14,3
6.	Hothouse maintenance	1,2	1,2	1,2	1,2
7.	Payments	0,2	0,2	0,2	0,2
8.	Total production costs	114,7	115,2	114,0	107,7
9.	Total production on variant (kg)	132	140	143	154
10.	Cost (lei/kg)	0,87	0,82	0,80	0,70
11.	The value of the crop/variant	114,8	114,8	114,4	107,8
12.	The market value of the yield (lei)	132	140	143	154

From the data presented in the table it results that between the experimental variants and the witness there are differences in the high production cost compared to the variants where biostimulators and biopesticides were used. The use of biopesticide complex treatments contributed to the achievement of an additional quantity in production of over 22 kg/experimental variant, under the circumstances of a decrease in the cost price of 0,17 lei/kg of tomatoes.

CONCLUSIONS

1. The conversion period from the classical to the ecological agriculture is the most delicate for the agricultural producer since an important reduction in the quantity and the quality of the crop is recorded.

2. The maintaining of the pathogen population under the harmful economic level can be achieved only by using complex preventive and curative methods associated with visual and laboratory analyses.

3. The curative methods should be associated with the anticipation şi avertizarea rezultate prin analiza vizuale şi de laborator repetate periodic.

4. The efficiency of the tomato cultures during the ecological conversion period can be also achieved by the knowledge, the utilization and the combination of the extracts from local spontaneous plants which contain active principles having repellent, bacteriostatic, fungicide, nematocide, acaricide and insecticide effects.

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Table 2

The variation of the speed growth(cm/) according to the experimental variant, on constant levels of the measuring date, at the Pablo variety

Date	Variety PABLO												
	V_1M	V_2				V_3				V_4			
		R_1	R_2	R_3	**Media**	R_1	R_2	R_3	**Media**	R_1	R_2	R_3	**Media**
19.05. 2008	11,3	18,0	17,0	18,0	**17,7**	18,6	18,0	18,3	**18,3**	20,0	15,3	18,0	**17,8**
21.05. 2008	11,3	18,0	17,0	17,6	**17,5**	18,6	18,0	18,3	**18,3**	20,0	15,3	18,0	**17,8**
23.05. 2008	12,6	20,6	19,0	20,3	**20,0**	21,0	20,0	20,3	**20,4**	21,3	22,0	18,3	**20,5**
26.05. 2008	14,6	31,0	25,6	24,6	**27,1**	22.6	23,6	22,6	**22,9**	30,0	22,3	22,0	**24,8**
28.05. 2008	10,3	32,3	33,3	33,3	**33,0**	37,3	31,0	31,3	**33,2**	28,0	27,6	27,3	**27,6**
30.05. 2008	23,0	32,6	34,3	34,6	**33,8**	41,0	31,6	31,6	**34,7**	33,6	30,0	30,0	**31,2**
02.06. 2008	24,3	34,0	34,6	35,0	**34,5**	41,6	33,6	33,6	**36,3**	34,6	30,6	30,6	**31,9**
04.06. 2008	25,0	34,3	39,3	40,0	**37,9**	41,6	33,6	35,3	**36,8**	35,6	31,6	31,6	**32,9**
05.06. 2008	41,6	43,3	45,0	45,3	**44,5**	59,3	55,3	55,6	**56,7**	50,0	49,0	49,0	**49,3**
09.06. 2008	46,0	47,3	47,0	46,6	**46,9**	63,3	60,0	57,6	**60,3**	53,3	52,6	52,6	**52,8**

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THE ROLE OF THE PREMULTIPLICATION NUCLEUS IN THE NATIONAL SYSTEM OF CERTIFYING THE GRAPEVINE PROPAGATION MATERIAL IN ROMANIA

Adriana Streinu, Ion Tița, Ion Rădulescu[1]

KEY WORDS: initial propagating material, premultiplication nucleus, biological category, the ameliorator's material

ABSTRACT

The strategy of developing the viticultural sector implies the restructuring of the national nursery system, as a result of implementing the European legislation, namely by placing the premultiplication nucleus at the head of the viticultural channel as a guarantee of ensuring the biological traceability and retraceability of the certified propagation material.

Also, in the nucleus hothouse, the ameliorator transfers the results of clone selection, sanitary and creation of new genotypes activity which can be finalized by homologation.

These stipulations which should be controlled and respected during the maintenance period with a view to prevent the biological degradation and the reinfection with pathogens of the propagating material, are obligatory during premultiplication and transfer period in the nursery.

INTRODUCTION

The setting up of the viticultural premultiplication nucleus appeared as a necessity of implementing the administration of the propagating material from the biological category Initial Propagating Material. The activity of the ameliorator who performs clone selection and sanitary activities of the grapevine can be finalized with the omologation of different clones only after they have been transferred in the nucleus hothouse.

The transfer of the selected material, achieved by public funds, can be performed only in a public structure which can guarantee a fair distribution of the material to the users according to necessities or to national or local programmes.

MATERIAL AND METHOD

The biological material transferred in the Premultiplication nucleus is produced by the ameliorator and transferred through a Guarantee certificate of authenticity. The maintenance method ist that of a double protection imposed by internal and international legislation.

[1] Institutul Național de Cercetare-Dezvoltare pentru Biotehnologii în Horticultură Ştefăneşti Argeş

RESULTS AND DISCUSSIONS

The ameliorators must establish a certain structure (organization statute and an appropriate technical and material support), which would have the ability to multiply the clones to be omologated. This structure must contain elements of both state and private sector, in order to ensure a correct repartion and distribution with all the administration issues concerning the propagation material, according to the current legislation and which would respect the zone of the varietis and clones (POLIDORI, 2004).

Legally ,the premultiplication nucleus, stands as a legal connection, on a basis of firm agreements, beetween the Ameliorator and the transfer of his creations in production (new varieties or valuable selected clones).

Between the role of producing the Initial propagating material and that of ensuring the biological maintenancee, of maintaining a direct contact between the ministry and the nurseries, the role connected to the research and production work is more important, as it performs the transfer of innovations in the large wine-growing and wine-making production permanently (POLIDORI, 2004).

Another role results from the restructuring of the national nursery system imposed by the European legislation and by the development strategy of the wine-making sector which places the Premultiplication nucleus at the head of the viticultural system, as a guarantee of ensuring the biological traceability of the certified propagation material (TIȚA I., 2004).

A problem of a general nature ist that of the necessity of producing large quantities of material from the biological category Base in future, with a view to eliminate the material Standard from the market.

The premultiplication nucleus ensure the initial phyto-sanitary status of the material maintained under safe conditions which would prevent both technological and biological degradation, but also the reinfection with phyto-sanitary quarantine pathogens. These stipulations must be controlled and respected, during the maintenance period as well as during premultiplication and transfer in the mother plantation.

Figure 1. The mother plantation

Figure 2. The premultiplication nucleus

The Initial Material must be propagated under the ameliorator's responsibility but, by traditional methods, the obtaining of a large quantity of material necessary to set up the base mother plantation would spread over more than 4-5 years. For that, taking into consideration specific culture conditions, in vitro multiplication has been authorized, which can achieve a large number of plants without degrading the biological material (repeated vegetative multiplication which is not associated with growing maintains the biological category over the whole multiplication period) (BOUDRON, 1995, WALTER, 1995).

In order to underline the role of the premultiplication nucleus the following issues must be solved:

- to ensure the certification of the whole quantity of the propagating material in an accepted viticultural system which, according to certain stipulations of the agreement Ministry- Premultiplication-nurseries- nucleus, would settle a price for the Base material, including also the value of the selected clones and would bring certain benefits to the ameliorator. This problem must be regulated either by a due system or by a subvention of the high category biological material;
- the local interest varieties (being limited to one area) such as Busuioacă, Braghină, Crâmpoşie, Frâncuşă, Furmint etc. do not have available clones and , by rapid multiplication, can produce what Enzo Polidori calls „genetical erosion" (deliberate restriction of genetic variability which ensures the biodiversity of some varieties which must be avoided);
- the dissemination of information, through all available means, in order to coordinate the activity of the premultiplication nucleus with that of the wine-growing and wine-making associations.

CONCLUSIONS

1.The new created variety and the selected clone must reflect the invested value and the ameliorator's activity and must be valorized as a brand.

2. The maintenance and the premultiplication of the initial propagating material will develop under the direct responsibility of the Ameliorator and/or the Maintainer.

3. The initial propagating material from the Premultiplication nucleus and the check plots represent an important part of the national genetic patrimony and can be used either as a source of germoplasm in the amelioration activities,or as a propagating material destined to the setting up of the Base mother plantation.

4. By its organization and functioning, The Premultiplication nucleus has a decisive role in the national system in the production and the certification of the whole quantity of grapevine propagating material from Romania.

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RESEARCHES CONCERNING THE FEASIBILITY OF AN INVESTMENT PROJECT FOR SETTING UP A MODERN PLANTATION OF VITIS VINIFERA USING NEW VARIETIES OF CERTIFIED CATEGORY FOR TABLE GRAPES

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KEY WORDS: investment project, vine plantation, feasibility

ABSTRACT

The paper aimed to determine the feasibility of an investment project for setting up a modern vine plantation using new varieties of certified category for producing table grapes. The experiment was organized in the Experimental Polygon of Bujoru Research Station in the period 2002-2008 on 0.58 ha, using 2,450 high quality vines. Based on the technological sheets, each cost category was calculated. The feasibility of the investment project was appreciated based on Present Value and Internal Rate of Return Methods. The total costs required for setting up such a plantation totalized Euro 7,645 in the period 2002-2004. The grape Production was planned to reach 20,230 kg grapes during the period 2005-2008 and to bring Euro 21,588 incomes to the farmer. The Net Present Value registered a positive value of 1.18 and Internal Rate of Return was 12.52 % showing the project proposal could be accepted and recommended to be implemented by other viticulturists.

INTRODUCTION

The development of a modern viticulture imposes the creation of new wine plantations using high biological seeding material provided by research units. The improvement of grape production for table is required by consumers who are more informed about healthy diet based on grapes and other types of fruit. This is a challenge both for researchers called to assure the delivery of high value biological grafted vines whose origin is in high performance and locally adapted vine varieties for table grapes, but also for viticulturists who are called to produce such an amount grapes and of such high quality to meet consumers' demand.

In other words, the Romanian producers have to be aware that their existence in a more and more competitive market depends on how flexible they are to adapt to the market requirements and to keep pace to the EU and international standards concerning grape production.

For setting up modern vine plantations, important investments are required using both the farmers' own capital but also loans taken from banks.

Each investment projects has to be carefully set up and evaluated concerning its feasibility. This means that its implementation to assure such a cash flow so that investment

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costs, operating costs and production costs to be covered and the farmer to get a corresponding profit.

In this context, this paper presents a case study concerning an investment project for setting up a modern vine plantation of 0.58 ha in a production farm. The economic impact of the implementation of the project is based on a feasibility study.

MATERIAL AND METHOD

The creation of the new modern plantation of Vitis vinifera is based on the use of 2,450 standard vines of the certified category for table grapes. The vines were planted on 0.58 ha in the Experimental Polygon II, of a production farm belonging to Bujoru Research and Development Station for viticulture and vinification. The experiments were carried out in the period 2002-2008.

The plantation was set up in the year 2002 and the average grape production for the first 3 years (2005-2007) was the following one: 7,000 kg/ha in 2005, 9,500 kg/ha in 2006 and 13,500 kg/ha in 2007.

For the investment variant all the related costs, incomes and profit were calculated. The costs related to the investment project were determined taking into account the following aspects: production cost per hectar according to the technological production sheets, the surface of the new plantation 0.58 ha and the discount rate = 14 %. The costs were determined for each cost category: investment costs, operating and maintenance costs, production costs and also by cost item: materials, labor, depreciation, direct and indirect costs.

The feasibility study of the investment project is based on the Present Value Method and Internal Rate of Return Method.

Net Present value, NPV = $\sum_{n=1}^{t} \frac{V_n - C_n}{(1+i)^n}$, where Vn = total incomes in the year n, C_n = total costs in the year n, i= discount rate, n = the number of years the investment project is running.

Internal Rate of Return, IRR was determined based on the following formula:

$$IRR = i_{min} + (i_{max} - i_{min}) x \frac{\sum_{n=1}^{t} \frac{V_n - C_n}{(1+i_{min})^n}}{\sum_{n=1}^{t} \frac{V_n - C_n}{(1+i_{min})^n} - \sum_{n=1}^{t} \frac{V_n - C_n}{(1+i_{max})^n}}$$

, where i_{min}= the inferior discount rate, i_{max} = the superior discount rate. The formula of the actualization factor for i, fa, was: $f_a = \frac{1}{(1+i)^n}$ i_{min} = 14 % and i_{max}=19 %.

RESULTS AND DISCUSSIONS

The technological parameters of the investment project for setting up a new vine plantation in the Experimental Polygon of a production farm at Bujoru Research and Development Station for Viticulture and Vinification, based on the use of new varieties of certified category for table grapes is presented in Table 1.

The plantation was founded on 0.58 ha, using 2,450 vine varieties of certified category. As the striking root rate was just 94.4 %, the number of planted vines remaining stroke root was 2,313 vines. The density of vines per surface unit was 4,166 pieces.

The first grape production was planned to be registered after 3 years from the plantation foundation, that is in the year 2005. The estimated average grape production was: 7,000 kg grapes/ha in the year 2005, 9,500 kg/ha in 2006 and 13,500 kg/ha in 2007 and in the following years.

Table 1

Technological parameters of the investment project for setting up a new vine plantation in the Experimental Polygon II of a production farm, based on the use of new varieties of certified category for table grapes

Specification	M.U.	Values
The year of setting up plantation year 2002		
Surface of plantation	Ha	0.58
Number of new vines of certified category for table grapes, used for setting up the plantation	Vines	2,450
Striking root rate	%	94.4
Number of planted stroke root vines	Vines	2,313
Density of vines	Vines/ha	4,166
The year of the 1st grape production	Year	2005
Average grape production	Kg/ha	2005-7,000 2006-9,500 2007-13,500
Total grape production	Kg	Total, of which: 2005-4,060 2006-5,510 2007-7,830

Investment Costs are made in the year 2005, being required by soil preparation for plantation (Euro 5) setting up the plantation (Euro 2,334) and setting up the supporting system of the plantation (Euro 1,307), totalizing Euro 3,646. Also, in the first year it was necessary to assure Euro 415 for maintenance costs of the plantation. As a result, in the year 2007, the farmer had to spend Euro 4,061.

In the second year, 2003, it was needed to spend Euro 1,137 for setting up the supporting system (investment cost) and also Euro 1,099 maintenance costs of the plantation. In the third year, 2004, it was necessary just to spend Euro 1,348 for maintaining the plantation. In consequence, the total costs with the plantation in the first three years reached the value Euro 7,645, of which Euro 4,080 (53.36 %) for materials, Euro 774 (9,73 %) for labor force, 3.68 % depreciation. Direct cost represented 66.77 % in total costs (Table 2).

The Incomes were estimated for the first 4 years of grape production 2005-2008, taking into consideration the grape production and average grape price, as presented in Table 3. Total income registered for the period 2005-2008 is Euro 21,588.

Table 2

Investment Costs, maintaining costs and operating costs in the new vine plantation in the first year of activity (Euro)

Cost category	2002	2003	2004	Cumulated costs 2002-2004	Of which:				
					Materials	Labor	Depreciation	Direct Costs	Indirect Costs
Soil preparation for plantation	5	-	-	5	-	3.5	-	3.5	1.5
Setting up the plantation	2,334	-	-	2,334	1,475	121	10	1,606	728
Setting up the supporting system	1,307	1,137	-	2,444	1,485	138	65	1,688	756
Total investment Costs	3,646	1,137	-	4,783	2,960	262,5	75	3,297.5	1,485.5
Maintenance Costs of the plantation	415	1,099	1,348	2,862	1,120	481	206	1,807	1,055
Total Costs	4,061	2,236	1,348	7,645	4,080	743.5	281	5,104.5	2540.5

Table 3

Incomes estimated for the first 3 years of grape production

Specification	MU	2005	2006	2007	2008
Grape production	Kg	4,060	5,510	7,830	7,830
Average grape price	Euro/kg	0.66	0.76	0.88	1.00
Incomes	Euro	2,680	4,188	6,890	7,830

Table 4

Present Value of Costs, Present Value of Incomes and Net Present Value for i = 14%

Year	Investment	Maintenance	Production Costs	Total Costs	fa i=14 %	Present value of Costs	Total incomes	Present Value of Incomes	Net Present Value
2002	3,646	415	-	4,061	0.877	3,561	-	-	-3,561
2003	1,137	1,099	-	2,236	0.769	1,719	-	-	-1,719
2004	-	1,348	-	1,348	0.675	910	-	-	-910
2005	-	1,348	518	1,866	0.592	1,105	2,680	2,403	+1,298
2006	-	1,415	544	1,959	0.519	1,017	4,188	2,860	+1,843
2007	-	1,486	571	2,057	0.455	935	6,890	3,563	+2,678
2008	-	1,560	600	2,160	0.400	864	7,830	3,132	+2,268
Total	4,783	8,671	2,233	15,687	-	10,111	21,588	11,958	+1,847

Present value of Costs, Present Value of Incomes and Net Present Value were calculated for a discount rate i=14 % as shown in Table 4. Present Value of Costs was Euro 10,111 and Present value of Incomes Euro 11,958. As a result, Net Present Value registered a positive value, Euro 1,847.

The ratio Present value of Incomes/Present Value of Costs is 1.18 >1 showing that the investment project assures the covering of costs by incomes at the discount rate i = 14 %. At this moment of the analysis , we could accept the investment project for setting up a modern plantation based on vines of certified category because it assures sufficient incomes to cover costs at a discount rate i = 14 % and to assure profit as the ratio Income/Costs is 1.18.

Internal Rate of Return was continued trying to establish the discount rate where the Present Value of total Costs is equal to the Present Value of Incomes. In this purpose , the Internal Rate of Return was calculated for determining the Present Value of Profit Flow at a sufficient high discount rate (i=14 %)as Net Present Value to record a negative value (Euro - 84) as well as the Present Value of Profit Flow at a sufficient low discount rate (i=11 %) as Net Present Value to register a positive value (Euro + 712) as shown in Table 5.

Table 5

Present Value of Financial Results for i_{min} = 11% and i_{max} =14 % and Internal Rate of Return

Year	Financial results	Fa i=11 %	Present Value of financial Results for i=11 %	fa i=14 %	Present value of Financial results for i=14 %
2002	-4,061	0.901	-3,659	0.877	-3,561
2003	-2,236	0.812	-1,816	0.769	-1,719
2004	-1,348	0.731	-985	0.675	-910
2005	+814	0.659	+536	0.592	+482
2006	+2,229	0.593	+1,322	0.519	+1,157
2007	+4,833	0.534	+2,581	0.455	+2,199
2008	+5,670	0.482	+2,733	0.400	+2,268
Total	+7,249	-	+712	-	-84

Based on its formula, IRR calculated value was 12.52 % meaning that the investment project could be accepted and recommended to be implemented by other farmers.

CONCLUSIONS

1. The investment project was destined to set up a modern plantation using high value standard vines of certified category in a production farm on the surface of 0.58 ha.

2. The costs required for setting up and maintaining the plantation in the first 3 years represented Euro 7,645.

3. Incomes were provided to be obtained starting from the 4th production year so that in the period 2005-2008, the total grape production registered 20,230 kg, bringing Euro 21,588 from the marketed grapes.

4. At a discount rate, i=14 %, Net Present Value of Incomes was Euro 11,958 and Net Present Value of Costs was Euro 10,111, resulting Euro 1,847 Net Present Value and positive ratio Incomes/Costs = 1.18.

5. The Internal Rate of Return is 12.52 % for Present Value of Profit to record the negative value, Euro – 84, at i_{max}=14 % and Present Value of Profit to register the positive value, Euro +712, at i_{min} = 11%.

6. The final conclusion is the investment project for setting up such a plantation could be accepted and recommended to put into practice by other farmers.

7. The use of high value vines of certified category assures high productions, incomes and profit from marketable grapes and a competitive grape quality according to consumers' requirements.

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A COMPARATIVE STUDY CONCERNING THE ECONOMIC EFFICIENCY IN THE PRODUCING OF GRAFTED VINES

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KEY WORDS: economic efficiency, producing grafted vines

ABSTRACT

The paper aimed to present a comparison concerning the economic efficiency in producing grafted vines. Three experimental variants were organized in the nursery of Bujoru Research Station as follows: V1 – surface cultivated with new vine varieties of certified category for table grapes, V2- surface cultivated with standard varieties for table grapes and V3 – surface cultivated with wine varieties. For each experimental variant, both the technological and economical parameters were determined. The variant V1 recorded the highest performance; 31,253 grafted vines, Euro 5,789 production cost, Euro 19,325 income, Euro 13,536 profit and 233.82 % profit rate per ha . On the 2nd position comes the variant V3 and on the 3rd one the variant V2.All the variants assure profit . As a conclusion , certified grafted vines are high value seeding material useful for horticulturists to develop high performance plantations according to the EU standards .

INTRODUCTION

Romania's entry into the EU imposes the development of a modern and efficient viticulture, using new high biological and economical value varieties in the vine plantations. In order to respond to this requirement research work is directed to the creation and multiplication of high value vine varieties in the vine nurseries under a controlled regime. The resulting grafted vines are destined to be delivered as high quality, controlled, attested and certified seeding material to the private sector, where viticulturists should use it for improving vine plantations and obtain high quality and wines competitive in the market.

In this context, the paper aimed to present a comparison concerning the economic efficiency of producing grafted vines in order to prove that such an activity contributes not only to the improvement of vine plantations but also could bring important incomes to research institutes and stations.

MATERIAL AND METHOD

The experiments were achieved at Bujoru Research and Development Station for Viticulture and Vinification, Galați County, one of the most important producers of seeding material, grapes and wines in the Eastern part of Romania. In the vine nursery, three experimental variants were organized as follows:

V1 – surface cultivated with new vine varieties for table of certified category;

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V2- surface cultivated with varieties of standard category for table ;

V3 - surface cultivated with wine varieties.

In order to carry out the comparison concerning the economic efficiency between the three experimental variants, the following parameters were needed: cultivated surface, the number of grafted vines planted in the vine nursery; total costs, of which: materials, labor force, third parties, depreciation, other direct, direct and indirect costs for each variant; incomes, coming from sold grafted vines, in close relationship with vine production and price, for each variant; financial results per each variant.

Finally, the hierarchy of all the three variants was set up, based on profit and profit rate level.

The experiments were carried out in the period 2001-2003.

RESULTS AND DISCUSSIONS

The surface planted with high value grafted vines in the nursery was 1.36 ha in the year 2001 and 0.49 ha in the year 2002. The distribution of planted surface by experimental variant was the following one: in the year 2001: V1- 0.15 ha, V2- 0.17 ha and V3 – 1.04 ha; in the year 2002: V1 – 0.06 ha, V2 – 0.10 ha, V3 – 0.33 ha.

The number of grafted vines in the nursery was: in the year 2001: V1 – 18,000 vines, V2 – 20,000 vines, V3 – 162,000 vines and in the year 2002: V1 – 7,600 vines, V2 – 16,000 vines and V3 – 50,000 vines.

The density of grafted vines in the field was: 112,000 pieces/ha in case of each experimental variant.

The obtained production of grafted vines was the following one: in the year 2002, V1 – 4,688 grafted vines, V2 – 4,873 vines and V3 – 32,589 vines; in the year 2003, V1 – 1,409 grafted vines, V2 – 1,683 vines and V3 – 15,208 vines.

The Destination of the grafted vines obtained in the nursery. The production of grafted vines was divided into two parts: a small part to be used in the Experimental Polygon of The Research Station and the largest part to be sold to various viticulturists from the Eastern part of Romania and not only. Therefore, a number of 41,518 grafted vines were sold to viticulturists in the year 2002 and in the year 2003, 18,050 other vines were sold to other farmers, as shown in Table 1.

The rate of standard grafted vines was ranking between 20 % and 29 % in the year 2002 and 10.4 % and 30 % in the year 2003.

Production Costs were Euro 6,836 in the year 2001 and Euro 3,204 in the year 2002.

In the year 2001, V3 registered the highest production costs: Euro 5,227, then V2 comes on the second position with Euro 855 and finally V1 – Euro 754.

In the year 2002, the same hierarchy between variants was registered but the value of production costs was lower as follows: V3 – Euro 2,158, V2 – Euro 653 and V1 – Euro 393.

Concerning cost structure, the highest share in total costs was recorded by materials (about 34 %), labor about 32 % and third parties 9.35 % in the both years of experiments.

Incomes were registered in the years 2002 and 2003 when the production of grafted vine was recorded and the largest pat of it sold to viticulturists.

Table 1

Technological parameters in the vine nursery

Specification	MU	V1	V2	V3	V1	V2	V3
		2001			2002		
Planted surface	Ha	0.15	0.17	1.04	0.06	0.10	0.33
Number of grafted vines used in the nursery	Pieces	18,000	20,000	162,000	7,600	16,000	50,000
Density of grafted vines	Pieces/ha	112,000	112,000	112,000	112,000	112,000	112,000
Grafting rate	%	9	10	81	10.3	21.8	67.9
Number of grafted vines obtained in the nursery of which:	Pieces	4,688	4,873	32,589	1,409	1,683	15,208
- to be used in the experimental Polygon of Research Station	Pieces	70	73	489	19	23	208
- to be sold to viticulturists	Pieces	4,618	4,800	32,100	1,390	1,660	15,000
Standard grafted vines rate	%	29	24	20	21.6	10.4	30

The incomes coming from the grafted vines retained to be used in the experimental polygon of Research Station were estimated at the production cost/vine.

The incomes, coming from the grafted vines sold to other farmers, were calculated at the following vine prices: in the year 2002: Euro 0.46/grafted vine of new varieties certified for table (V1), Euro 0.28/standard grafted vine varieties for table (V2) and the same price, Euro 0.28/grafted vine for wine varieties (V3); in the year 2003: Euro 1.05/grafted vine belonging to V1 and Euro 0.58/grafted vine belonging to V2 and V3.

Taking into account the cumulated incomes for the period 2002-2003, the situation per variant is the following one: V3 – brought the highest income: Euro 18,177, then comes V1 – with Euro 3,595 and on the last position comes V2 – with Euro 2,319.

The situation of incomes by year and experimental variant is given in Table 3.

Financial results

Taking into account production costs and incomes recorded in the period when the experiments were carried out , the financial results registered a positive value, meaning profit as follows: V3 – Euro 10,792, V1-Euro 2,448 and V2 – Euro 811, as shown in the Table. 3.

Table 2

Total Costs by category and variant

Euro

Specification	V1	V2	V3	Total
Year 2001				
Materials	263	298	1,825	2,386
Labor Force	246	279	1,704	2,229
Third parties	70	80	488	638
Depreciation	13	15	89	117
Direct costs	592	672	4,106	5,370
Indirect costs	162	183	1,121	1,466
Total Costs	754	855	5,227	6,836
Year 2002				
Materials	137	228	753	1,118
Labor Force	128	213	703	1,044
Third parties	37	61	202	300
Depreciation	7	11	37	55
Direct costs	309	513	1,695	2,517
Indirect costs	84	140	463	687
Total Costs	393	653	2,158	3,.204

Table 3

Production Costs, Incomes and Financial results per experimental variant

Euro

Specification	2001	2002	2003	Cumulated 2001-2003
Total production costs, of which for:	6,836	3,204	-	10,040
V1	754	393	-	1,147
V2	855	653	-	1,508
V3	5,227	2,158	-	7,385
Total income of which :	-	12,968	11,123	24,091
V1	-	2,135	1,460	3,595
V2	-	1,356	963	2,319
V3	-	9,477	8,700	18,177
Total Financial results for:	-6,836	+9,764	+11,123	+14,051
V1	-754	+1,742	1,460	+2,448
V2	-855	+703	963	+811
V3	-5,227	+7,319	8,700	+10,792

Economic efficiency was compared between the three variants based on the number of obtained grafted vines, average production cost per surface unit and per grafted vine, income per surface unit and per grafted vine, profit per surface unit and per grafted vine as well as profit rate for each variant as presented in Table 4.

The experimental variant V1 – recorded the highest number of grafted vines, represented by 31,253 vines obtained from varieties certified for table. It also recorded almost a similar average production cost per hectar, Euro 5,789, compared to the other experimental variants, V2 and V3. Despite that the production cost per ha is a little bit higher, it does not have such a big significance. The average production cost per grafted vine recorded by V1 was Euro 0.22, a middle value among V2 (Euro 0.28) and V3 (Euro 0.15).

Table 4

Comparison concerning economic efficiency between experimental variants

Specification	MU	V1	V2	V3
Number of obtained grafted vines	Pieces/ha	31,253	28,665	31,336
Average production : - Cost per surface unit - Cost per grafted vine	 Euro/ha Euro/vine	 5,789 0.22	 5,780 0.28	 5,783 0.15
Average Income per: - surface unit - vine	 Euro/ha Euro/vine	 19,325 0.76	 8,848 0.43	 17,782 0.43
Average profit per: - surface unit - grafted vine	 Euro/ha Euro/vine	 13,536 0.54	 3,068 0,15	 11,999 0.28
Profit rate per: - surface unit - grafted vine	 % %	 233.82 245.45	 53.07 53.57	 207.49 186.66

But, V1 registered the highest average income per surface unit (Euro 19,235) and per grafted vine (Euro 0.76) which are obviously very high values compared to the variants V2 and V3.

The variant V1 is also on the 1st position if profit per ha and per grafted vine was taken into account. It also assures the highest profit rate: 233.82 % per surface unit and 245.45 % per grafted vine.

Based on the same rationale analysis, the variant V3 comes on the 2nd position assuring 207.49 % per ha and 186.66 % per grafted vine. The variant V2 is definitely on the 3rd position with a profit rate of about 53 % both per ha and grafted vine.

CONCLUSIONS

1. The production of grafted vines has to be an important objective of Research Institutes and Stations in order to give their contribution to the improvement of vine plantations, grape and wine quality according to the EU standards.

2. The production of grafted vines is also a good deal for research institutions as it could bring important incomes from the sold vines to viticulturists.

3. The variant V1 where in the nursery the surface was cultivated with new vine varieties of certified category is the most efficient one as it recorded the highest technological and economical performances as follows: 31,253 grafted vines, Euro 5,789 production cost, Euro 19,325 income, Euro 13,536 profit and 233.82 % profit rate per surface unit.

4. The variant V3, where in the nursery the surface was cultivated with wine varieties, comes on the second position, assuring the obtaining: 31,336 grafted vines, Euro

5,783 average production cost, Euro 17,782 income, Euro 11,999 profit, and 207.49 % profit rate per ha.

5. The variant V2 – producing grafted vines of standard category comes on the 3^{rd} position based on its performances: 28,665 grafted vines, Euro 5,780 production cost, Euro 8,848 income, Euro 3,068 profit and 53.07 % profit rate per surface unit.

6. Therefore, all the tree experimental variants are efficient from an economical point of view bringing important incomes and profit from high value grafted vines to the producers .

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INFLUENCE OF FOLIAR FERTILIZATION WIYH BORON ORGANIC COMPOUNDS AND OF TREATMENTS NUMBER UPON SOME BIOCHEMICAL INDEXES IN VINEYARDS ON SANDY SOILS

Rățoi I., Croitoru Mihaela[1]

KEY WORDS: vines, sandy soil, boron, biochemical indexes

ABSTRACT

The treatments with boron natural compounds applied in vineyard, in different vegetative stages were influenced the activity of some biochemical indexes. The chlorophyll content, in stage of intense increasing of offshoots, registered the best rezults in variant which was applied Bor complex (2,23 mg/1 g fresh substance after 2 treatments and 3,09 mg/1 g s.p. after 4 treatments). The content of caroten presented the big variations between variants.

The content of NPK from leaves was relative influenced by treatments with boron. The bigest contents registered in variant treated with Bor complex, after 4 treatments (3,12-3,20% Nt, 0,16-0,19% Pt, 0,52-0,58% Kt).

The application of some boron natural compounds in vineyard was influenced different the grapes quality. The content of T.D.S. (total dry substance) presented values of 17% in variant treated with Cupribor, 5 l/ha, 4 treatments and 20,8% in variant treated with Bor complex, 5 l/ha, 4 treatments.

INTRODUCTION

The sandy soils from Romania have a reduce natural fertility and a granulometry thickness prevailing. This contain a reduce quantity of macroelements and microelements, for example the boron (Băjescu Irina, Chiriac Aurelia, 1984).

Velicica Davidescu., Davidescu D., 1981 şi Davidescu D., 1974, asserted that the boron constitute an important element for plants with role in increasing of roots, flowers fertility, intensification of enzime activity, synthesis of aromatical compounds.

Scorei R. şi colab., 2005, showed that boron contribute to translocation of glucide, differentiate of cells, division of cells, maturity of fruits, accumulation of free auxine and biosynthesis of acids.

The boron reduce the toxicity of some elements, for example the copper and operate upon acetique fermentation.

Absence of boron from plants produce unbalance of nutrition, with negative repercussion upon production quantity and quality (Gartel W., 1974).

[1] CCDCPN Dabuleni

MATERIAL AND METHODS

The experimentation was effectuated at CCDCPN Dăbuleni, in 2005-2006 period, in vineyard, of 25 years (in first year of experimentation).

Were used three produce on the basis of boron natural compounds, Folibor standard, Cupribor and Bor complex, which applied on plant in vegetative stage. Was applied 2 and 4 foliar treatments. The rezults were compared with a witness variant, treated with water. The fertilization of base was uniform effectuated in all variants with N 150 P_2O_5 100 K_2O 100.

The experimental variants were the following:

V 1 - Witness, foliar unfertilized;
V 2 - Folibor standard, 5 l/ha, 2 treatments;
V 3 - Folibor standard, 5 l/ha, 4 treatments;
V 4 - Cupribor, 5 l/ha, 2 treatments;
V 5 - Cupribor, 5 l/ha, 4 treatments;
V 6 - Bor complex, 5 l/ha, 2 treatments;
V 7 - Bor complex, 5 l/ha, 4 treatments.

The experienced was placed in blocks, in 4 repetition.

The surface of experimental plot: 30 m^2. The surface of experience: 840 m^2.

The moments of application of foliar fertilizers:

- the treatment I, before flowery;
- the treatment II, after flowery;
- the treatment III, at 15 days after second treatment;
- the treatment IV, at 15 days after third treatment.

Were effectuated the following experimental observation and determination:

- the content of chlorophyl pigmens and the activity of catalaze enzime in intens increasing of offshoots stage and at grapes maturation;
- the content of NPK from leaves in time of intens increasing of offshoots;
- the grapes biochemical composition.

REZULTS AND DISCUTIONS

The treatments with boron natural compounds applied at vine, in different vegetative stages, were influenced the activity of some biochemical indexes.

The boron stimulate formating of chlorophyll in leaves. The content of chlorophyl, in intens increasing of offshoots stage, registered the best rezults in variants in which applied Bor complex, 2,23 mg/1 g fresh substance after 2 treatments and 3,09 mg/1 g fresh substance after 4 treatments (table 1).

The content of caroten presented great variations between variants in the first year of experimentation. After two years of study the content of caroten, in time of intens increasing of offshoots presented the values too great in all variants treated foliar. The best values were obtained in variants treated with Bor complex, 4 treatments (0,59 mg/ 1 g fresh substance) and Cupribor, 4 treatments (0,57 mg/ 1 g fresh substance).

The boron intensify the activity of catalaze but and the other factors contribute at activity their enzime. Catalaze split the oxygenated water, in water and oxygen, and the activity of catalaze is in concordance with oxydaze activity which are strong influenced by the presence or absence of water in soil and air.

The catalaze enzime presented an activity too intens in variants treated with boron comparative with witness untreated foliar, differentiated in function of variant, 0,9 until 1,9 ml $KMnO_4$ n/10.

In ripen – maturity stage of grapes the catalaze enzime continuated their activity, with values too great in variants treated with produce on basis of boron, 1,5-2,5 ml $KMnO_4$ in variant with Cupribor, 4 treatments and 2,2-2,3 ml $KMnO_4$ in variant with Bor complex, 4 treatments (table 2).

Table 1

Influence of foliar treatments with boron upon the content of chlorophyll pigments and an activity of catalaze enzime in leaves in intens increasing of offshoots stage at vine

Variant	Chlorophyl pigments+caroten		Catalaze activity (ml $KMnO_4$ n/10)
	Chlorophyl (a+b) (mg/g f. s.*)	Caroten (mg/g f. s.*)	
Witness, unfertilized	2,09	0,61	0,7
Folibor, 5 l/ha, 2 treatments	2,02	0,29	0,9
Folibor, 5 l/ha, 4 treatments	1,16	0,30	1,2
Cupribor, 5 l/ha, 2 treatments	2,39	0,52	1,8
Cupribor, 5 l/ha, 4 treatments	1,80	0,57	1,5
Bor complex, 5 l/ha, 2 treatments	2,23	0,30	1,9
Bor complex, 5 l/ha, 4 treatments	3,09	0,59	1,7

* fresh substance

Tabelul 2

Influence of foliar treatments with boron upon the content of chlorophyll pigments and an activity of catalaze enzime in intens increasing of offshoots at vine in leaves in ripen-maturity stage of grapes

Variant	Catalaze activity (ml $KMnO_4$)		Clorofila a+b (mg/1g s.p.)		Caroten (mg/1g s.p.)	
	Anul 2005	Anul 2006	Anul 2005	Anul 2006	Anul 2005	Anul 2006
Witness, unfertilized	0,3	1,2	1,25	3,53	0,35	0,44
Folibor, 5 l/ha, 2 treatments	0,9	1,4	1,74	4,04	0,37	0,49
Folibor, 5 l/ha, 4 treatments	1,1	1,7	1,97	4,20	0,98	0,65
Cupribor, 5 l/ha, 2 treatments	1,3	2,2	2,22	3,68	0,49	1,05
Cupribor, 5 l/ha, 4 treatments	1,5	2,5	2,42	4,14	0,60	0,62
Bor complex, 5 l/ha, 2 treatments	1,5	1,9	2,28	4,07	0,48	1,01
Bor complex, 5 l/ha, 4 treatments	2,2	2,3	2,45	4,49	0,49	0,98

In general, in variants where applied 4 treatments were obtained rezults goods comparative with the variants where applied 2 treatments. The greatest content of chlorophyll from leaves was determined in ripen stage of grapes in 2006 year, 4,49 mg/1 g fresh substance in variant treated with Bor complex, 4 treatments. Therefore, foliar application repeated of produce on the basis of boron contribute at intens accumulation of chlorophyll in leaves.

In 2005 year the determinations of chlorophyll from leaves were effectuated at grapes maturity and in 2006 year in ripen grapes stage, when the content of chlorophyll and caroten is maximum.

The content of caroten, in intens increasing of offshoots stage, registered values greatest in variant fertilized radicular only and in ripen – maturity grapes stage the values were superior in variants fertilized and foliar.

The content of NPK from leaves was pozitive influenced by treatments with boron (table 3). The differences is not very semnificative but the greatest contents of NPK were in all variants in which were applied produce on the basis of boron. The best rezults in two years of experimentation were obtained in variant treated with Bor complex, 4 treatments, 3,12-3,20% Nt, 0,16-0,19% Pt, 0,52-0,58% Kt.

Table 3

Influence of foliar treatments with boron upon NPK content from leaves at vines

Variant	Nt (%)	Pt (%)	Kt (%)
Witness, unfertilized	2,72-2,80	0,09-0,11	0,35-0,42
Folibor, 5 l/ha, 2 treatments	2,96-2,96	0,11-0,14	0,42-0,47
Folibor, 5 l/ha, 4 treatments	3,08-3,04	0,14-0,15	0,47-0,50
Cupribor, 5 l/ha, 2 treatments	2,96-2,88	0,15-0,16	0,46-0,47
Cupribor, 5 l/ha, 4 treatments	3,04-3,08	0,17-0,19	0,50-0,52
Bor complex, 5 l/ha, 2 treatments	3,0-2,96	0,14-0,16	0,42-0,50
Bor complex, 5 l/ha, 4 treatments	3,12-3,20	0,16-0,19	0,52-0,58

It must specificated that absorbation of nutritive elements from soil is influenced by the deficit but and the excess of humidity, as well by the differences of temperature.

Application of some boron natural fertilizers at vine was influenced different grapes quality. Was determined the nutritive quality of yield reflected throught accumulation of some biochemical component as well the total dry substance (T.D.S.), soluble dry substance (S.D.S.), water content, glucide, acidity, C vitamine, in function of some boron natural fertilizers (table 4).

The content of total dry substance presented values between 17% in variant treated with Cupribor, 5 l/ha, 4 treatments and 20,8% in variant treated with Bor complex, 5 l/ha, 4 treatments. The values are comparable, and in some variants are greatest comparative the witness, unfertilized foliar.

The best rezults were obtained in variants fertilized with Folibor, 5 l/ha, 4 treatments (20,5%) and Bor complex, 5 l/ha, 4 treatments (20,8%) where the content of total dry substance was too great. The titrable acidity presented values too great, comparative with witness variant, with an exception, the variant fertilized with Bor complex, 5 l/ha, 4 treatments (3,54 g/l H_2SO_4).

The C vitamine reacted at treatments with boron. The values too great comparative with the witness, respectively 14,08-14,93 mg/100 g f.s., in variants treated with Folibor and 15,40-15,84 mg/100 g f.s., in variants treated with Bor complex.

Table 4

Influence of foliar treatments with boron upon biochemical composition of grapes

Variant	T.D.S. (%)	Water (%)	S.D.S. (g/l)	Titrable acidity (g/l H_2SO_4)	C vitamine (mg/100 g f.s.*)
Witness, unfertilized	18,7	81,3	157	4,21	13,20
Folibor, 5 l/ha, 2 treatments	18,5	81,5	152	4,53	14,08
Folibor, 5 l/ha, 4 treatments	20,5	79,5	155	4,57	14,96
Cupribor, 5 l/ha, 2 treatments	18,0	82,0	155	5,02	12,32
Cupribor, 5 l/ha, 4 treatments	17,0	83,0	147	5,07	13,64
Bor complex, 5 l/ha, 2 treatments	17,8	82,2	150	4,42	15,84
Bor complex, 5 l/ha, 4 treatments	20,8	79,2	155	3,54	15,40

* fresh substance

CONCLUSIONS

a. The treatments with boron natural compounds applied at vine, in different vegetative stages, were influenced different the activity of some biochemical indexes.

b. The content of chlorophyll, in intens increasing of offshoots stage, registered the best rezults in variants were applied Bor complex (2,23 mg/1 g f.s. after 2 treatments and 3,09 mg/1 g f.s. after 4 treatments).

c. The content of NPK from leaves was relative influenced by the treatments with boron. The greatest contents were registered in variant treated with Bor complex, 4 tratments (3,12-3,20 Nt, 0,16-0,19 Pt, 0,52-0,58 Kt).

d. Application of some boron natural fertilizers at vine was influenced different grapes quality. The content of total dry substance presented values between 17% in variant treated with Cupribor, 5 l/ha, 4 treatments and 20,8% in variant treated with Bor complex, 5 l/ha, 4 treatments.

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THE OENOLOGIC POTENTIAL STUDY OF NOVAC AND NEGRU DE DRAGASANI VARIETIES IN DRAGASANI VINEYARD

Daniel-Grigorie Dinu[1]

KEY WORDS: oenologic potential

ABSTRACT

There were taken into study two varieties of grapes for red choice wines created at SCDVV Dragasani, Novac and Negru de Dragasani.

The researches were made at the Dealu Olt plantation belonging to SCDVV Dragasani and part of Dragasani vineyard,,in 2007 .

There were studied total weight, 100 grapes weight, total acidity, sugar as well as anthocyanins on must and on wine alcohol, total acidity, volatile acidity, sugar, total dry extract and unreduce dry extract.

The analyses revealed that on the upper third of the slope, the wines are DOC-CMD wines, and on the lower third of the slope the wines are VS.

INTRODUCTION

Novac and Negru de Dragasani are two varieties of red choice wines created at SCDVV Dragasani by Mircea Marculescu (Novac, 1987) and Nircea Marculescu and Mircea Vladasel (Negru de Dragasani, 1993), both from Negru vartos and Saperavi varieties.

This study was carried aut to observe the oenologic potential and also to establish the right time of harvesting.to obtain DOC-CMD wines.

MATERIALS AND METHODS

There were taken samples of grapes of Novac and Negru de Dragasani varieties from the upper third of the slope and also from the lower third of the slope .

There were studied total weight, 100 grapes weight, total acidity(the titrimetric method), sugar (Zeiss hand refractometer method) as well as anthocyanins (Ribereau-Gayon-Stonestreet method) on must and on wine alcohol (Dujardin-Saleron electric ebuliometer), total acidity (the titrimetric method), volatile acidity (the indirect method-titrimetric), total dry extract and unreduced (Taberie method) .

[1] SCDVV Drăgăşani

RESULTS AND DISCUSSIONS

On the lower third of the slope at each variety, the analyses stopped on sixth of September 2007, where were made mechanic analyses while the analyses made on the varieties on the upper third the analyses stop on 24th of September.

Table 1

Novac- lower third

ANALYSES	**DATA**							
	23.07	**30.07**	**6.08**	**13.08**	**20.08**	**28.08**	**4.09**	**6.09**
TOTALWEIGHT	271	313	350	531,5	602	446	648	
100 GRAPES WEIGHT	83,20	80,48	90,78	127,55	143	162,7	149,5	173,1
ACIDITY	20,6	15	12	8,03	5,78	4,01	4,35	3,86
SUGAR	66	114	133	139	176	191	173	200

On 6th September I made mechanic analyses and the sugar reached 200g/l at Novac and 197 at Negru de Dragasani and an acidity of 3,86 (Novac) and 4,75 (Negru de Dragasani). (table 1 and table2).

Table 2

Negru de Dragasani – lower third

ANALYSES	**DATA**							
	23.07	**30.07**	**06.08**	**13.08**	**20.08**	**28.08**	**04.09**	**06.09**
TOTALWEIGHT	219	192	327	575	463	303,5	466	
100 GRAPES WEIGHT	58,25	63,97	81,42	98,59	101,47	100,78	106,2	114,8
ACIDITY	21,2	16,8	10,5	8,03	6,76	4,70	4,55	4,75
SUGAR	64	105	133	135	161	186	193	197

On 24th September, Novac reached 214 g/l sugar from 77 how it had at the begining and an acidity of 4,05 from 19. (table 3)

On 24th September Negru de Dragasani reached 230 g/l sugar from 84 g/l and an acidity of 3,76 from 21,5. (table4)

Table 3

Novac – upper third

ANALYSES	DATA									
	24.07	31.07	08.08	14.08	21.08	29.08	04.09	10.09	17.09	24.09
TOTAL WEIGHT	256	219,5	342,5	488	541,5	600	629	620	900	800
100 GRAPES WEIGHT	72,78	70,12	79,69	87,55	111,9	129,75	130,32	139	144,75	133
ACIDITY	19,3	13,7	10,09	7,44	5,39	4,31	4,45	4,25	4,35	4,05
SUGAR	77	110	121	135	165	186	177	191	197	214
ANTHOCYANINS						1048,2	985,7	1017,1	1244,9	1352,3

Table 4

Negru de Dragasani – upper third

ANALYSES	DATA									
	24.07	**31.07**	**08.08**	**14.08**	**21.08**	**29.08**	**04.09**	**10.09**	**17.09**	**24.09**
TOTAL WEIGHT	103,5	241	369	535	633	553	493	600	820	980
100 GRAPES WEIGHT	61,6	63,78	90,58	104,2	117,4	119,78	117,75	134,5	101,6	113,5
ACIDITY	21,5	13,6	8,52	6,66	5,29	4,50	4,05	2,07	4,35	3,76
SUGAR	84	127	149	169,5	198	220	215	220	227	230
ANTHOCYANINS						1088,4	1133,4	1076,9	1202,9	1360,3

Regarding wines the analyses are in the follow table.

Table 5

ANALYSES	Wines	
	Novac	**Negru de Dragasani**
ALCOHOL (VOL%)	13,8	13
TOTAL ACIDITY (g/l Tartaric acid)	4,94	5,02
VOLATILE ACIDITY (g/l Acetic acid)	0,39	0,24
SUGAR (g/l)	2,8	31
TOTAL DRY EXTRACT (g/l)	27,4	7,4
UNREDUCED DRY EXTRACT (g/l)	24,6	23,6

Due to these caracteristics, the wine Novac is a DOC-CMD dry wine.

To be a DOC-CMD wine, the sugar content at the harvesting is minimum 187 g/l, minimum11 vol% alcohol and minimum 21g/l unreduced what this wine are. With its 7,4 g/l sugar, it is a demidry wine. These analyses reveales that is a DOC-CMD demidry wine.

CONCLUSIONS

The analyses revealed that on the upper third of the slope, the wines are DOC-CMD wines, and on the lower third of the slope the wines are VS.

Novac is a dry DOC-CMD wine, Negru de Dragasani is demidry DOC-CMD

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A CLIMATOLOGICAL STUDY OF THE BANU MARACINE VITICULTURAL CENTRE FOR AN OPTIMAL USE OF THE ECOLOGICAL FRAMEWORK THROUGH GRAPEVINE CULTIVATION

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KEY WORDS: agro-ecosystem, viticultural ecology

SUMMARY

The study shows the results of the multiannual climatological studies obtained within the viticultural agro-ecosystem arranged on site at Banu Maracine. They emphasized the vocation of the viticultural echo-system under study for the practising of a quality-oriented viticulture, the optimal climatic factors and the climatic constraints, as well as the connections between the sub-systems of the viticultural ecosystem.

INTRODUCTION

The climate characteristic for a certain viticultural region or area is not constant in time. There are permanent variations in one way or another that depend on various genetic factors of climate. The evolution of the climatic framework can be shown by the interpretation of the climatic data recorded during a long-term period.

MATERIALS AND METHODS

The studies focused on climatic observations related to the matter under study, over a period of several years between 1997-2007, on the study of the climatic data recorded prior this period and their interpretation in relation to the ecological and technological characteristics of some varieties cultivable in the Banu Maracine viticultural centre. For the appreciation of the viticultural biotope under study we used several indexes and coefficients from the viticultural climatology. The interpretation of their values was provided by the specialty literature. (Oşlobeanu M. şi colab., 1980; Teodorescu Şt., Popa A., Sandu Gh., 1987; Olteanu I., Mărăcineanu L.C., 2007).

RESULTS AND DISCUSSIONS

The study of the ecological characteristics of the Banu Maracine viticultural centre pointed out the fact that in terms of heliothermal resources (Table 1), we have witnessed 3% increase in the current period, both in case of real insolation and active thermal balance.

[1] University of Craiova

Table 1

Climatic characteristics of the viticultural agro-ecosystem on site at Banu Mărăcine, recorded during the vegetation period

Year	Index				
	Real insolation (hours)	Active thermal balance (^oC)	Precipitations (mm)	Oenoclimatic capacity index	Grapevine bioclimatic index
1997	1567.1	3039.1	369.7	4486.5	7.03
1998	1589.0	3459.9	375.6	4923.3	8.00
1999	1572.5	3437.2	449.1	4810.6	6.55
2000	1857.6	3659.4	222.5	5544.5	16.10
2001	1629.5	3350.7	472.5	4757.7	6.24
2002	1504.3	3398.3	420.5	4732.1	6.66
2003	1572.1	3498.7	348.5	4972.3	9.57
2005	1509.0	3188.0	780.0	4167.0	3.37
2006	1588.0	3301.0	416.3	4722.8	6.88
2007	1628.0	3626.1	371.0	5133.0	8.70
Average	1601.7	3395.8	422.6	4824.9	7.9
Average of 1972-1981	1551.0	3289.0	-	-	7.5
Average of 1920-1955	-	-	303.4	-	-

These values are not meant to fundamentally change the favourability of the viticultural centre for grapevine cultivation but may point out the measures to be taken for reconverting the cultivated varieties with view to expanding the variety range.

In terms of hydric resources, we have witnessed their increase during the period under study, as compared to the multiannual average. As this happens during the increase of the heliothermal resources, an increase of the water requirements is expected, as result of the evapotransipration going up. On the other hand, the distribution of precipitations during the vegetation period is not always judicious, as there are also extreme situations (years 2000 and 2005). Therefore, the appreciation of the climatic favourability of a certain region will be much more accurate if synthesis climatologic indexes are used.

As result of the global warming, which can be characterised as a climatic accident nowadays, this may become more or less permanent in the future and, as result, it may be useful to consider the completion of the hydric deficit at Banu Maracine and the reuse of the terraces as measures to reduce the soil erosion.

These statements can be supported by the mainly high values of the bioclimatic index of grapevine, requiring irrigation process, as well as by the values of the Thornthwaite index, over the year and during the vegetation period (Table 2).

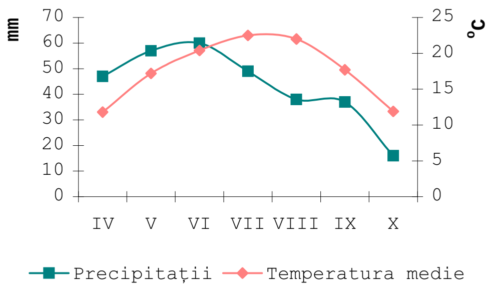
The evolution of the pluviometric and thermal regimes is shown in Picture 1 for the period 1961-1970. The climograme of the decade above shows wet period until June, after which drought settles in. Currently (see Pic. 2), one may notice that the drought gets bigger, being distributed over a period of 5 months, May through September.

On the other hand, establishing the favourability of a viticultural area cannot be complete without establishing the risk represented by minimum negative, critical temperatures during the period of vegetative repose. The multiannual study performed for the Banu Maracine viticultural centre showed that their frequency is quite high (see Pic. 3), forcing viticulturists to choose the semi-protected cultivating method.

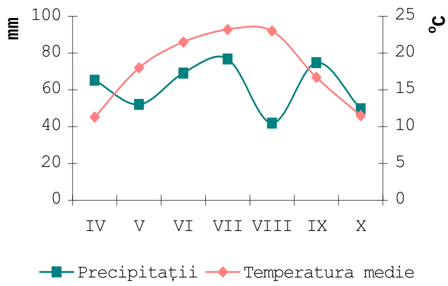
Table 2

The values of Thornthwaite indexes, over the year and during the vegetation period

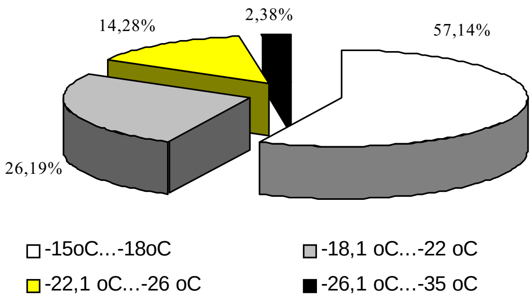
Year	Thornthwaite Index			
	Annual		During the vegetation period	
	value	Significance	value	Significance
1997	58.87	Wet	-1.85	No deficit or very small deficit
1998	23.22	Wet	-13.51	No deficit or very small deficit
1999	34.40	Wet	0.28	No deficit or very small deficit
2000	-38.95	Semiarid	-45.81	High deficit over the summer
2001	21.82	Wet	6.04	No deficit or very small deficit
2002	23.83	Wet	-4.05	No deficit or very small deficit
2003	5.05	Sub humid	-21.68	Moderate deficit over the summer



Pic.1 – The Climograme of the Banu Mărăcine viticultural centre (1961 – 1970)



Pic. 2 – The climograme of the Banu Mărăcine viticultural centre (1997 – 2003)



Pic. 3 – Reaction percentages of minimum negative and critical temperatures at Banu Mărăcine viticultural centre

By corroborating the facts observed so far with some agro-ecological characteristics (see Table 3) of some cultivated or cultivable varieties at Banu Maracine (according to the laws in force), one may conclude that the danger of negative temperatures is real and forces viticulturists into choosing those technological chains in order to secure a vegetative repose period with minimum losses. Thus, a judicious distribution of the bud load and the strict observance of technologies for each group of varieties must be considered in such way to ensure a proper distinction amongst fruit-bearing buds and a high level of wood maturation. With view to reusing terraces one will choose those varieties that turn to best account the slope environmental conditions.

Table 3

Some agro-ecological characteristics of cultivated or cultivable varieties at Banu Mărăcine

Varieties	Endurance to negative temperature			Endurance to drought		
	Small (-16ºC...-18 ºC)	Average (-18ºC...-22 ºC)	High (sub -22 ºC)	Small	Average	High
Fetească regală			⊙		⊙	
Fetească albă		⊙			⊙	
Sauvignon		⊙			⊙	
Riesling italian		⊙		⊙		
Chardonnay		⊙				⊙
Tămâioasă românească	⊙			⊙		
Fetească neagră			⊙			⊙
Merlot	⊙			⊙		
Cabernet-Sauvignon		⊙				⊙
Pinot noir			⊙			⊙
Chasselas dore		⊙			⊙	
Victoria		⊙				⊙
Muscat dAdda	⊙				⊙	
Muscat de Hamburg	⊙				⊙	
Afuz-Ali	⊙			⊙		

CONCLUSIONS

- The edafic, climatic and orographic characteristics of the Banu Maracine centre may be turned into account through the cultivation of grapevine from varieties for red wines, white wines and table wines.
- The distribution of environmental factors during the vegetation period and the interaction amongst them does not always meet the requirements of grapevine, fact which demands measures for their alignment with the ecology and physiology of grapevine;
- The global warming phenomenon, so intensely mediatised nowadays, may lead in time to the reconsideration of the range, cultivation technologies or modifications of the geographical limits of the grapevine cultivation.

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RESEARCHES CONCERNING THE EVALUATION OF THE ECONOMIC IMPACT OF GRAFTED VINES TESTING IN AN EXPERIMENTAL POLYGON

Cristina Simion[1], Agatha Popescu[2], Gabriel Tabăran[2], Ion Simion[2]

KEY WORDS: economic impact, vines testing, experimental polygon

ABSTRACT

The paper aimed to present a case study concerning the producing and testing of standard grafted vines of certified category in the Experimental Polygon I within Bujoru Research Station for Viticulture and Vinification during the period 2001-2003. From an experimental surface of 0.22 ha, a number of 4,825 grafted vines was obtained, of which 62.33 % were sold to other farmers and the remaining was transferred to the Experimental Polygon II. In the analyzed period, the cumulated income was Euro 5,016, of which 94.56 % came from standard grafted vines of certified category marketed to other viticulturists. As a conclusion, grafted vines producing and testing is an important activity destined to support farmers to create modern vine plantations and increase income both of the research units and viticulturists .

INTRODUCTION

The improvement of viticultural assortment in nurseries is an important requirement for creating new high quality varieties of Vitis vinifera and for extending them to the viticultural plantations.

After the year 1990, once that private sector has begun to the set up in viticulture, a negative phenomenon has been noticed: the stopping of the use of high value vine varieties and the development of low productive hybrids easily to be purchased and cultivated but leading to low performance. This has lead to the degradation of vine plantations quality, to reduced productions and low quality of products achieved in viticulture and vinification.

Romania’s entry into the EU structures offered a new challenge to the research work called to offer new high value varieties , well adapted to local conditions.

The vine varieties created by research institutes and stations dealing with viticulture and vinification are less known and advertised, because in general they are locally used mainly in the area of influence of each research unit. But their high biological value is very special , a reason to consider that their use could be extended in all the areas favorable for Vitis vinifera culture according to the adaptation capacity of each variety to various soil, climate and environmental conditions.

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The Romanian scientific research has created high performance vine varieties which brings Romania among the first positions in the world concerning grapes for table. Varieties such as Victoria, Otilia, Azur, Splendid, Napoca, Tamina, Xenia and Gelu assure the obtaining of high quality grapes for table, due to their big berries, attractive shape and color, pleasant flavor, few seeds or lacked of seeds, sweetness etc which are important strengths satisfying consumers' needs in great measure. In addition, these new varieties recently created assure high productions of grapes with a different period of grape maturity, which allows the organization of some plantations in a conveyer of varieties in the production farms .

In this way, grapes could be offered in the marked for a longer period of time, covering consumers' needs over the year and assuring more balanced incomes and reduced risks to producers.

The demand for table grapes is higher and higher, because of the new consumer' behaviour, who are better trained and informed about a healthy diet. The diet based on grapes has dietetical and therapeutical effects, being recommended in liver, kidney, cardio-vascular diseases, intoxications etc. A kilogram of grape assures 700-1,200 calories and high value nutrients such as: sugar easily to be assimilated, vitamins, enzymes, minerals, organic acids etc with a benefic effect upon human health.

As long as the enlargement of the EU market has already taken place, new imports of grapes from various countries were made which is a new challenge for the Romanian producers to keep pace with the increased competition in the field.

In this context, viticulturists have to pay more attention to the use of high performance varieties, assuring higher productions both from a quantitative and qualitative point of view, a competitive price for the Romanian grapes in the market, which is fact an important measure for protecting the domestic producers.

Viticulturists can not develop commercial viable and competitive farms without developing and implementing modern technologies using high potential value vine varieties.

Research units are obliged to assure high quality seeding material – grafted vines – for creating new plantations able to produce high quality grapes for table under the condition of an increased economic efficiency. The vine nurseries have to assure the multiplication of those high quality varieties under a controlled regime. The new varieties have to be tested in experimental polygons and delivered directly to the beneficiaries either other production farms of various research units or to private viticulturists.

In this context, this paper is a case study concerning the evaluation of the economic impact of grafted vines testing in an experimental polygon.

MATERIAL AND METHOD

For testing the grafted vines, an experimental polygon was organized within a vegetal farm of Bujoru Research and Development Station for viticulture and Vinification, during the period 2001-2002. The surface of the polygon was 0.17 ha in the year 2001 and 0.05 ha in the year 2002. A number of 23,000 grafted vines were used in the year 2001 and 7,500 grafted vines were used in 2002, assuring a density of 112,000 pieces/ha. The economic impact of producing grafted vines in the experimental polygon was estimated based on the number of vines suitable to be sold to various viticulturists, the rate of standard vines of certified category, production costs, incomes and profit rate in the two years of experiments.

RESULTS AND DISCUSSIONS

Cultivated surface in the experimental Polygon was 0.17 ha in the year 2001 and 0.05 ha in the year 2002.

The number of grafted vines used in the Experimental Polygon was 23,000 pieces in the year 2001 and 7.500 pieces in the year 2002.

The number of planted grafted vines was 19,600 pieces in the year 2001 and 5,500 pieces in the year 2002.

The density of planted grafted vines was 112,000 plants/surface unit.

The striking root rate was 80 % in the year 2001 and 75 % in the year 2002.

Production of tested grafted vines. In the year 2001, a number of 4,825 tested grafted vines was obtained, of which 1,818 vines (37.67 %) were destined to be transferred in the Experimental Polygon II, production farm, in the same Research Station and the most of vines, 3,007 pieces to be sold to various viticulturists who intend to create new high value vine plantations.

In the year 2002, no vines were retained for testing in the production farm, but all the 3,200 grafted vines were destined to be marketed to various farmers.

The rate of standard vines of certified category was 21 % in the year 2001 and 43.6 % in the year 2002.

The technological parameters in grafted vines testing in the Experimental Polygon I is presented in Table 1.

Table 1

The technological parameters in grafted vines testing in the experimental Polygon I

Specification	M.U.	2001	2002
Cultivated surface	Ha	0.17	0.05
Number of grafted vines	Pieces	23,000	7,500
Number of planted grafted vines	Pieces	19,600	5,500
Vine density	Pieces/ha	112,000	112,000
Striking root rate	%	80	75
Number of grafted vines which will be transferred to the Experimental Polygon II in 2002	Pieces	1,818	-
Number of grafted vines marketable to farmers	Pieces	3,007	3,200
Rate standard vines of certified category	%	21	43.6

The Production costs recorded in the year 2001 reached Euro 745, meaning Euro 0.15 per grafted vines. In the year 2002, the total production costs were Euro 1,052, that is Euro 0.33 per grafted vines.

For the two years of testing, the cumulated costs were Euro 1,797.

The share of various cost category in the total costs was the following one: 36.44 % materials, 34.00 % labor force, 9.73 % third parties, 0.78 depreciation. The direct costs represented 81.96 % of the total costs as shown in Table 2.

Incomes coming from standard grafted vines of certified category produced and tested in the Experimental Polygon I.

Table 2

Production costs related to the standard grafted vines of certified category obtained in the Experimental Polygon I

Cost category	2001	2002	Cumulated value
Material costs	288	367	655
Labor Costs	268	343	611
Third parties Costs	77	98	175
Depreciation Costs	14	18	32
Direct Costs	647	826	1,473
Indirect Costs	98	226	324
Total production costs	745	1,052	1,797

Taking in the account the two destinations of the obtained standard grafted vines of certified category, incomes have to be analyzed from two points of view:

- The incomes coming from the grafted vines destined to be used in the Experimental Polygon II depending on the number of grafted vines following to be transferred (1,818 pieces) and unitary production cost (Euro 0.15/piece) meaning Euro 273.
- The incomes coming from marketable grafted vines (3,007 pieces in the year 2002 and 3,200 pieces in the year 2003) and grafted vine price (Euro 0.46/piece in the year 2002 and Euro 1.05/piece in 2003).

As a result, in the year 2002, the total income counted for Euro 1,656 , while in the year 2003 it counted for Euro 3,360.

Therefore, the cumulated income obtained in the Experimental Polygon in the years 2002 and 2003 was Euro 5,016 as presented in Table 3.

Table 3

Incomes coming from standard grafted vines of certified category produced in the Experimental Polygon I

Year	Amount of grafted vines	Price Euro/vine	Income
2002			
A. Income from grafted vines obtained to be obtained to used in the Experimental Polygon II of the Research Unit			
	1,818	0.15	273
B. Income from grafted vines obtained to be sold to various viticulturists			
	3,007	0.46	1,383
	Total income in 2002	-	1,656
2003			
B. Income from grafted vines obtained to be sold to various viticulturists			
	3,200	1.05	3,360
Cumulated income	-	-	5,016

Financial results. Taking into account the level of production costs and incomes registered every year, we noticed a negative value of financial results (-Euro 745 loss) in the year 2001 and a positive value in the coming years: Euro 604 profit in 2002 and Euro 3,360 profit in 2003.

The cumulated financial results have a positive value + Euro 3,219.

In consequence, in the year 2001, the loss rate was 100 %, while in the year 2002, profit rate was 57.44 %. Also, in the year 2003, the research station registered only incomes. As a result, taking into account the cumulated values of costs and incomes over the period 2001-2003, the profit rate was 179.13 %, a considerable one which shows that the producing and testing of grafted vines in the Experimental Polygons in the Research units is a high performance activity both from a technological and an economical point of view (Table 4).

Table 4

Financial results in grafted vine testing in the Experimental Polygon I

Euro

Specification	2001	2002	2003	Cumulated value 2001-2003
Production costs	745	1,052	-	1,797
Incomes	-	1,656	3,360	5,016
Financial results	-745	+604	+3,360	+3,219
Profit/Loss Rate (%)	-100,00	+57.44	-	+179.13

CONCLUSIONS

1. The producing and testing of grafted vines in the Experimental Polygon of the Research units is compulsory for keeping under a controlled regime all the grafted vines which are destined to be delivered to viticulturists in order to set up new modern vine plantations based on high value seeding material.

2. In addition, such an activity assures important incomes and an increased profit rate to farmers.

3. As a result of this case study, from a surface of 0.22 ha, a number of 4,825 grafted vines was obtained, of which 62.33 % were sold to other viticulturists and the remaining of 37.67 % was transferred to be tested in the Experimental Polygon II, in a production farm within the same research station.

4. The related production costs, for the period while the experiments were running, were Euro 1,797, of which materials 36.44 %, labor 34 % and third parties 9.73 %.

5. The total income obtained in the experimental polygon was Euro 5,016, of which Euro 4,743, that is 94.56 % comes from standard grafted vines of certified category marketed to other viticulturists.

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CLONAL SELECTION RECENTLY HOMOLOGATE OF TRADITIONAL ROMANIAN VARIETIES (FETEASCĂ REGALĂ, FETEASCĂ ALBĂ, FETEASCĂ NEAGRĂ)

Onache Anca, Rădulescu Ion, Popa Camelia[1]

KEY WORDS: grapevine, clone top-notches, traditional varieties, wine, analysis

ABSTRACT

Clonal selection it's necessary if we want to make sure genetic stability and to obtain new genotypes of grapevine with advanced characteristics. Current method is used in vegetative propagation of grapevine and this way is avoided the degeneration of traditional romanian varieties (Fetească Regală, Fetească albă, Fetească Neagră) which are important in wine production . To obtain high quality and quantity of wine production the attention of wine growers and the wine makers was pointed to a systematic application of individual selection of traditional romanian varieties with high potential in wine production.

INTRODUCTION

Within the Stefanesti grapevine, the *Feteasca Regala, Feteasca Alba, Feteasca Neagra* are the main varieties for obtaining Romanian quality wine. You can find the studied varieties of grapes on Goleasca Range – the research lots. The vinification of Romanian traditional varieties, but also world-wide known varieties like Cabernet Sauvignon, Pinot Gris, Pinot Noire, Sauvignon, etc. was the job of many employers from National Research and Development Institute for Biotehnology in Horticulture Stefanesti (N.R.D.I.B.H Stefanesti): Musat Dumitru, Grosanu Gheorghe, Popescu Titus, etc. along of 50 years.

The clone selection of grapevine concerned many researchers like Zweigelt, Husfeld, Negrul, Huglin. In Romania, the clone selection was successfully used by: Neagul, Constantinesu, Oslobeanu, Popescu, Toader, Banita, Margareta Baditescu, Pituc, Doina Damian, etc. [1]. The Romanian traditional clone top-notch *Feteasca Regala 72, Feteasca Alba 97, Feteasca Neagra 6* were selected, passed through all the clone selection stages and confirmed within the N.R.D.I.B.H Stefanesti.

MATERIAL AND METHOD

Making wines from controlled origins and late harvest controlled origins grapes is very important on national and European level. This has to be done in the restricted cultural area where we cultivate the recommended authorized vine varieties, but also the traditional ones.

The elements of research were three clones and their witnesses of some Romanian traditional grape varieties. These ones are well-known for wine productivity and quality.

[1] INCDBH Ştefăneşti

The selection of the main plantation of clone top-notch from *Feteasca Regala, Feteasca Alba, Feteasca Neagra* varieties was made between years 1997 in a production plantation from 1960 in Research Goleasca Ranch. [2,3]

The clone top-notch found in the comparative range was multiplied by grafting the SO4-4 mother plant giving out grafted vines. These ones were planted on the testing range as the last stage of clone selection applied to the representative clone top-notch of Stefanesti grapevine. [2,3]

The grapes obtained from every variety were mechanic tested and the must was chemical and physical tested.

Table 1

The main mechanic characteristics of the grapesnd of the must obtained from homologated clones (*Feteasca Regala 72, Feteasca Alba 97, Feteasca Neagra 6)* and their witnesses

The mechanic characteristics of the grapes	The clone			The witness		
	Feteasca Regala	Feteasca Alba	Feteasca Neagra	Feteasca Regala	Feteasca Alba	Feteasca Neagra
Clusters' no.	8	11	5	7	5	3
Clusters' weight	40 g	41g	32 g	29,5 g	30 g	30 g
Healthy grapes' no.	661	808	777	668	682	770
Must:– volume - grams	960 g	940 g	960 g	950 g	910 g	945 g
Husks of grapes' weight	700 ml 760 g	670 ml 780 g	660 ml 710 g	650 ml 810 g	600 ml 580 g	630 ml 690 g
100 grapes Weight	135 g	160 g	160 g	135 g	140 g	160 g
Peel weight	200 g	126 g	213 g	183 g	106 g	161 g
Seeds' no.	14 g	14 g	12	10,5 g	35 g	15
Seeds' weight	195	171	175	148	236	207
Anthocyans	6 g	4,5 g	7	4,5 g	6,5 g	10

The used must for testing was submitted to the specific wine making technology of every variety. For the white grapes we use the specific vinification lines for white varieties (the crushing machine, the must obtained without pressing the grapes is sent back to the fermentation containers). For the red grapes we use the same method. The only difference is the vinification process. This is made by maceration – fermentation on hush for 3-4 days in stainless containers. The fermentation finishes in rotative containers. [4,5]

RESULTS AND DISCUSSIONS

Climatic conditions. The data that came out from the observation are influenced by the climatic conditions between the years 2004-2007 when the clone top-notches were studied

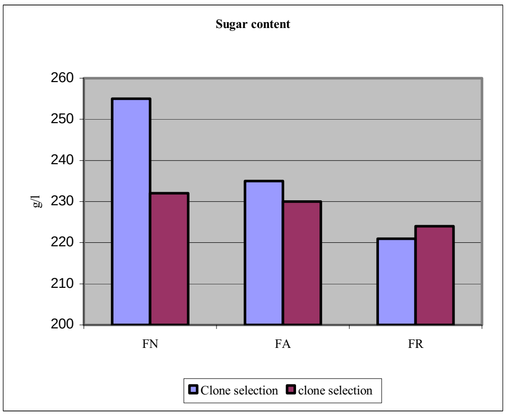
on the comparative and the testing ranges at National Research Institute Stefanesti.

The climatic conditions from the last 4 years are characterised by a low amount of water regime, especially in the critical times of growing and ripening of the grapes and by big differences between summer and winter. The annual average temperature recorded at Stefanesti is 9 -10 C.

The values of the viticulture index (2,0-2,5), hydrothermal index (3,0-6,0)and bioclimatic index (3,0-7,0) were situated in the admitted limits for viticulture. [2,3]

Regarding the climatic conditions of the past years, from the point of view of the harvest and theirs productivity, from these varieties was obtained must with a high content of sugar and acidity, in 2007. From this reason, we have obtained wines by controlled origins with high alcoholic potential and less sugar.

It comes out from the main physical and chemical characteristics of the wines obtained from the recent homologated clones (*Regala 72, Feteasca Alba 97, Feteasca Neagra 6)* that these wines are superior to the witness. The colour intensity of the Feteasca Neagra clone (4,81) is much higher as the selected varieties even if the vinification technology was identical for bough of them.



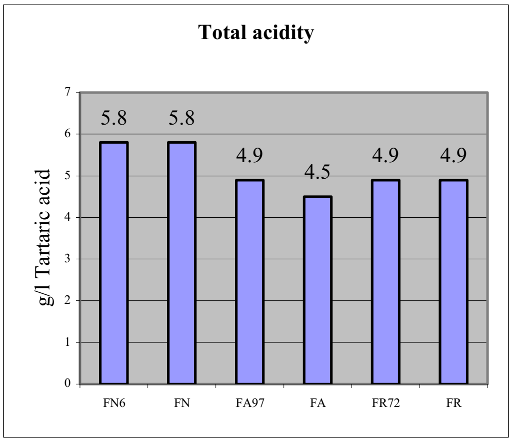


Fig1 and 2. The variation of the sugar content and total acidity of the wine obtained from clones comparing to the witness.

To the same volume of the must, the sugar content is much higher comparing to the witness. A good example is Feteasca Neagra. The total acidity (g/l tartaric acid) is identical to the clones and to the witness as we can see in the next diagram.

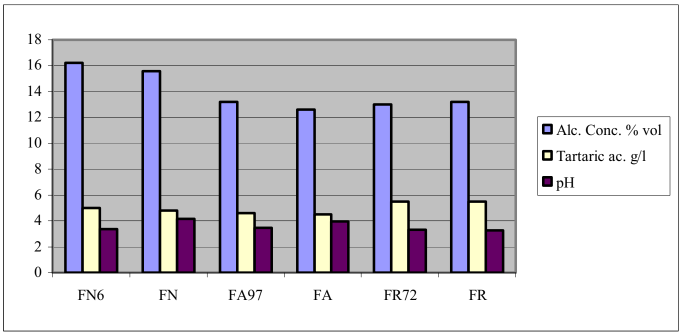


Fig . 3. The variation of the alcohol concentration of the total acidity and of the pH of the wine obtained from clones comparing to the witness.

CONCLUSIONS

1. Regarding the chemical compounds of the wine and its quality, the obtained product from *Regala 72, Feteasca Alba 97, Feteasca Neagra 6* is superior and it is successfully able to replace the *Feteasca Regala, Feteasca Alba, Feteasca Neagra* varieties.

2. Due to the high productivity potential of the wines, to the balance of the organoleptic characteristics and to the physic and chemical composition of the wines, the *Regala 72, Feteasca Alba 97, Feteasca Neagra 6* clones are recommended for completing or replacing the witness varieties in the production of the quality wines.

3. The accumulation potential of the sugar quantity from the homologated clones is adequate to the origin controlled wines and superior to the reference varieties. These are due to:

- the adjusting, multiplying and fermentation capacity of the must where the temperature rises sometimes to high levels (30-35 C);
- the optimum transformation efficiency of the sugar in alcohol;
- the high alcohol level (16,2% - FN6, 13,2% - FA97, 13,0% - FR72);
- the capacity of transformation of the sugar from the must with high concentration levels of sugar.

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THE STUDY ON NATURAL ENVIRONMENT OF THE YEASTS FROM THE MAIN VITICULTURAL REGIONS OF OLTENIA

Oaie Lenica, Popa Aurel, Gheorghe Mirela[1]

KEY WORDS: yeasts, natural environment, insulating, identification

SUMMARY

In this study there are presented the results of research on issues, that have concerned the study of natural environments of yeasts, from viticultural areas: Stârmina-Mehedinți and Sâmbureşti-Olt which is the subject of a doctoral thesis inscribed in the Faculty of Horticulture, University of Craiova.

INTRODUCTION

The proof of the necessity of germs to cause fermentation had been made by Pasteur, but where they were-inside or on the thin skin of the grape bean-when and where they came from, they were all so many questions that waited an answer to explain spontaneous fermentation of the must of grapes, more than misunderstood of the must of malt, where the yeast is transmitted from manufacturing to manufacturing .

The results of studies and research in the field, worldwide, have demonstrated that the number of yeasts from the soil and on the beans of the grape, up before their harvesting and after, vary depending on several factors: the geographical settlement of the vineyard, the pedoclimatic conditions during the maturation of grapes, state of health of crop protection products and treatments applied on the vine (Ribéreau-Gayon and cooper., 1998).

The researches were carried out during 2003-2007 in two vines centres from Oltenia, namely: Starmina - Mehedinti and Simburesti-Olt.

MATERIALS AND METHODS

Soil samples, grapes and must were collected from the vine centers in order to isolate and identify the yeasts. For the isolation of the yeasts in the study areas and all sources that have been taken samples (soil, grapes and must) it was used an enriched YPG environment (Popa Aurel and cooper., 1996; Dragomir Felicia, 2002; Popa Aurel and cooper., 2004) (fig. 1, 2).

The identification of yeasts colony isolated from samples of soil, grapes and must of the main centres of Oltenia (Stârmina Mehedinți and Sâmbureşti Olt), was designed by submitting them to identification standard tests:

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-Morphological tests:

- ❖ shape and size of the cell; colonial characteristics; behavior in liquid environment.

-Physiological tests:

- ❖ fermentation and assimilation of sugars; nitrate assimilation, the use of alcohol as the sole source of carbon; arbutine division; growth in the absence of vitamins, growth in the presence of the ciclohexamide (actidione).

In order to achieve morphological tests it was used an optical microscope equipped with video camera to capture the image (image 3.4**).**

RESULTS AND DEBATES

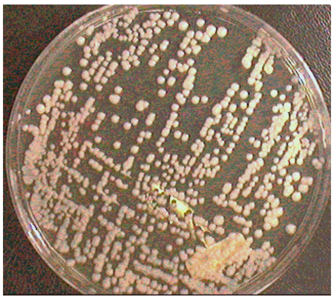
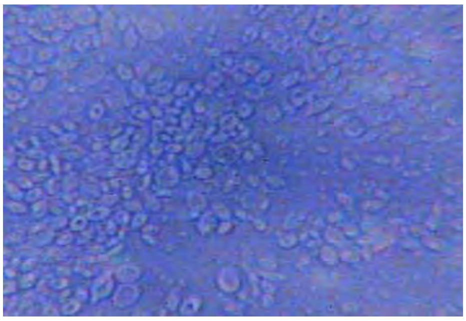


Fig. 1. Kloeckera apiculata Fig. 2. Saccharomyces ellipsoideus
–culture on solid medium-



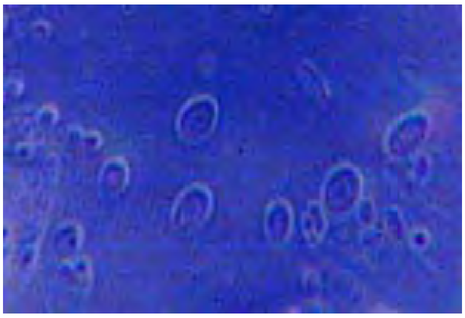


Fig. 3. Kloeckera apiculata Fig. 4. Saccharomyces ellipsoideus
- cells in liqui d medium -

Following the study of yeasts microphlora, present in the centres of vines Stârmina Mehedinți and Sâmburești Olt there were isolated and identified a number of 26 colonies of yeasts, which, as a result of the identification standard tests, were placed in seven genders (Saccharomyces, Candida, Pichia, Kloeckera, Hanseniaspora, Metschnicowia, Rhodotorula) and nine species (Saccharomyces ellipsoideus, Saccharomyces oviformis Saccharomyces rosei, Candid vini, Pichia membranefaciens, Kloeckera apiculata, Hanseniaspora uvarum, Metschnicowia pulcerrima, Rhodotorula glutinis).

The percentage of species of isolated yeasts from natural environments (the land of vineyards, grapes and must) of the two vine centers are shown in Table 1 and image nr.5.

The results of these studies have led to the certainty that the main yeasts species existing natural environments of the two centers are Saccharomyces cerevisiae wine (29%), followed by Kloeckera apiculata (15%), Saccharomyces oviformis (14%), Hanseniaspora uvarum (11%) , Pichia membranefaciens (10%), along which there also live in a limited number yeasts belonging to other genres. (Image nr.5).

The spontaneous flora (Table no. 1) is the distinct characteristic of each area under vines and it is noticeable that the prevalent species are those which initiate alcoholic fermentation but also the least alcooligene

Table 1

The distribution of isolated yeast species in the wine center Stârmina Mehedinți and Sâmbureşti in Olt the period between 2003 -2007

Yeasts species	The number of isolated cells	Percentage (%)
Saccharomyces ellipsoideus	75	29
Saccharomyces oviformis	37	14
Saccharomyces rosei	20	8
Candida vini	18	7
Pichia membranefaciens	27	10
Kloeckera apiculata	40	15
Hanseniaspora uvarum	28	11
Metschnicowia pulcherrima	5	2
Rhodotorula glutinis	11	4
Total	**261**	**100%**

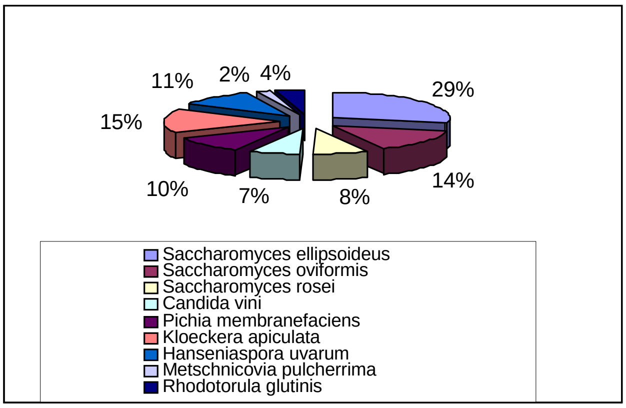


Fig.5

CONCLUSIONS

- The results of studies and research in the field, worldwide, have demonstrated that every oenoclimatic area, more specifically every wine center presents a different levurian structure which varies depending on several factors (geographical settlement, pedoclimatic conditions , phytosanitary satrea of the crop etc.);
- Following the identification of isolated colony of yeasts from grape , it was noticed that most of the species on the surface of grapes are the apiculated shape Hanseniaspora uvarum and imperfect form of Kloeckera apiculata, which is approximately 50-75% of the levurian total population. Other types with significant presence on the grapes are: Candida, Pichia, Metschnikovia, Hansenula and Rhodotorula.

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YEASTS STRAINS DISTRIBUTION IN MAINFOLD NATURAL ENVIRONMENTS FROM WINE-GROWING CENTRE SÂMBUREŞTI OLT

Oaie Lenica, Popa Aurel, Gheorghe Mirela[1]

KEY WORDS: natural environment, distribution, yeast strains, wine-growing centre.

SUMMARY

A synthesis of the results obtained at Wine-Growning Centre Sâmbureşti Olt by studying the wine growing microflora of this region during the 2004 – 2005 period is presented. The investigations that had been carried on, revealed, by means of the selected yeasts separated (in soil, grapes and must), that the wine growing microflora of these vineyards are divided into 7 genders (Saccharomyces, Candida, Pichia, Kloeckera, Hanseniaspora, Metschnicowia, Rhodotorula). The prevailfog specie is Saccharomyces. The identified yeast strains belong mostly to the Kloeckera apiculata, Saccharomyces cerevisiae var. ellipsoideus and Saccharomyces oviformis.

INTRODUCTION

Studies on grapes and wines microflora have been focused on insulating and identification of new yeasts sources, for a better approach of microbiology fermentation purposes. It is pursued to separate yeast sources from Sâmbureşti Olt vineyard area and use them in vinous fermentation to improve the wine quality in this wine-growing centre.

It has been proven that the spontaneous yeast microflora is not enough to provide an effective natural fermentation in difficult environment conditions, such as: late and rainy autumns, mildew crops, undesired yeasts and bacteria etc. This is the reason why it is necessary to obtain special leavens, from clean cultures of certain yeast species.

The research carried on Sâmbureşti Olt Wine-Growing Centre pursued to identify and insulate yeasts from wine microflora and, also, to determinate the yeast species distribution.

METHODS AND MATERIALS

Soil, grapes and must have been sampled from the wine-growing centre, mentioned above. Sampled grape varieties were: Cabernet Sauvignon , Merlot and Italian Riesling.

Samples of soil and grapes have been taken, in diverse sweeping phases, by washing them and the resulted water was inoculated on culture environments.

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Sugariness of musts was figured out and it was observed the evolution of yeasts species, during the vinous fermentation process.

An enriched YPG environment was used for insulate the yeasts in the sampled sources - soil, grapes and must – (Kontec A., Adriana K.,1975 Popa A. & cooper., 1996; Dragomir Felicia, 2002; Popa A & cooper., 2004).

Yeast cultures identification, from soil, grapes and must samples, have been accomplished by standard identification tests:

- **morphological tests:**
  - cell's size an shape, cell strains features, behaviour in wet environment.
- **physiological tests:**
  - sugar fermentation and assimilation, nitrates assimilations, the use of ethyl alcohol as the only source of carbon, arbutine segregation, growing in absence of vitamins, growing in ciclohexamide presence etc. (Barnett & cooper., 1990, Loder J.1970).

It was used an optical microscope fitted with a capture camera for morphological tests.

RESULTS AND DISCUSSIONS

The study carried on Sâmbureşti Olt Wine-Growing Center has revealed a number of 133 yeast strains, classified – following the standard identification tests – in seven genders (*Saccharomyces, Candida, Pichia, Kloeckera, Hanseniaspora, Metschnicowia, Rhodotorula*) and nine species (*Saccharomyces ellipsoideus, Saccharomyces oviformis, Saccharomyces rosei, Candida vini, Pichia membranefaciens, Kloeckera apiculata, Hanseniaspora uvarum, Metschnicowia pulcerrima, Rhodotorula glutinis).*

Saccharomyces gender is dignifying with 68 species in a total of 133 identified strains, thus, from Saccharomyces ellipsoideus specie, it was insulated a number of 40 strains, which means a 30% from the total number of insulated yeast strains. Saccharomyces oviformis was present with a number of 20 strains and Saccharomyces rosei revealed the presence of 8 strains.

According to Tabel no. 1, a number of 22 Kloeckera apiculata strains was insulated, representing a quite high preponderance.

The percentage distribution of insulated yeast species from sampled natural environments (soil, grapes and must) is presented in Table no. 1 and Fig. No. 1.

The study results have revealed that Saccharomyces cerevisiae is the regnant species in Sâmbureşti Olt Wine-Growing Centre, followed by Kloeckera apiculata, Saccharomyces oviformis, Hanseniaspora uvarum, Pichia membranefaciens and a few other minor yeast genders.

The most number of yeast strains was insulated from the grapes samples, followed by must and then soil samples, as we can see in Table no. 1 and Fig. no 1, containing data on yeast species evolution in Sâmbureşti Olt Wine-Growing Centre. Yeasts strains belonging to Saccharomyces ellipsoideus were the regnant specie in must samples, representing 50% from the total occurrence of this specie.

Table 1

Yeasts insulated and identified at Sâmburesti Olt Wine-Growing Centre

Yeast species	Number of insulated yeast strains	Percent (%)	Soil	Grapes	Must
Saccharomyces ellipsoideus	40,00	30,00	8,00	12,00	20,00
Saccharomyces oviformis	20,00	15,00	5,00	7,00	8,00
Saccharomyces rosei	8,00	6,00	2,00	4,00	2,00
Candida vini	10,00	7,50	3,00	5,00	2,00
Pichia membranefaciens	12,00	9,00	4,00	6,00	2,00
Kloeckera apiculata	22,00	16,50	3,00	12,00	7,00
Hanseniaspora uvarum	12,00	9,00	4,00	5,00	3,00
Metschnicowia pulcherrima	2,00	1,50	2,00	-	-
Rhodotorula glutinis	7,00	5,50	4,00	3,00	-
Total	**133**	**100%**	**35**	**54**	**44**

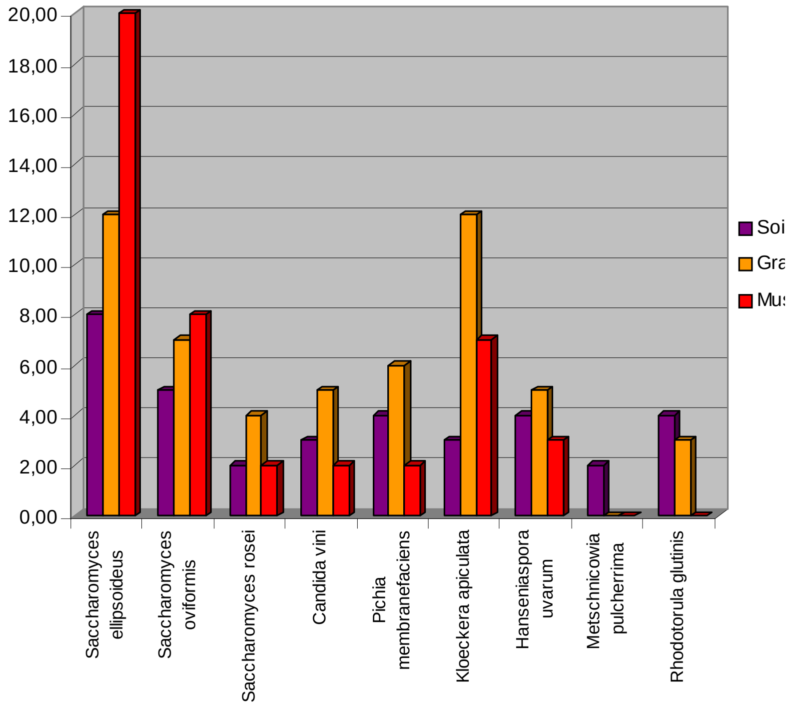

Fig. 1. Species evolution of yeasts sampled from soil, grapes and must at Sâmbureşti Olt wine-growing centre

CONCLUSIONS

- It was a number of 133 yeast strains insulated from soil, grapes and must samples, classified, according to standard identification tests, in seven genders (*Saccharomyces, Candida, Pichia, Kloeckera, Hanseniaspora, Metschnicowia, Rhodotorula*) and nine species (*Saccharomyces ellipsoideus, Saccharomyces oviformis, Saccharomyces rosei, Candida vini, Pichia membranefaciens, Kloeckera apiculata, Hanseniaspora uvarum, Metschnicowia pulcerrima, Rhodotorula glutinis).*
- The regnant specie is Saccharomyces ellipsoideus, with 40 strains.
- The main identified yeast strains belong, as number and percentage, to next species: Saccharomyces ellipsoideus, Kloeckera apiculata, Saccharomyces oviformis, Hanseniaspora uvarum, Pichia membranefaciens, Candida vini, Saccharomyces rosei, Rhodotorula glutinis, Metschnicowia pulcerrima.
- The insulated yeasts from Sâmbureşti Olt Wine-Growing Centre will be tested to obtain new yeast sources, for ameliorated wine varieties.

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IMPROVEMENT OF GRAPEVINE VIRUS A (GVA) DIAGNOSIS BY ELISA TESTING

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KEY WORDS: grapevine, GVA, detection, DAS-ELISA–biotin, $OD_{405\ nm}$

ABSTRACT

In order to establish the distribution of grapevine virus A (GVA) in plant, different organs and tissues (leaf blade, petiole, tendril, root, dormant cutting, green shoot, shoot tip, inflorescence, bunch) collected from infected grapevines belonging to Servant variety were used as source of antigen. The samples were tested by DAS-ELISA-biotin method with commercial antiserum to detect the virus and also to estimate the level of infection. The virus was detected over the course of the entire year, both in the vegetation and dormancy; the best sources of virus were basal mature leaf and phloem tissue from mature cane, respectively. GVA was not reliable detected in young material and bunch. The efficiency of detection of grapevine viruses based on ELISA tests depends on the source of the virus and the time of the year in which the sampling is performed.

INTRODUCTION

The rugose wood complex consists of several diseases (Grapevine rupestris stem pitting, Grapevine kober stem grooving, Grapevine corky bark, Grapevine LN33 stem grooving) that are usually latent in ungrafted *Vitis vinifera* and American *Vitis* species and rootstock hybrids, but develop in grafted vines (Martelli and Budon-Padieu, 2006).

These disorders often show symptoms in the field (Credi, 1997; Tomazic et al., 2003). Typical symptoms related to grafted vines include swelling above the graft union and wood with pits or grooves that can only be seen after the bark is removed. The severity of symptoms varies with the rootstock or scion variety and the virus type, ranging from delayed budburst to vine decline and death. Environmental stress and/or the combination of rugose wood syndrome with other diseases may intensify the disease symptoms.

A key role in the development of rugose wood abnormalities, particularly the Kober stem grooving syndrome may be played by the presence of grapevine virus A (GVA). A reliable identification method is the use of woody indexing tests with Kober 5BB as indicator (Bovey and Martelli, 1992). Visual field diagnosis of grapevine diseases is important, but ultimately the grower should rely on laboratory tests to rule out infection or pinpoint the disease causal agent. The application of ELISA contributed to determine the role of GVA in the determinism of Kober stem grooving (Boscia et al,. 1992; Garau et al., 1994; Credi and Giunchedi, 1996).

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The paper reports the results of DAS- ELISA-biotin testing of GVA, pointing out its distribution (localization) and concentration in different organs and tissues of grapevine plant in growing and dormant plant material with the aim to optimize the virus detection.

MATERIAL AND METHOD

The study was conducted on own rooted plants belonging to grapevine virus infected collection in greenhouse, during 2007-2008 years. The GVA infected grapevines (*V. vinifera*, Servant cv.) were previously selected by DAS-ELISA-biotin testing with commercial reagent produced by SEDIAG France. No virus disease symptoms have been observed in infected vines. To determine the distribution of the viral antigens in grapevine during the year, samples from virus infected vines were collected both in the vegetation (leaf blade, petiole, tendril, green shoot, shoot tip, inflorescence, bunch, active root), and winter dormancy (phloemic tissue from one year old mature cane). The samples were collected in different stages of grapevine or period of the year, as follows: flowering, berries pea-sized, ripening, vintage and dormancy. Also, the leaf samples were collected along the shoot, from basal, middle and upper part.

The results concerning the detection, distribution and also the GVA concentration in grapevine were evaluated using DO_{405nm} values (absorbance) obtained in ELISA tests (Clark and Adams, 1977). For each kind of sample OD_{405nm} values represent the average of at least two ELISA readings.

The interpretation of the results was achieved by the calculation of a detection threshold (twice the mean of the negative controls OD_{405nm}). A sample is considered as positive (+, virus infected) if its OD is far above the threshold; it must be considered as doubtful (±) if its OD is close to this threshold.

RESULTS AND DISCUTION

The distribution of GVA in infected grapevines belonging to Servant variety in the period of vegetation was realized using tissue samples collected in different stages of plant growing (Table 1).

In the flowering stage

The GVA presence was analyzed in leaf blade and petiole from basal and upper leaf, inflorescence and tendril. All OD 405 nm values of samples were positive (3 – 7 times higher then the negative control (C-). In this stage were registered differences of virus content between apical and basal leaf, and also between blade and petiole of the same leaf. The maximum ELISA reading was obtained with petiole of basal leaf. In the case of blade of upper leaf was registered a pour content of viral antigens. The inflorescence and tendril contain large quantities of virus.

Large amount of GVA in grapevine tissues in the growing season may be due the metabolic activity of the plants and virus replication (Rowhani et al., 1992). On the other hand, the young tissues are more turgescent and allow a better extraction of the virus.

In the berries pea-sized stage

At this stage the viral antigens were consistently found in leaves (petiole and blade) along the shoot, green shoots, apices and active roots. The virus was detected in leaves in higher concentrations than in middle and basal leaves. Also, unexpected high ELISA values have been obtained with grapes where the viral antigens were detected both in rachis and berries.

Table 1

ELISA detection of GVA in the period of vegetation, using different sources of virus

Source of antigen / tissue sample		**ELISA values ($OD_{405\ nm}$)**	**Observation (positive or negative result)**
In the flowering stage			
Basal leaf	Petiole	0.795	+
	Blade	0.624	+
Upper leaf	Petiole	0.479	+
	Blade	0.347	+
Inflorescence		0.686	+
Tendril		0.744	+
	Negative control	0.114	
In the berries pea-sized stage			
Basal leaf	Petiole	0.984	+
	Blade	0.757	
Upper leaf	Petiole	1.011	+
	Blade	0.769	
Middle leaf	Petiole	0.855	+
	Blade	0.724	
Green shoot		0.642	+
Shoot tip		0.538	+
Root		0.692	+
Grape	Rachis	0.928	+
	Berry	0.455	+
	Negative control	0.110	
In the ripening stage			
Basal leaf	Petiole	0.427	+
	Blade	0.318	+
Upper leaf	Petiole	0.209	±
	Blade	0.193	-
Middle leaf	Petiole	0.304	+
	Blade	0.276	+
Grape	Rachis	0.689	+
	Berry	0.125	-
	Seed	0.112	-
	Negative control	0.098	
In the vintage stage			
Basal leaf	Petiole	0.846	+
	Blade	0.831	+
Upper leaf	Petiole	0.878	+
	Blade	0.793	+
Middle leaf	Petiole	0.844	+
	Blade	0.723	+
Grape	Rachis	0.925	+
	Berry	0.711	+
	Seed	0.329	+
	Negative control	0.115	

In the ripening stage

The GVA presence was analyzed in basal, middle and upper leaf (blade, petiole) and fruits (rachis, berry, seed). Despite the low differences of ELISA readings between leaves along the shoot, the upper leaf doesn't allow a reliable detection of GVA because the mean of blade samples ELISA values were negative and the petioles samples registered doubtful results. The extracts from fruit were positive in the case of rachis only; the virus was not detected in berry and seed. The basal leaf remains the most reliable and accessible tissue for GVA detection in this stage. However, in the ripening stage was registered a significantly decrease of ELISA values, presumable due the climatic conditions (high temperature). The technology of virus elimination by heat treatment is based on depressive effect on the virus, inactivation, reducing its replication, slower migration of the viral antigens thru the shoot tip and reducing the titre in the meristematic tip (Rives, 1970).

In the vintage stage

The virus was detected in all samples analyzed. The ELISA values are remarkable for the presence of GVA in fruit, the repeatability and the reproducibility of the results. The virus is not transmitted by seeds (Martelli and Boudon-Padieu, 2006) but high $OD_{405\ nm}$ values were obtained in this case. Larger amounts of virus were present in the petiole than in the blade of similar leaf. All values were higer than in the ripening stage and the results of the ELISA testing were more reliable.

In the winter dormancy

The viral antigens were detected in phloemic tissue of one year old dormant canes collected from virus infected vines. In this period, from November until March, were registered the highest ELISA values; OD 405 nm readings were between 0.870 and 1.119, that seems they are between 7 and 11 times higher than the negative control, appreciatively (Fig. 1). The GVA infected lignified canes produced high level of ELISA readings perhaps because the better extraction conditions (there are not chlorophyllous pigments in this kind of tissue, which interfere in viruses extraction) and phloem affiliation of the virus.

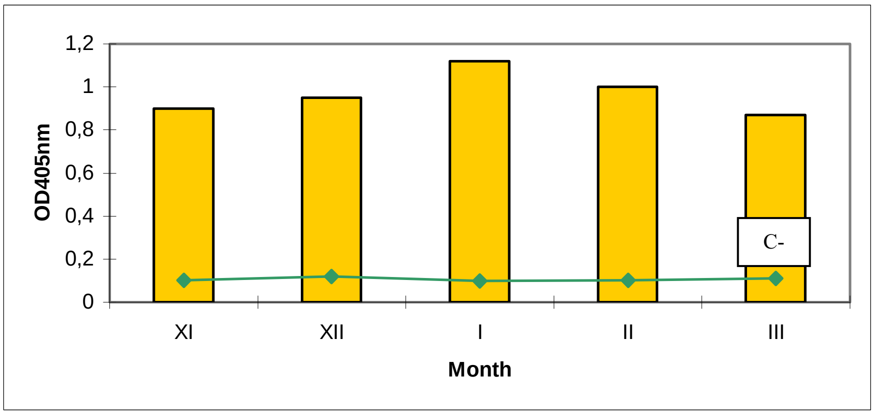

Fig. 1. ELISA detection of GVA in Servant cv. grapevine plants in winter dormancy, using phloemic tissue from mature cane as source of antigen.

In Sardinia, GVA detection was possible in petioles of mature leaves kept for one year at -80°C and on cortical scraping for mature canes kept at +4°C for two months. In other assay done at Bari, GVA was detected in cortical scrapings of mature canes kept at +4°C for eight month (Boscia et al., 1997).

The virus was reliable detected over the course of the entire year, both in the vegetation and dormancy, using leaf and mature cane, respectively, because they are the most accessible source of tissue in these periods. The leaf samples (blade and petiole) were collected along the shoot. The samples from mature cane are represented by shavings of active cambium of one year old cuttings. However, it is recommended to avoid the GVA testing in the hot periods because ELISA values were fluctuant and decreased comparatively with the other time of the year. (Fig. 2).

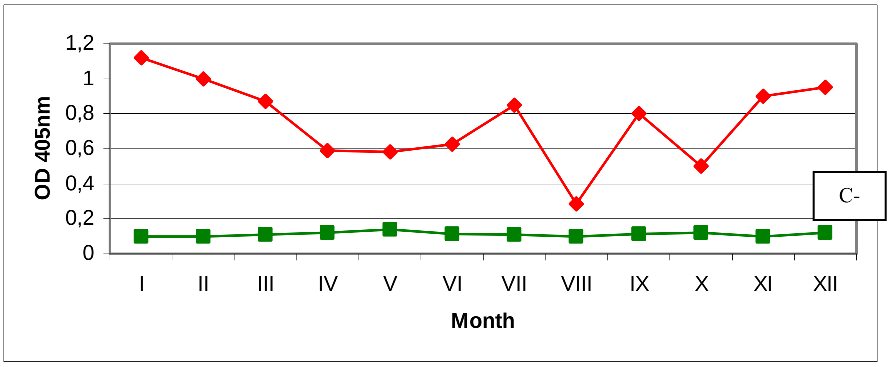

Fig. 2. Evaluation of sensitivity of ELISA detection of GVA in Servant cv. grapevine plants over the course of the entire year

The level of OD405nm readings on the source of GVA and the time of the year in which the sampling is performed.

Viruses are known to be unevenly distributed in many host plants and seeds (Walter and Etienne, 1987; Hughes and Ollennu, 1994; Latvala et al., 1997; Dahal et al., 1998) thus making the sampling strategies critical for virus detection. Where the distribution of the virus is not known, the use of composite samples from different parts of the plant or seed will help to avoid this problem.

CONCLUSIONS

1. The efficiency of detection of grapevine virus A based on ELISA tests depends on the tissue source and the period of the year in which the sampling is performed.

2. Grapevine virus A was detected along the year in different green tissues (leaf, tendril, shoot, shoot tip, inflorescence, rachis, berry) and lignified material (phloemic tissue from dormant cane).

3. The sensitivity of the ELISA test varies in function of the climatic conditions. Also, is recommended to avoid the GVA testing in the hot period of the year because the OD readings decreased comparatively with the other time of the year.

4. In order of effectively use ELISA detection of GVA, information on virus distribution and content in different grapevine tissues taken over the course of the entire year is necessary.

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QUALITATIVE AND QUANTITATIVE YIELD OF CHASSELAS DORE VARIETY IN CONDITIONS OF THE DIDACTIC STATION TIMIŞOARA

Drăgunescu Aneta Anca, Podrumar T., Becherescu Alexandra, Taru O.[1]

KEY WORDS: chasselas doré, fruit formation load, works and operations in the green period, grapes yield, quality of yield

ABSTRACT

The objectives of the experiment were concerned on establishing the best fruit formation loadings and the most efficient works and operations in the green period to the table grapes variety Chasselas doré, cultivated in conditions of the Didactic Station Timisoara, in order to obtain superior qualitative and quantitative. The researches started from the premise that correct pruning, made according to the variety and culture technologies, will determine a good balance between growth and fruiting, high yields and improved quality harvest. The grapes yield obtained for table grapes is given in the yield per vine, yield per hectare and commercial yield. The values of vine and hectare yield obtained from Chasselas doré variety have been different along the years and in the same year among the experimental variants. Concerning grapes quality there were made determinations on: the weight of a grape, sugars content, total acidity and commercial yield.

INTRODUCTION

The grape vine has been an interest and preoccupation for man eve since prehistoric times, when its fruit, the grape was harvested from forests. The grapes are natural medicine fruits as well as the vine itself and the wine because of their therapeutic effects (1). An important role in obtaining superior grapes yields, quantitative and qualitative, was represented by pruning. So, the size of fruit formation load and its repartition on the fruiting elements has been and still is a major concern for scientists and practical workers (2,3,4). By applying correct operations in the green period the table grapes varieties are favorable influenced concerning the grape weight increase, the uniform size of berries and a positive effect upon the increase of the total yield of 10-15%. By these means there is given a higher percentage of commercial yield, which can get to 80-90%, knowing the fact that "the grapes are consumed at first by the eyes" (3).

MATERIAL AND METHOD

The researches made on Chasselas doré variety developed along the years 2002 and 2004 and the experiment was placed in the Vineyard of the Didactic Station Timisoara, which contains table grapes varieties of 16 years age. The culture system is a non-protected

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one, an a semi stem, planted at the distance 2 m between the rows and 1,2 m between the vines on a row, having a density of 4166 vines/ha.

The experiment consisted in observing the behavior of Chasselas doré variety, a table grapes variety, to different fruit formation loads and to some works and operations made in the green period (rate setting and shortening the inflorescences) specific to the table grapes varieties.

The experiment was a poly-factorial one having 5 repetitions and 2 factors: factor A – fruit formation load with graduations: a_1= 24 buds/vine; a_2=36 buds/vine; a_3=48 buds/vine and factor B – number of inflorescences/vine, with the graduations: b_1=16 inflorescences /vine; b_2=24 inflorescences /vine; b_3=32 inflorescences /vine. In this way we got 9 combinations in 5 repetitions: 11 = a_1 b_1; 12 = a_1 b_2; 13 = a_1 b_3; 21 = a_2 b_1; 22 = a_2 b_2; 23 = a_2 b_3; 31 = a_3 b_1; 32 = a_3 b_2; 33 = a_3 b_3.

RESULTS AND DISCUSSIONS

The medium grapes yields per vine during the years of experimentation (2002and 2004) obtained from Chasselas doré variety have varied between the values of 2,192 kg/vine for variant 31 and 4,033 kg/vine for variant 23.

By statistical analyze of the yield/vine, excepting variant 23, which has no significance, but has a superior yield than the control (with 1,86% higher) and variant 33, which is also not significant, but negative, all the other variants are very significant negative or distinct significant negative (variant 22) (table 1 and figure1).

Table 1

Influence of interaction between A and B factors on grape yield for Chasselas doré variety, mean values 2002-2004, kg/vine

Variant	Grapes yield (kg/vine)	Relative value (%)	Difference to control	Significance
11 = a_1 b_1	2,307	58,26	-1,653	000
12 = a_1 b_2	2,672	67,49	-1,287	000
13 = a_1 b_3	2,781	70,24	-1,178	000
21 = a_2 b_1	2,941	74,27	-1,019	000
22 = a_2 b_2	3,474	87,73	-0,486	00
23 = a_2 b_3	4,033	101,86	0,074	-
31 = a_3 b_1	2,192	55,37	-1,767	000
32 = a_3 b_2	2,870	72,48	-1,090	000
33 = a_3 b_3	3,682	93,00	-0,277	-
Control	3,959	100,00	0,000	-

DL5%=0,30 DL1%=0,41 DL0.1%=0,53

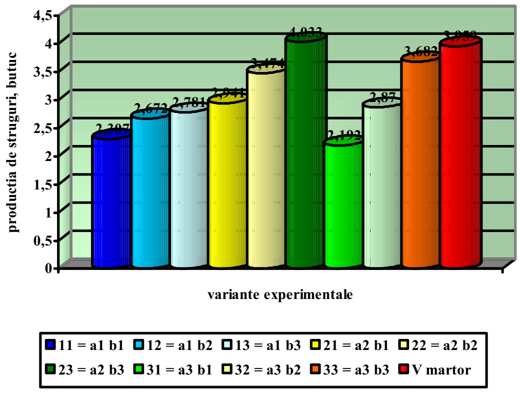

Fig. 1. Grape yield per vine of Chasselas doré variety, mean values 2002-2004, kg/vine

For the qualitative analyze of the yield there were determined the mean weight of a grape and its content in sugars and acidity.

The weight of a grape of Chasselas doré variety in the experimented period had values between 103 g for variant 13 and 184 g for variant 21 (table 2 and graphic 2). Under the influence of the two experimental factors there were observed weight increases compared statistical to the control.

The most valuable variant is 21, which had grapes weighting 184 g, superior than the control (105 g), with an increase of over 75%, following variants 22, 11 with an increase of over 37% than the control, then variant 31 with an increase of over 30% to the control and variant 23, with a weight increase of over 20%, all the other variants being very significant to the control. Variant 32 had an increase of 13,90% than the control weight and it has a distinct significant difference to it, and variant 12, with an increase of 10,67% is only significant.

Variants 33 and 13 have weights that had no difference to the control.

Table 2

Average grape weight of Chasselas doré variety, mean of experimental years

Variant	Grape's weight, g	Relative value, %	Difference to control	Significance
11 = a_1 b_1	144	137,33	39,20	***
12 = a_1 b_2	116	110,67	11,20	*
13 = a_1 b_3	103	97,81	-2,30	-
21 = a_2 b_1	184	175,05	78,80	***
22 = a_2 b_2	145	137,81	39,70	***
23 = a_2 b_3	126	120,10	21,10	***
31 = a_3 b_1	137	130,48	32,00	***
32 = a_3 b_2	120	113,90	14,60	**
33 = a_3 b_3	115	109,81	10,30	-
Control	105	100,00	0,00	Control

DL 5%= 10,64 DL1%= 14,26 DL0,1%= 18,82

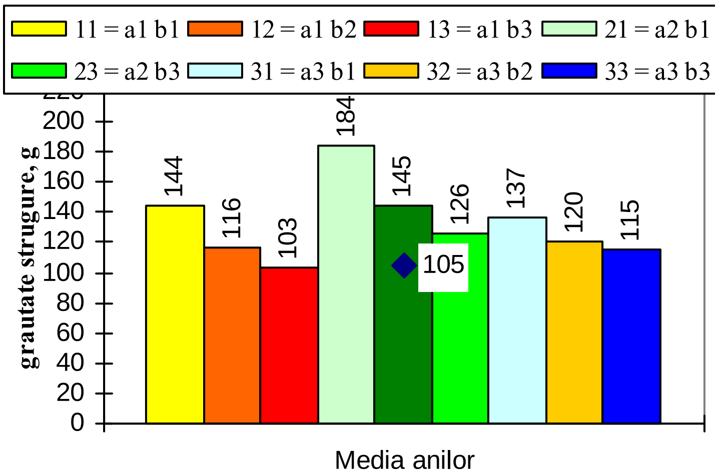

Fig.2. Comparative values of grape weight for the experimental years

During the experiment period the value of sugars content obtained from Chasselas doré variety were of 159 g/l in must for variant 23 and 173 g/l in must for variant 11 (table 3). The mean sugar content of the control variant during the experiment was of 160g/l in must. By studying the interaction of the experimental factors there were observed statistical increases for 5 variants. Variants 11 and 21 had a sugar content superior distinct significant than the control, having an increase of 12,80 g/l sugar in must and 12,30 g/l sugar in must. Variants 12, 31 and 32 had significant values superior than the control, with an increase between 8,80 g/l sugar in must and 10,30 g/l sugar in must.

Table 3

Sugar content of grapes for **Chasselas doré** variety

Variant	Mean sugars g/l	Relative value, %	Difference to control	Significance
11 = a_1 b_1	173	108,02	12,80	**
12 = a_1 b_2	170	106,14	9,80	*
13 = a_1 b_3	166	103,69	5,90	-
21 = a_2 b_1	172	107,70	12,30	**
22 = a_2 b_2	163	102,07	3,30	-
23 = a_2 b_3	159	99,81	-0,30	-
31 = a_3 b_1	170	106,45	10,30	*
32 = a_3 b_2	169	105,51	8,80	*
33 = a_3 b_3	163	102,07	3,30	-
Control	160	100,00	0	Control

DL5% = 7,90 DL1%= 10,59 DL0,1%=13,97

By analyzing the average of the studied years, the acidity of Chasselas doré variety had values of 3,98 g/l H_2SO_4 for variant 11 and 4,83 g/l H_2SO_4 for variant 23. The average of the studied years for the control variant was 4,51 g/l H_2SO_4 acidity.

In conclusion, after studying the interaction of the two factors, none of the experimented variants was statistically assured, which shows that the experimental factors did not influence on a significant way the acidity of the grapes belonging to this variety (table 4).

Table 4

Acidity of grapes for Chasselas doré variety

Variant	Mean acidity, g/l H_2SO_4	Relative value, %	Difference to control	Significance
11 = a_1 b_1	3,98	88,25	-0,53	00
12 = a_1 b_2	4,26	94,46	-0,25	-
13 = a_1 b_3	4,20	93,13	-0,31	-
21 = a_2 b_1	4,26	94,46	-0,25	-
22 = a_2 b_2	4,52	100,22	0,01	-
23 = a_2 b_3	4,83	107,10	0,32	-
31 = a_3 b_1	4,15	92,02	-0,36	-
32 = a_3 b_2	4,30	95,34	-0,21	-
33 = a_3 b_3	4,32	95,79	-0,19	-
Control	4,51	100,00	0	Control

DL5%=0,39 DL1%=0,52 DL0,1%=0,69

Observing the mean percentage of commercial yield from the total grape yield of Chasselas doré variety during the experiment (table 5), we can affirm that the highest percentage was registered for variant 31 (87,76%), and the lowest for variant 33 (79,44%). The control variant had a percentage of commercial yield of 63,46%, value which was lower with 16-24% than the other variants.

We can conclude that for Chasselas doré variety an adequate rate-setting of the fruit formation load and of the inflorescence, as well as shortening the top of these are all necessary and they led to an increase of the commercial yield of over 24% than the variant that had no operation made on it.

Table 5

The value of commercial grape yield from total grape yield of **Chasselas doré** variety

Variant	Total yield, kg/ha	Commercial yield, kg/ha	% of total yield
	Years average	Years average	Years average
11 = a_1 b_1	9609	8154	84,86
12 = a_1 b_2	11133	9216	82,78
13 = a_1 b_3	11586	9352	80,72
21 = a_2 b_1	12251	10588	86,43
22 = a_2 b_2	14471	12529	86,58
23 = a_2 b_3	16801	13930	82,91
31 = a_3 b_1	9133	8015	87,76
32 = a_3 b_2	11955	10141	84,83
33 = a_3 b_3	15340	12186	79,44
Control variant	16495	10468	63,46

CONCLUSIONS

1. The grape yield of Chasselas doré variety, in conditions of the experimented period, 2002 and 2004, was not influenced by the experimental factors (fruit formation load and rate-setting – shortening the inflorescence) or they were very few influenced, such as the case of the variant that had 36 buds and 32 inflorescences on the grape vine, where the increase of the yield was only of 1,86% than the control variant.

2. The commercial grape yield from the total yield of Chasselas doré variety during the experimented period, registered the highest percentage in case of the variant that had 48 buds on the vine and 16 inflorescences (87,76%), and the lowest for the variant that had 48 buds on the vine and 32 de inflorescences (79,44%).

3. Chasselas doré variety had increases of the commercial yield from the total one of almost 24% than the control variant (that had no work or operation in the green period), because of the adequate rate-setting of the fruit formation load and the number of inflorescences.

4. We can say that concerning La soil Chasselas doré variety the commercial grape yield can be influenced both positive and negative by the experimental factors if there is an uncontrolled appliance of these factors that would cause important yield losses.

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RENOVATION OF FRUIT GROWING IN THE REPUBLIC OF MOLDOVA

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Key words: species, variety, productivity, plantation, harvest.

ABSTRACT

The fruit growing inheritance surface was reduced from 251 thousands ha in 1993 to 108, 4 thousands ha in 2008. Based on a complex research, performed for the first time under market economy conditions in the Republic of Moldova, a program of sustainable development of the pomiculture branch has been development, as it constitutes a competitive economic sector, based on advanced technologies complying with European standards.

The abovementioned program provides for an increase in the shares of the crops demanded in the market (drupaceous, juglandaceous and baccate crops). This program has been included in the "Strategy of development of the agro-industrial sector in the time span 2006-2015", approved through the Resolution of Government of the Republic of Moldova.

INTRODUCTION

Pomiculture has been and continues to be one of the major agricultural branches in the Republic of Moldova, due to the favorable natural conditions, the people's traditions, the high economic efficiency, and availability of over 100 thousand ha of land in slopes with a northern exposition and an inclination of 6-12 degree, which can be used in the most efficient manner by way of cultivating pomicultural species, particularly the drupaceous and juglandaceous ones (1, 4).

In 2000 the area of orchards in the Republic of Moldova totaled over 100 thousand ha, of which around 75 thousand ha were in a satisfactory state and possessed an efficient productivity potential, which could be used through the application of modern technologies.

Therefore, the scientists of the chair of pomiculture at the State Agrarian University of Moldova, of the Institute of Pomiculture and the Botanical Garden at the Academy of Scinces of Moldova were confronted in 2000-2008 the challenge of performing fundamental research in order to improve the situation in the pomiculture branch, by way of rationalizing the use of the available orchards with the inexhaustible productivity potential and by their replacement with orchards of a new kind, with a new assortment and advanced technologies, that would ensure an early fructification, a high productivity of quality fruit, particularly bio-products, demanded and competitive both in the internal and external markets.

Hawing these realities in view the author sets himself the to evidence some aspect referring to fruit growing development in the context of the unprecedented reduction of

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productivity of orchards that have not yet been cut clear and foundation of new intensive and superintensive orchards.

MARERIALS AND METHODS

The study refers to the period 1991-2008 and aims at the evolution of principal indexes achieved in the fruit growing of the Moldova Republic such as: development of fruit growing plantation area; development of canceled, of the cut clear areas and of those planted with trees, bush fruits and strawberry; evolution of fruit growing plantations, productivity and of the total production by species; modalities of turning fruits to good account (2, 3, 6).

RESULTS AND DISCUSSIONS

At the current stage, one of the priorities in the Moldovan pomiculture, aimed at contributing considerably to the growth in the national income and counterbalancing the international balance of payment through the increase of exports, is the extension and modernization of cultivation of walnut, as the production thereof at the global scale, and particularly at the European level is deficient; it enjoys an ever growing demand and is being paid well.

Currently, the favorable prospects concerning the intensification of production in our country offer a technology of cultivation of this species based on the variety, recently developed by the country's scientists. The technology provides for the use of some competitive domestic varieties with a high productivity and walnuts of the highest quality for reproduction.

The paper suggests for homologation and authorization 17 varieties scab-immune apples, which just like the previously authorized Prima variety, are not sprayed against this disease. The competitors have studied 138 new varieties and hybrids of pear, of both foreign and domestic selection. As for the cultivation of sweet cherry, the papers reflect the outcomes of researching the biological, genotypic and phenotypic peculiarities of 250 varieties and best specimens of sweet cherry from 8 ecological-geographical groups of origin.

This paper deals with the technology of production of genetically superior, virus-free, physiologically well developed planting stock hat contributes to the increase in productivity of pomicultural plantations compared with the ordinary ones. The implementation of virus-tree plant in production shall ensure: an increase by 25-30% in the share of graft rooting in the nursery; increased adaptability of trees to the conditions of the Republic of Moldova; facilitating the creation of intensive and super-intensive plantations; an earlier fructification of plantations; attaining harvests 30-35% higher as compared to the existing prototype; a reduction of the production costs; an easier optimization of the phytosanitary state of plantations; a more efficient longevity of trees and production plantations; obtaining a production of high quality fruit, organic products and competitiveness in the market.

The fruit growing unsatisfactory state maybe administered to repartition of fruit growing plantations area (65 %) on spots having an inclination from 3-5 up to 5-10 degrees, all being subjected to erosion processes. At the same time, a great negative influence on the fruit growing plantations state and their productivity was brought about by ignorance or negligent accomplishment of agro technical measures. Accordingly, the productivity of the existent orchards progressively diminishes, and especially have been reduced the total harvests that in turn has determined the fate of enterprises for processing and industrialization of bruits (1, 4).

In 1993 the area of fruit growing plantations was ascent, reaching 251 thousand ha. Statistic data confirm the reduction of fruit growing plantations area of 2.2 times. The area of the fruitful orchards until 1993 increased and constituted 173,5 thousand ha (70 % of the overall plantations). It is reduced up wards of 60 in comparison with 1993 and constitutes 101,2 thousand ha in 2008. Practically the total orchards area the Moldova Republic has equals to the fruitful orchards area. From statistic data results that while the cut clear areas had an ascendant tendency, the young plantations traversed an inverse sense. Extension of the fruit growing plantation area till 2007 was ascent reaching 5100 ha.

The average production per ha and the analyzed total harvest had an irregular evolution. It is sufficient to mention that during the last 18 years only three times (1993, 1997 and 2003) the average harvest of fruit growing plantations has overcome the level of 5 t/ha, and the total harvest only in 1993 reached the level of one million tons of fruits – as for the rest of years these indexes are in average at the level of 3-4 t/ha and 300-400 thousand tons of fruits that constitute the level of associated fruit growing productivity comprising the agropomiculture system and family gardens.

The programmed of the fruit growing development for the period 2003-2020 aims at the increase of fruits production, improvement of quality and of higher competitively. This programmer (5, 6) forecasts that the areas occupied by orchards will reach 100 thousand ha up to the end of 2020, and the total harvest of fruits will reach one million tons in the period 2006 – 2020.

The stable development of fruit growing foresees the gradual displacement of exhausted orchards with ones of intensive and superintensive type having a productivity potential and quality of fruits of 1.3-1.5 times higher in comparison with the previous level on the basis of rational utilization of ecologic, biologic, technologic, economic resources characteristic for each sector of spot and fruit growing farm.

The right to partial compensation of the production expenses of fruit growing planting material and for foundation of fruit growing plantations may benefit the economic agents regardless of the type of property and legal form of organization, who have founded tree nurseries as well as those who have founded fruit growing plantations. Subventions are granted: for production of fruit growing planting material (grafted trees) – in an amount of 20 thousand lei per one ha of field I area (bench grafting) or field II (bud grafting); for foundation, beginning with autumn 2006, of fruit growing plantations – in an amount of 10 thousand lei per ha of planted area with seed-bearing species and in an amount of 7.5 thousand lei for an area of one ha planted worth stone-fruits species.

An evaluation of the economic efficiency reached owing to the renovation of the pomiculture branch confirms that the benefit on average in the republic has increased up to MDL 75 million over the years 2003-2007, which proves the strategic importance of this branch to our country's economy.

CONCLUSIONS

In 2008 the fruit growing patrimony of the Moldova Republic has been diminished with 142,6 thousand ha, in comparison with 1993. Nowadays the orchards area constitutes 108,4 thousand ha of with seed-bearing 67.3 thousand ha, stone-fruits – 36.5 thousand ha, nuts-3.7 thousand ha, bacciferous-0.9 thousand ha.

The structure of fruit growing plantations is unsuitable, in the sense that fruitful plantations constitute 92 % and the most pond ration is detained by apple trees and prune trees while the pear trees, nut trees, apricot trees and other are cultivated on rather reduced areas.

The state development of fruit growing in perspective of 2020 requires investments worth 602 mln USA dollars which will be defrayed by the private sector, allocations from the state budget and foreign investments. The program also foresees the creation of a state fund for fruits production development in the Moldova Republic.

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MORPHOLOGICAL VARIATION IN THE LEAVES OF PLUM CULTIVAR STANLEY AFTER REJUVENATING PRUNING

Hristina Dinkova[1]

KEY WORDS: plum, leaves, stomata and palisade cells

ABSTRACT

The trial was carried out in IMSA Troyan to study morphological variation in the leaves of plum cultivar Stanley after manual and mechanized rejuvenating pruning.

Vigorous growth was found accompanied by sprouting of leaves with greater area, without regularity in the variation of stomata number and size depending on the strength of rejuvenating pruning.

The rejuvenating pruning of the plum trees of cv. Stanley provoked more pronounced changes in the length of palisade cells in the year of its conducting. The same cells were longer in mechanized rejuvenating pruning than in the manual one.

INTRODUCTION

The most common effect after rejuvenating pruning of fruit trees is intensification of their growth. This results from the radical change in the balance between root system and aboveground part. On the one hand, the undisturbed root system supplies the reduced number of growth points with great quantities of water and nutrients. On the other hand, the cutting of apical points of branches eliminates the effect of high concentration of auxin moving basipetally, known as "harassment of apical meristem on the growth of dormant buds" (Janick J., et al, 1972). The nutrient redistribution and disturbed apical dominance lead to sprouting of many dormant buds and influence the metabolic processes and photosynthetic activity of leaves.

In most cases, the knowledge of the effect of rejuvenating pruning on fruit plant development is connected with the immediate variation in their growth (Wareing P. F., Phillips I. D. J. 1970). The fuller knowledge and more perfect technical methods can lead to provocation of more profound changes in the plants. It is possible to influence not only the form and vigour of growth, but also its character, as well as bud differentiation and physiological processes, such as flowering and root formation. In addition, the training and pruning can contribute to increase of fruit productivity and quality.

The growth can be regulated by purely physical methods aimed at changing the plant shape, size and orientation in space. Though the pruning decreases many times the content of reserve nutrients, that is not of significant importance, because many of the

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nutrient supplies remain in the roots and many old parts of the plants in the form of sugars and other carbon compounds.

The intense growth after pruning for reduction has a rejuvenating effect. However the sprouting growth never compensates completely for the removed plant parts. This has many explanations. One of them is based on carbon-nitrogen balance, according to which in the plants with greatly reduced shoots the reserve hydrocarbons are used for growth stimulation. Another, not very common explanation is that the actively growing leaves produce substances that suppress the flowering, so the quick increase of vegetative growth counteract the flowering. Stimulation of flowering and productivity of fruit trees is achieved through root trimming. The exact interrelation and relationship between these processes has not been clarified yet. The nitrogen and carbon exchange in the plants are closely related and considerably influence the metabolic processes, during which a great number of organic compounds are produced, many of which are exceptionally complex. Ones of them are the pigments, the substances that absorb selectively the light of definite length and are of significant importance not only to the plants.

In the complicated complex of interrelations between the processes taking place in the fruit plant leaves after rejuvenating pruning, it is of interest to us whether there is some variation in morphological structure of their leaves. The objective of this study was focussed on the effect of the different strength of reduction during rejuvenating pruning of plum trees of cultivar Stanley on the number and size of stomata cells and length of palisade cells in its leaves.

MATERIAL AND METHOD

The field trial with rejuvenating pruning of 14-year trees of cv. Stanley was laid out in two subtrials A – manual and B – mechanized

Trial variants:

1. Control – Pruning that is widespread in practice and consisting in removal of dried, broken, diseased, closely located, crossing and greatly bent down branches.

2. Reduction of skeletal branches and ramifications of 3-4-year wood or by about 1/3 of their length. Thinning and reduction of overgrowing wood according to the requirements and recommendations of fruit-growing science. Crown lighting as in variant 1.

3. Reduction of skeletal branches and ramifications of 6-7-year wood or by about ½ of their length. The overgrowing wood was treated as in variant 2 and lighting as in variant 1.

Contour mechanized pruning was conducted with a pruning unit of a circular type RATs-6 in the following variants:

1. Reduction of about 1/3 of the length of a skeletal branch perpendicular to the row as from the top to its base.

2. Reduction of about 1/2 of the length of a skeletal branch perpendicular to the row as from its top.

3. Reduction of about 2/3 of the length of a skeletal branch perpendicular to the row as from its top.

The following characteristics were recorded: leaf area (cm^2) measured with an electronic area meter of average samples of 100 leaves each per variant (50 leaves were picked from short branches, such as flowering, May bouquets and weak tree ones and 50 leaves from mixed and strong tree branches), Number and length of stomata measured in micrometres (μ), diametrically along the line of adjoining.

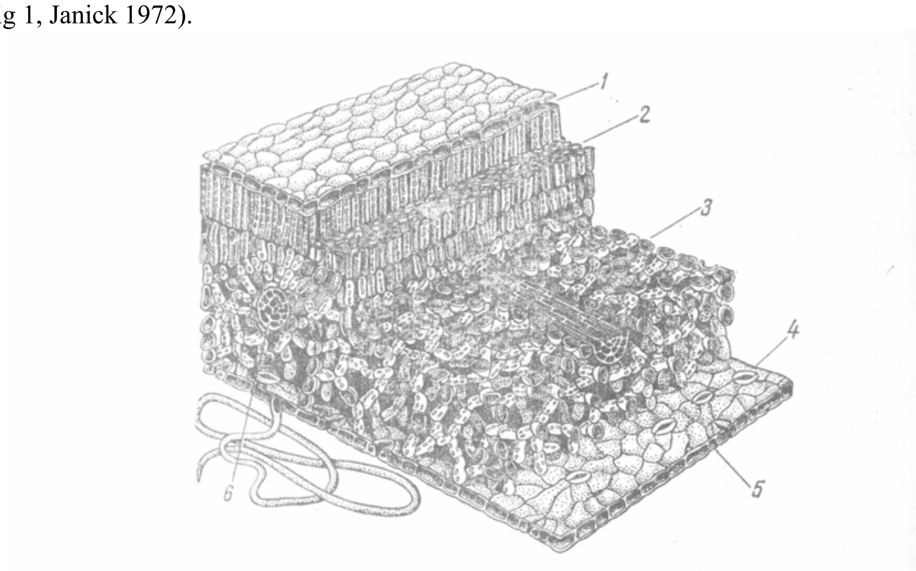
The observations were conducted with a microscope ROW (RATHENOW) without immersion, through an ocular micrometer 15x. The number of stomata cells was recorded at magnification of the objective of 25x. The radius of the field of vision at magnification of 375 (15x25) was 195 μ and its area was 119798,5 μ^2 equal to 0,119398 mm^2. From the back side of 6 leaves picked from the middle of shoots in each variant a small piece of epidermis was taken, from which 4 objects were prepared. Seven fields of vision were observed for each object to count the stomata.

The length of stomata cells was recorded at magnification of 600 (15x40) in 2 fields of vision on each of the four objects described above. Each division represents 0,111 μ.

The length of palisade cells was recorded at magnification of 15x40. From 1 leaf a piece was taken, from which 3 objects were prepared, on each of which 8 cells were measured.

ANALYSIS OF THE RESULTS

The leaves are organs performing photosynthesis that in its nature is a complex series of processes connected one with other, taking place above all in the presence of two pigments chlorophyll *a* and chlorophyll *b* and in the process of which carbon compounds are produced having a complex structure. The palisade cells of the fruit tree leaves are richest in chlorophyll. In first place let's acquaint ourselves with the anatomy of a plum leaf (Fig 1, Janick 1972).



1 upper epidermal layer
2 closely adjoining palisade cells - chloroplasts
3 spongy mesophyll
4 stomata
5 lower epidermis

Figure 1. Anatomy of a plum leaf (by Janick 1972).

Usually the leaf blades are bilaterally symmetrical, but not radially, because their apical and basal parts are different. Under the upper epidermal layer characterized by abundant depositions of cutin, elongated, closely adjoining palisade cells, particularly rich in chloroplasts, are located. They are followed by cells with disorderly location forming a layer similar to sponge (spongy mesophyll), within which the gas exchange takes place, during photosynthesis and transpiration. The lower epidermis is pierced by numerous stomata – pores in the leaves, through which the exchange of carbon dioxide and water vapours with their surrounding environment is performed (Robbins W. W., Weier T. E., Stocking C. R. Botany&An introduction to plant science. 2nd ed. Wiley, New York, 1957)

The stomata, an object of our observations, are epidermal structures consisting of two kidney-shaped, uniting cells that when adjoining form a small aperture (pore) between them. The coat of these cells from the side of the pore is thicker than the other surface. That provokes opening of the stomata under increased turgour in the adjoining cells and their closing under the reduced one. On the plum leaves picked for analysis these cells are in an adjoined state and their size was taken diametrically along the line of adjoining.

According to Kolesnikov et al. (1966) the number of stomata on the leaves is different depending on the site of growing and environmental conditions. Under heavier soil and air drought and more intensive sun shining, the leaves have more numerous stomata and denser nerves. In the leaves located higher on the shoots there are more stomata per unit leaf area.

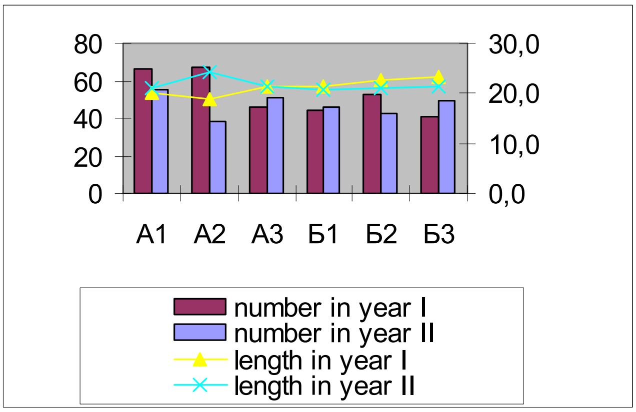


Fig. 2. Number and length (μ) of stomata cells in the year of pruning and a year later

In the year of pruning in the manual conducted variants the greatest number of stomata cells was recorded in the control variant and in that with reduction of 1/3 of the length of the skeletal branches (Fig. 2), but the fact that in variant 3 with highest degree of reduction the lowest number of stomata was recorded showed that there was no direct relation between the two factors. In the second year after pruning when the growth was still very active, the number of stomata cells was greatest in the control variant 1 and smallest in the second one, so again there was no trend in the variation of this character. In the first year in the plum trees with mechanized pruning the stomata number was smaller in variants 1 and 3, as against that in second variant, but in the second year it was greater in the mentioned two variants. In the mechanized pruning again we did not find direct relation between the stomata number and degree of reduction of the skeletal branches.

The smallest stomata length (18,98 μ) was recorded in the year of pruning in variant A_2- with manual moderately strong reduction and the greatest one (24,18 μ) in the same variant a year later. In the other variants the stomata length varied to a smaller extent – from 19,98 to 24,18 μ, without well-pronounced relation to the strength of pruning.

For greater thoroughness we will consider also the leaf area simultaneously. The effect of pruning on activation of plum tree growth reflected to a certain extent also on their leaf area. Our results showed that in the year of rejuvenation the leaf area was greatest in the two subtrials in variant 3 with the strongest reduction of skeletal wood. In second, third and fourth vegetation this trend remained more pronounced in the mechanized pruning, whereas in the manual one, with small exceptions, the leaves in first and third variant had almost the same area (Table 1).

No direct relation was found between leaf area and stomata number and size.

Table 1.

Leaf area (см^2)

Variant	Manual rejuvenating pruning				Mechanized rejuvenating pruning			
	1st	2nd	3rd	4th	1st	2nd	3rd	4th
1	30,65	30,85	29,18	23,16	26,58	25,98	25,55	23,32
2	29,03	25,41	23,62	22,46	27,49	27,68	26,31	24,75
3	31,17	29,29	28,85	24,19	29,18	27,92	30,48	25,28

When observing the changes in the palisade cells after rejuvenating pruning there was variation, though within narrow limits, proportionately to the strength of reduction.

The palisade cells were relatively longer after mechanized rejuvenating pruning, as against the manual one. There was also a pronounced trend in the first year after pruning, namely the effect on the palisade cell size was stronger and they had greater length than a year later.

After strong pruning of the Stanley trees positive changes occurred in the dimensions of the palisade cells of its leaves. And as these are exceptionally rich in chloroplasts and are the site where the active photosynthesis takes place we can indirectly judge of the direct effect of the rejuvenating pruning on its activity.

Table 2.

Length of palisade cells in μ

Variant	A_1	A_2	A_3	Average for the year	B_1	B_2	B_3	Average for the year
1st year	36,67	37,98	40,73	**38,46**	37,50	38,06	42,29	**39,28**
2nd year	35,10	37,77	39,19	**37,42**	37,87	39,60	38,81	**38,76**
Average for variant	**35,86**	**37,88**	**39,96**	**37,94**	**37,69**	**38,83**	**40,55**	**39,02**

CONCLUSIONS

The rejuvenating pruning of the plum trees of cv. Stanley provoked morphological variation in its leaves with more pronounced changes in the length of palisade cells in the year of its conducting. The variation, though within narrow limits, was proportional to the strength of reduction. They had greater length in mechanized rejuvenating pruning and smaller one in the manual one.

The strong reduction of the plum trees was accompanied by sprouting of strong mixed and tree branches and leaves with greater area. No relation was found between leaf area and stomata number and size.

No regularity was shown for the variation in the number and size of stomata on them depending on the strength of rejuvenating pruning,

We did not find direct relation between the stomata number and degree of reduction of the skeletal branches in both manual and mechanized pruning.

The smallest stomata length (18,98 μ) was recorded in the year of pruning in variant A_2- with manual moderately strong rejuvenating pruning and the greatest one (24,18 μ) in the same variant a year later. In the other variants the stomata length varied from 19,98 to 24,18 μ, without well-pronounced relation to the strength of pruning.

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SYSTEMS FOR SOIL FERTILITY MAINTENANCE IN MOUNTAIN CONDITIONS

Penka Mihaylova, Hristina Dinkova[1]

KEY WORDS: plums, sloping terrains, erosion, systems for soil maintenance, major nutrients

ABSTRACT

During the 1961-2007 in IMSA of Troyan a number of field and laboratory trials were carried out for soil protection from erosion and increase of its fertility through growing of plums and forage undercrops. It was found that the complex of cultural measures including pre-planting preparation of areas with reserve organic fertilizing and anti-erosion systems for soil surface maintenance increased biological activity of soil microorganisms, conserved soil fertility and provide high and regular plum fruit yields. On the basis of the conducted trials technologies were worked out including cultural anti-erosion measures during establishment of perennial plantations on sloping terrains.

INTRODUCTION

The main geocomponents in the natural ecosystems in the mountain regions are in a relatively unstable state. The territory of Troyan municipality is an interesting object of study, because it combines the characteristics of hollow-hilly, central mountain and high mountain relief in a small area (Pencheva, Kalcheva Nam, 1992).

As it is known the mountain and fore-mountain regions not only in the Troyan region, but also in the rest of our country are a natural area of spread of plum. The main part of orchards are located on sloping terrains subject to intensive water erosion processes leading to soil removal and decrease of its fertility (Petrov, 1989). This is one of the most topical problems of fruit-growing in these regions. The growing of fruit crops on sloping terrains requires application of a complex of measures for soil protection (Mihaylova, Petrov, 1995). The cultural measures, such as pre-planting preparation, schemes of planting, systems of planting, systems of maintenance of soil surface, fertilizing, ecologically friendly plant protection, etc., are main elements in the technologies for plum fruit production (Dinkova, 2006).

The obtaining of high yields from this crop every year requires its growing on a high farming background and close observance of the requirements for protection of edaphotope, including the soil from harmful antropogenic activities. The object of this study was to present results from long studies in anti-erosion efficiency of cultural and engineering-technical measures in fruit plantations under different slopes and their effect on growth and fruit-bearing of plum trees.

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MATERIAL AND METHOD

The trials were carried out in the territory of IMSA of Troyan during 46 years (1961-2007). The region is characterized by a complex relief and moderate continental climate (Sabev, Stanev, 1963). The average annual precipitation amount was 759,1 mm, being highest in summer - 274,9 mm and lowest in winter – 15,1 mm. The winter was moderately mild, the lowest temperature (-28,4^{0}C) being measured in January and the highest one (+39,8^{0}C) in August. The average annual relative air humidity was about 75 %, being lowest in summer – about 70 %. The altitude varies from 400 to

800 m. The soils in the region are grey forest, with different depth of soil profile and marked process of gleyzation and to a smaller degree light grey (pseudopodzolic) with unfavourable physico-mechanical and chemical properties (Mihaylova, Dinkova, 2005). The profile depth is 187 to 240 cm.

The humus horizon varies from 20 to 35 cm. The illuvial "B" horizon has a depth of 90 to 210 cm. According to texture they are medium to heavy sandy-clay in the humus horizon and heavy sandy-clay in the illuvial one. That determines their small water permeability and high water retaining capacity and leads to worsening of their air regime, as well as to creation of conditions during the more humid periods of the year for surface overmoistening and gleyzation.

The organic matter in these soils is low and concentrated in the surface horizon. The humus content varies from 1,62 to 2,12 %. The quantity of mineral nitrogen in the surface horizon is from 7,05 to 11,75mg/kg soil, mobile phosphorus (P_2O_5) – from 0,1 to 14,2 mg/100 g soil, available potassium (K_2O) – from 13,3 to 38,3 mg/100 g soil, pH from 3,9 to 5,2.

The study covered 6 trials:

Trial I – with the cultivars Stanley, Gabrovska, Strinava and pre-planting preparation of the areas by the trench method. It consisted in ploughing at a depth of 25 cm, opening of trenches through double passing in the same place with plough PNU – 50 at an interval of 6 m, filling of the trenches with manure, their covering up with soil. For comparison, in parallel with the trenches trees were planted also by the conventional technology in planting pits.

Trial II – determination of soil protection and flow reducing efficiency of cultural measures and their effect on vegetative and reproductive activities of fruit trees of cv. Kyustendilska Sinya Sliva. The trials was laid out on a terrain of a slope of 6-8^0 and the soil surface was maintained as: black fallow without anti-erosion measures (control); interrupted flow retention furrows in the inter-row spacings; grass buffer bands in each inter-row spacing; grass buffer bands in every second inter-row spacing; grass buffer bands in every second inter-row spacing and flow retention furrows

Trial III – at a slope of the area of 18-19^0 step-like earthwork terraces were studied, the soil surface on which was maintained in black fallow and the slopes of the terraces and the area between the circles around stems was grassed in the following variants: black fallow (control); terraces with a bed slope of 0°,+3°,+6°;-3°; terraces with a bed slope of 0°, +3°,+6° and flow retention furrows; not terraced area – circles around stems and artificially grassed area between them.

Trial IV – at a slope of 25° – circles around stems with a diameter of 2,5 m, the area around them was naturally sodded, the ditches were located in the middle of the inter-row spacings; the planting was by the chessboard system at a spacing of 6/5 m and variants: 1) Black fallow (control); 2) black fallow under mulch; 3)black fallow with flow retention ditches in every second inter-row spacing; 4) black fallow with flow retention ditches in every two inter-row spacings

Trial V – the trial was laid out in a fruit bearing plantation of cv. Kyustendilska Sinya Sliva. Four systems for maintenance of soil surface were studied: inter-row spacing – black fallow – row band – black fallow; inter-row spacing – perennial grasses and legumes; row band – herbicide combination (Stomp + Afalon); inter-row spacing – rye or perko; row band – mulch of them; inter-row spacing – perennial grasses; in the row band only the circles around stems with mulch of them

Trial VI – growing of nontraditional annual crops in a young plum plantation

The used undercrops were winter pea cv. Mir; broad beans cv. Dafa; bitter vetch cv. Rodopi; phacelia; winter rape.

Characteristics recorded in the trials

Effect of the systems of soil surface maintenance (SSM) on the vegetative (trunk girth, cm; annual growth of one-year branches – total length; crown volume, m^3); and reproductive (yield in kg per tree and per decare) activities of the trees.

RESULTS AND DISCUSSION

The following more important results were obtained:

In *trial I* the trunks of the trees of all three cultivars planted in trenches increased more intensively as compared to those planted in planting pits, the difference in cv. Stanley reaching to 1,4 cm. In this pre-planting preparation the trees had also greater total annual growth, being 23% in cv. Stanley, 22% in Gabrovska and 143 % in Strinava. The crown volume was greater in the trench mode of planting (Table 1).

The pre-planting preparation of the areas for establishment of plum plantations on sloping terrains including abundant organic fertilizing, enabled the plum trees to develop normally and to be grown until the beginning of their fruit-bearing without using mineral fertilizers when planted in planting pits filled with 30-35 kg manure each and for a longer period when planted in trenches with 65-70 kg manure each per linear meter.

It was found from *trial II* that the cultural anti-erosion measures showed high flow retention and anti-erosion efficiency. The soil protection efficiency of a plantation (C-factor) in the first years after planting was 0,749 and with increase of crown size it became higher–C=0,071 to 0,089.

The grass buffer bands with flow retention furrows had a marked anti-erosion effect P=0,0012. The grass buffer bands in each and in every second inter-row spacing also protected completely the soil from erosion. The removal of major nutrients and humus with the erosion flow in the variants with different systems of soil surface maintenance, as compared to black fallow decreased many times: nitrogen from 11 to 136 times; phosphorus – from 28 to 928; potassium – from 311 to 1105 times.

The studied systems increased the soil moisture by 0,9-1,8 % on average in the summer-autumn season, as compared to the black fallow. The retention of the available soil moisture in the summer months was of decisive importance to both nutrition of current crop and accumulation of reserve nutrients for the next year.

The vegetative activities of the fruit trees were not influenced very much by the studied variants. The trees of the variants with flow retention ditches and grass buffer bands in every second inter-row spacing had greatest trunks, crowns and an average growth. The data on the fruit yield was analogous.

The highest average annual yield was recorded for the variants with interrupted flow retention furrows in the inter-row spacings - 1624,0 kg/da and grass buffer bands in every second inter-row spacing (row) – 1621,8 kg/da.

IV trial.

The studied anti-erosion measures according to the terrain slope and conditions of growing site provided successful soil protection from erosion in fruit plantations and at the same time they influenced positively the vegetative and reproductive activities of plum trees (Table 2).

In the studied variants with grounds around stems no course of water erosion processes was recorded (solid and liquid flow), which showed their high protection efficiency when growing plum trees on strongly sloping terrains. With regard to biometric characteristics due to more favourable conditions of growing site they occupied an intermediate position between the cultural anti-erosion measures and terracing. The highest yield (805,6 kg/da) was recorded in variant of black fallow under mulch.

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The effect of the conducted cultural measures on the soil *Actinomyces* was similar to that on the bacteria, but their increase after rye was by 54,5 %; for mulching it was by 68,5 %, and after perennial grasses by 87,5 %, as compared to black fallow.

The effect of the mulching was most pronounced on the quantity of soil *microscopic* fungi. In the variants with processing around stems + mulching, as well as black fallow + mulch these microorganisms were about two to four times more than the black fallow. In the other systems for soil surface maintenance there was not an effect on the quantity of soil microscopic fungi (Table 3).

When comparing the microbiological activity in the soil under the studied systems, the biological elements have priority. It is desirable to limit the use of herbicides in the mountain and fore-mountain regions due to their catchment nature and production of pure fruit output, as well as due to the fact that the properties of the grey forest soils in these regions deteriorate additionally.

From an anti-erosion and ecological point of view the growing of undercrops in a young plum plantation (*trial VI*) has a positive effect. Even the more slightly growing ones, such as bitter vetch and phacelia protected the soil from removal mainly due to the fact that the row direction was orientated along the horizontals. At the same time with the high anti-erosion effect the inter-row crops used as green manure had high content of major elements N, P, K and enriched the soil with them.

CONCLUSIONS

The following conclusions can be drawn from the considered cultural anti-erosion systems for soil surface maintenance in plum plantations on sloping terrains:

The pre-planting preparation of the areas for establishment of plum plantations on sloping terrains including abundant organic fertilizing enabled the plum trees to develop normally and to be grown without using mineral fertilizers.

Among the studied systems for soil surface maintenance through application of cultural measures, the grass buffer bands in every second inter-row spacing with flow retention furrows had the highest anti-erosion effect. At the same time they contributed to increase the yield of plum fruits and provided additional output of herbaceous forages.

After stabilization of the terraces the highest anti-erosion efficiency was observed for those with a slope of terrace bed of $+6^0$, the building of which required the input of the lowest labour and fund costs.

When establishing fruit plantations on a terrain with a slope of over 20^0, the application of grounds around stems and naturally grassed area around them protected the soil from removal completely. This system for soil surface maintenance influenced positively the vegetative and reproductive activities of fruit trees.

The system for soil surface maintenance through mulching contributed to a considerable increase of the quantity of some soil microorganisms. The perennial grasses sown alone or in combination with legumes had no negative effect on the soil microorganisms, as compared to the black fallow.

The herbicide combination of Stomp and Afalon increased insignificantly the quantity of soil bacteria during the first 30 days after their application to the soil.

The growing of annual forage crops provided a possibility to use the soil in a young plum plantation during the period until the beginning of fruit bearing, without creating conditions for competition between them.

The annual forage crops phacelia, winter pea and broad beans gave the best results in the control of erosion and green manure under the Troyan conditions. The green mass of the plants used for green manuring had high content of major nutrients and when ploughing them in the soil they increased its fertility.

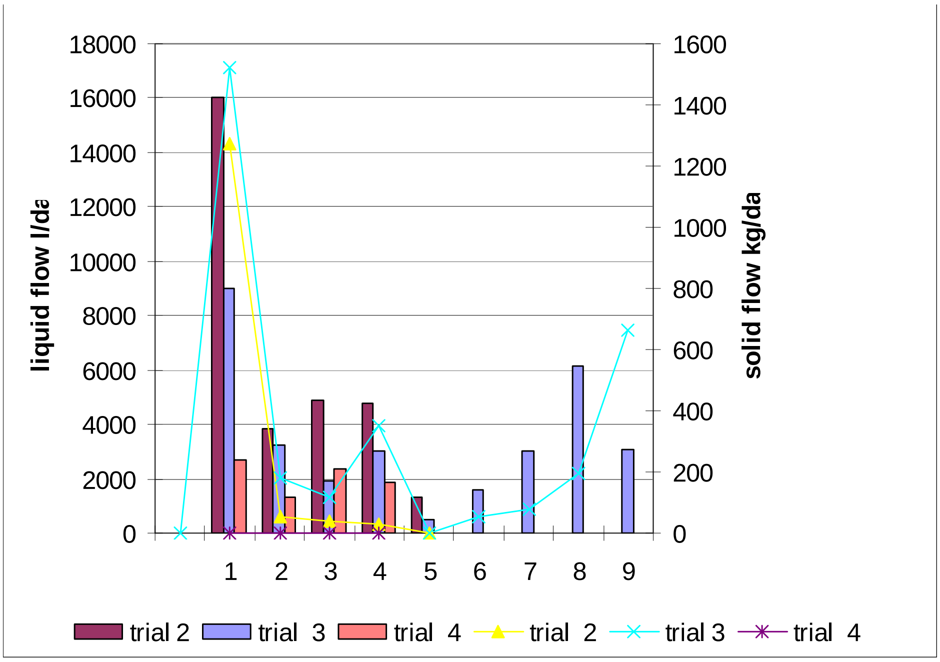

Figure 1. Average annual liquid flow and solid flow

Table 1

Average annual growth and yields of plum trees

	Растеж			Yield		
	TCSA (cm^2)	Crown volum m^3	Total growth (cm)	Kg/tree	Kg/cm^2	Kg/m^3
1	81.0	7.9	512.7	61.0	0.8	5.4
2	66.6	6.2	1003.5	37.7	0.5	5.9
3	73.9	12.8	1084.6	46.4	0.6	3.7
4	79.1	11.5	497.8	57.2	0.7	4.8
5	81.6	8.4	1650.9	37.0	0.5	4.5
6	70.9	15.3	1760.1	57.6	0.8	3.9

Table 2

Vegetative and reproductive parameters of plum trees

variants	trunk girth cm	Crown volum		Average length of branches (cm)	Yield kg/da
		m^3	m^2		
II trial 1	48,7	44,38	20,06	91,4	1503,1
2.	50,8	48,57	21,17	99,3	1624,0
3	47,8	44,40	19,63	90,3	1408,9
4.	50,4	49,18	21,59	95,7	1621,8
5.	49,6	46,26	19,32	93,1	1577,3
III trial 1.	48,5	30,84	16,97	69,0	835,2
2	44,4	25,10	14,49	64,3	742,9
3.	45,2	26,67	14,91	69,9	754,2
4.	46,9	29,91	16,22	72,2	771,8
5	45,9	28,26	15,30	70,2	712,5
6.	49,2	30,28	16,27	75,2	733,0
7.	46,7	26,01	14,64	66,1	575,9
8.	46,9	26,08	14,55	66,7	522,1
9.	44,3	24,15	13,41	62,9	546,5
IV trial 1	43,7	28,65	16,10	57,4	729,0
2.	46,2	29,16	17,15	62,6	805,6
3.	42,9	28,05	17,06	57,2	765,6
4.	44,5	29,70	17,64	57,7	793,7

Table 3

Influence of the study of different systems for soil surface maintenance on the the quantity microorganisms млн/g

variants	microorganisms	days after applicacion to the soil				
		10	30	60	90	120
1. Inter-row spacing	bacteria	11,6	8,6	7,0	6,1	15,0
	actinomyces	7,9	6,3	4,3	3,6	12,2
	microscopic fungi	50	85	65	85	90
Row band	bacteria	11,6	9,3	7,1	6,0	15,2
	actinomyces	8,1	7,2	4,1	3,5	10,8
	microscopic fungi	55	110	60	85	50
2. Inter-row spacing	bacteria	11,8	11,5	7,9	8,5	17,5
	actinomyces	7,5	8,1	6,2	4,1	11,5
	microscopic fungi	50	105	100	100	60
Row band	bacteria	13,5	11,5	7,0	6,2	14,6
	actinomyces	9,5	8,2	4,4	4,5	12,0
	microscopic fungi	45	100	60	90	40
3. Inter-row spacing	bacteria	14,3	11,2	7,1	8,2	14,7
	actinomyces	9,5	7,9	4,4	5,4	12,5
	microscopic fungi	65	105	65	90	50
Row band	bacteria	19,3	11,8	9,9	14,4	19,9
	actinomyces	13,9	10,5	7,7	7,4	12,4
	microscopic fungi	110	155	95	150	50
4. Inter-row spacing	bacteria	7,2	6,4	7,0	8,3	15,0
	actinomyces	4,5	4,3	4,8	4,4	12,7
	microscopic fungi	30	70	60	110	50
Row band	bacteria	19,6	11,2	15,4	11,1	21,0
	actinomyces	14,9	12,2	10,7	6,6	12,4
	microscopic fungi	200	145	120	155	50.0

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PLUM CULTIVARS BRED IN BULGARIA DESERVING GREATER ATTENTION

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KEY WORDS: plums, cultivars, morphology, phenology, chemical composition

ABSTRACT

Some morphological characteristics of trees and fruits of plum cultivars Gabrovska, Strinava, Baleva Sliva, Ranna Sinya Sliva (Early Blue Plum) were studied. Time of flowering and fruit ripening was determined. The trees were cultivated in the region of Central Balkan Mountains, which is typical of plum production in Bulgaria.

Among the studied cultivars, cv. Baleva Sliva has the largest fruits, their weight reaching to 40 g. Ranna Sinya Sliva is earliest to ripen (08.-15.08). Its flowering is the latest. The quality of cv. Gabrovska fruits is closest to that of Kyustendilska Sinya Sliva fruits.

The values of total sugars in fruits of the four cultivars are similar to those of Stanley that ripens in the studied region in late August.

INTRODUCTION

The plum growing in the Central Balkan Mountain region has well formed traditions. In the past it gave the aspect of fruit growing in our country. At present it ranks first according to occupied area in mountain terrains among the fruit crops (Bogdanov et al., 2002; Iliev et al., 1977). The major limiting factor for plum use is plum pox. The spread of this disease in the last decades caused great limitation of blue plum production from disease susceptible cultivars in main plum producing regions. The only possible way of disease control for the present is to use tolerant and resistant cultivars (Trifonov, 1972; 1983; Anzin et al., 1956). This is one of the reasons for the mass use of cv. Stanley in our country that represents up to 75%. The use of a single cultivar caused tension during fruit picking and processing. Prolongation of picking period and supply of the market with quality fruits for a longer time necessitates using more cultivars with different time of ripening.

About 2000 plum cultivars are known in the world. In the last decades in our country a great number of cultivars were developed (Iliev et al., 1977). The socio-economic changes having occurred in our country, as well as the new requirements of the market condition specifying of their evaluation and introduction.

The objective of this study was to determine some morphological characteristics and biological traits of four plum cultivars bred in Bulgaria and grown in the region of the Central Balkan Mountains.

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MATERIAL AND METHODS

The plum cultivars Gabrovska, Strinava, Baleva Sliva and Ranna Sinya Sliva (Early Blue Plum) were studied. The trees were maintained in a collection plum orchard. They were grafted on rootstock Yellow Myrobalan. They were grown on a light grey forest soil without irrigation according to the generally accepted technology. Plant protection measures were reduced. Fruit morphological characteristics, weight and size, shape and colouration, stone weight and size were determined. Chemical analysis of samples from fresh fruits was performed to determine total sugars, sucrose and inverted sugar, acids and tannins. The total sugars were determined according to Schoorl and Regenbogen. The acid content was established titrimetrically and dry matter – refractometrically. The tannins in fresh fruits were determined according to Levental-Neubauer and anthocyans by the method of Fuleki and Francis.

Phenological observations were performed to establish the time of flowering and reaching of picking ripeness for the different cultivars.

Behaviour of the studied cultivars to the economically important diseases of plum was established.

Cultivar Stanley was used as a control. The studies were conducted according to the Methodology for studying the plant resources in fruit plants (Nedev et al., 1979).

RESULTS AND DISCUSSION

The plum cultivars Gabrovska and Strinava were bred in the Experimental Station of Plum in Dryanovo. As parental forms in both cultivars the Kyustendilska Sinya Sliva (Kyustendil Blue Plum) was used as a mother and Monfort as a pollinator.The plum cultivars Ranna Sinya Sliva and Baleva Sliva have been bred in Troyan. The first cultivar was obtained by hybridization of Tetevyanska Sinya Sliva x Zaharna. Baleva Sliva is a blended hybrid obtained by hybridization of hybrid 49/23 (Kyustendilska Sliva x Belle de Louvain x Malvazinka.

The presented cultivars grown in the studied region have good development and fruiting. They form trees characterized by ball-shaped crown in the cultivars Ranna Sinya Sliva and Strinava. Baleva Sliva has reverse pyramidal crown and Gabrovska had wide pyramidal crown. The skeletal roots of Baleva Sliva come out at a relatively acute angle, but it has strong wood and breaking of branches was not observed. The crown is well formed with overgrowing twigs. The skeletal branches of the other cultivars come out at a relatively great angle and are strongly connected with the trunk.

The dates of flowering are a characteristic feature of the plum cultivars. The late-flowering cultivars are preferable. The risk of flower frost killing caused to them by turning frosts is smaller. The flowering of the studied cultivars was mid-early. Ranna Sinya Sliva had the latest flowering. Its flowering began in second half of April and ended in early May. Cv. Baleva Sliva had also later flowering and in most cases it ended in the second half of April. The flowering dates of Gabrovska and Strinava coincided to a considerable extent with those of cv. Stanley. That determined Strinava and Stanley as suitable pollinators of the self-sterile cv. Gabrovska. Ranna Sinya Sliva and Strinava are self-fertile and allowed establishment of single-cultivar plantations. Baleva Sliva is self-fertile, but better yields were obtained with alien pollination.

The most important pomological characteristic of fruit species are their fruits. In the studied plum cultivars there were significant differences with regard to fruit weight, size and ripening time. The fruits of Ranna Sinya Sliva were the earliest to reach picking ripeness – 8-15.08, followed by Baleva Sliva, Gabrovska, Strinava – 24-27.08. The cv. Strinava fruits ripen on 25.08 – 04.09 in the studied region (Table 1). In cultivars Gabrovska and Ranna Sinya Sliva they remained for a long time on the tree after ripening without falling and deteriorating their qualities, whereas in the other cultivars their consistence changed quickly.

The fruit weight varied within a wide range in the different years and had direct relation with soil-climatic conditions of the region and mostly with precipitations during the year, as well as with the fertility. Cv. Baleva Sliva had the largest fruits, reaching weight of 40 g in favourable years. Ranna Sinya Sliva had smaller fruits. The weight of cultivars Gabrovska and the control Stanley was 32 and 37 g, respectively (Table 1). The plum cultivars Stanley and Strinava are semi-freestone, whereas the other presented cultivars are freestone. Stanley had the greatest stone weight - 1,6-1,9 g. Strinava had the smallest stone – 0,9 g. In the other cultivars the weight had similar values and varied from 1,1 to 1,4 g (Table 1).

Suitability and application of the plum fruits are determined by their size, consistence and appearance, as well as by their main biochemical composition (Iliev, Shtarkova, 1995). The total sugars in the fruits of the studied cultivars varied within close limits from 10,18% in Strinava to 10,78% in Gabrovska. In the control cultivar Stanley the total sugars were 10,68%. The share of inverted sugar prevailed in the content of total sugars. Only in cv. Baleva Sliva the quantity of sucrose was greater – 4,23%. Its content in the control was 3,42%. The acid content varied from 0,64 in Ranna Sinya Sliva to 1,61mg% in Baleva Sliva. The value in the control was 0,54 mg% (Table 2).

A distinguishing feature of the plum cultivars is their behaviour to the economically important diseases. The tolerant cultivars allow their growing with reduced plant protection. That allows obtaining fruits at lower cost price and meeting more the contemporary requirements of the market for biological products. Baleva Sliva was attacked very slightly by red leaf spots. It showed field pox resistance. The fruits were symptom-free. During the period of study no damages caused by red leaf spots were observed in Ranna Sinya Sliva. It was pox tolerant and symptoms were observed only on the leaves. Cultivars Gabrovska and Strinava had complex tolerance to red leaf spots and rust. They were pox tolerant. The fruits reached picking ripeness and did not deteriorate their palatability. In cv. Strinava violet-bluish spots were observed on the surface of fruit skin of the trees attacked by the virus, but the fruit quality did not deteriorate.

CONCLUSIONS

The studied plum cultivars covered a picking period from 08.08. to 30.08. and allowed to provide the market with fresh fruits. The fruits of Ranna Sinya Sliva had the earliest ripening and at the same time its flowering was the latest – 05.05. Baleva Sliva had the largest fruits – 40 g. The highest fertility was recorded in cv. Gabrovska.

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Table 1.

Phenology and morphology of plum cultivars

Cultivar	Flowering		Ripening	Weight, g	
	beginning	end		Fruit	Stone
Gabrovska	01.-15. 04.	11.–20.04.	23.-26. 08.	20-32	1,1
Strinava	28.03.-13.04.	08.-19.04.	24.-27. 08.	24-30	0,9
Baleva Sliva	29.03.-26.04.	06.04.-02.05.	20.-30. 08.	32-40	1,4
Ranna Sinya Sliva	09.04.-01.05.	13.04.-05.05.	08.-15. 08.	22-26	1,1
Stanley Control	03.-17.04.	12.-24.04.	25. 08.-04. 09.	29-37	1,6-1,9

Table 2.

Chemical composition of fresh plum fruits

Cultivar	Dry matter %	Total sugars %	Inverted sugar %	Sucrose %	Acids mg %	Tannins mg %
Gabrovska	16,5	10,78	8,85	1,83	0,67	0,145
Strinava	19,0	10,18	9,65	0,50	1,01	0,198
Baleva Sliva	19,0	10,25	5,82	4,23	1,61	0,079
Ranna Sinya Sliva	17,0	10,68	8,43	2,14	0,64	0,125
Stanley Control	19,5	10,68	7,08	3,42	0,54	0,099

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PHOMA STEM BLIGHT OF OLIVE PLANTS CV. ARBEQUINA

Alexandros Papachatzis, Ioannis Vagelas[1]

KEY WORDS: Olea europea, Stem blight, Phoma

ABSTRACT

Olive (Olea europea L.) is an economic important crop in Greece. In spring 2008, one year old trees (cv. Arbequina) were observed with stem blight symptoms. The symptoms were associated with leaf chlorosis, defoliation, twig dieback and eventual plant collapse. A Phoma sp., were isolated from the infected plants. All isolates were produce gray-green mycelium on PDA with typical conidia and brown chlamydospores in chains. Sporulation and obsulance of pycnidia were observed on oatmeal medium three days after inoculation. Pathogenicity was assessed by inoculating healthy one year old olive plants (cv Arbequina) with spore (1x 10^6 conidia/ml) suspensions. Control plants were treated only with water. One month after inoculation inoculated plants were observed with leaf chlorosis, defoliation and twig dieback. Two months later clear stem blight symptoms were observed. Stem blight of olive plant seedlings (cv Arbequina) caused by Phoma species is a first report in Greece.

INTRODUCTION

Olive *(Olea europaea* L.) is one of the major tree crop in Greece. The olive trees have been cultivated since the ancient times mainly for the olive oil (black olives) or for olives consumption (green olives). The planting distance for olive trees varies from 7 to 10m each way, depends mainly on the habit of the cultivar and the scheme. *Olea europaea* L., cv. Arbequina is a small olive tree with small fruits consider for high density plantings promising high yield. The production starts early after the first year and is high. Arbequina cultivar was considering tolerance to Verticillium wilt caused by the soilborne pathogen *Verticillium dahliae*, a magor pathogen in olive production in Mediterranean countries. In spring 2008, an unidentified disease occurred of olive trees cv. Arbequina in a new, one year, plantation in central Greece. The disease caused stem blight associated with leaf chlorosis (Figure 1a), defoliation, twig dieback and eventual plant death. Most of the infected plants were stand partially defoliated with brown roll back leaves on the field (Figure 1b). Whereas heavy infected plants were observed death (Figure 1c).

The casual organism was isolate from twenty infected plants in vitro and in planta studies were undertaken in order to prove Koch's postulates.

MATERIALS AND METHODS

The casual organism was isolate from twenty infected plants in vitro onto PDA plates. Infected stems segments from twenty infected plants were surface sterilized in 0.5% NaOCl (1 min), rinse three times in sterilized tapwater, plate onto PDA and onto V8 agar

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and incubate at 25^o C in dark. The pathogen was identified according to morphological characters. Pathogenicity was assessed by inoculating soil with spore suspension (1x 10^6 conidia/ml) and transplanting healthy (one year old olive plants cv. Arbequina) on it. Control plants were treated only with tap water. Treatments were 40 folds. Disease symptoms and the progress of the disease were observed 30, 60, 75 and 90 days after inoculation. The chlorophyll content of the infected and health plant leaves was estimated. Measurements were taken using Minolta SPAD-502 chlorophyll meter (Wu *et al*., 2007). SPAD readings were taken from four top plant leaves at 60 days after inoculation. Healthy olives fruits number per plant was also observed. Measurements were taken from 40 plants per treatment. Data were analyzed with the statistical program Minitab ver. 13 and present in box plot graphs.

RESULTS

In vitro tests from all affected plant stem segments a same fungus was isolated. The fungus was identified as *Phoma* sp., based on conidia shape, chlamydospore production and colony color (Fig. 2) onto PDA, V8 and oat agar plates according to Boerema *et al*., (2004). After four days of incubation plenty of pychnidia were observed onto V8 agar. First symptoms of the diseases were leaf chlorosis, partial defoliation and twig necrosis (Fig. 3). Those symptoms appeared 30 days after inoculation. Two months later clear stem blight symptoms with mummify olive oils remain attached and brown roll back leaves were observed (Fig. 4). Dead plants began to appear 90 days after inoculation. A *Phoma* sp. was reisolate from all the infected plants.

(a) (b) (c)

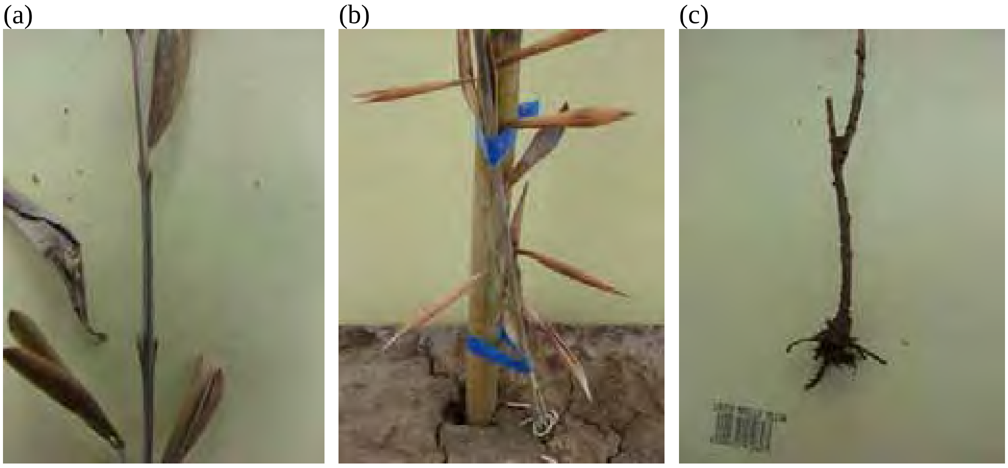


Figure 1. Disease symptoms were observed as stem blight (a), partially defoliated with brown roll back leaves (b) and death plants of cv. Arbequina with a less root system (c).

SPAD readings showed significant treatment differences at 60 days after inoculation (Graph 1). Infected plants showed significant low leave chlorophyll contents SPAD values indicate the leaves necrosis process as mention above.

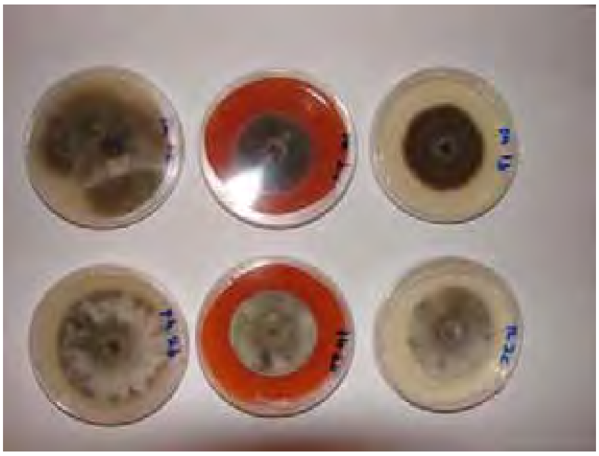


Figure 2. For the left to the right, *Phoma* sp., colony morphology on PDA, V8 and oat agar medium.

(a) (b)

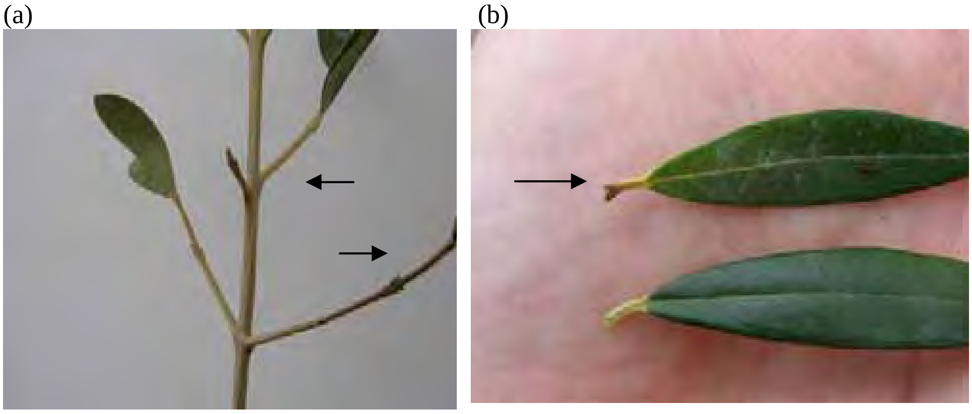
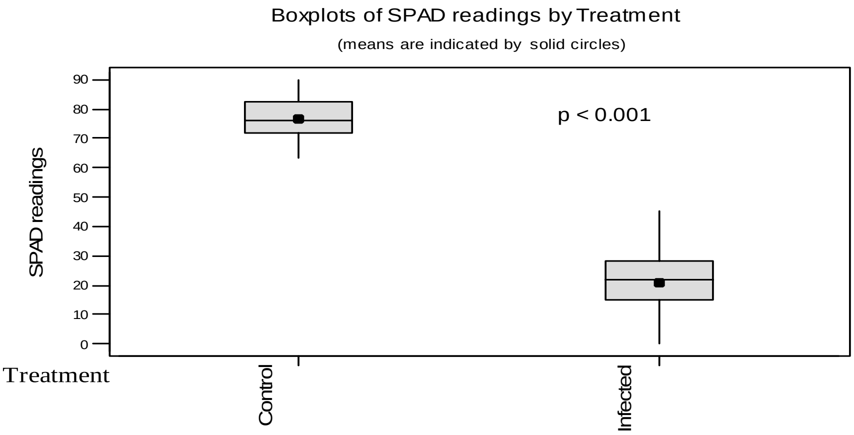
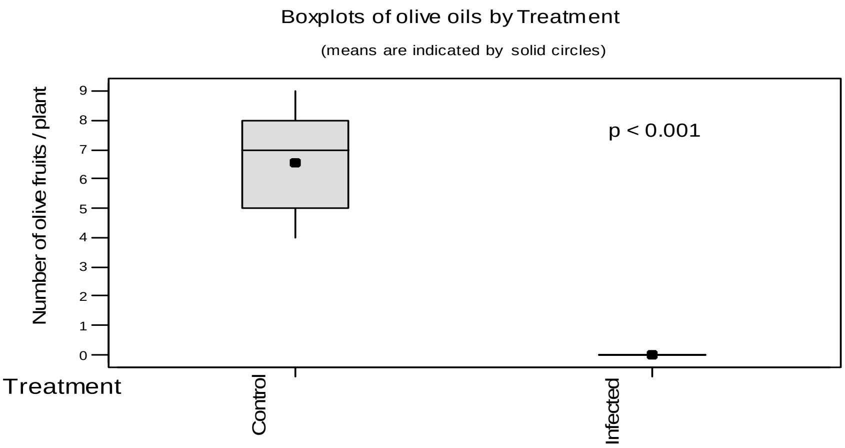


Figure 3. Branches necrosis (a & b arrows) and partial defoliation (b) occurred before plant death.

Figure 4. Infected olive plant (on the left) shows stem blight symptoms with brown leaf and mummifies fruits compared with the untreated control (right).





Graph 1. Box plot graphs (SPAD and number of olive fruits/plant) present the statistical differences for infected with *Phoma* sp., olive plants and untreated (control) at 60 days after fungus application.

DISCUSSION

To our knowledge, this is first report of stem blight caused by *Phoma* sp., on olive cv. Arbequina in Greece.

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FICUS CARICA ROT ROT DISEASE CAUSED BY *ARMILLARIA MELLEA* AND *ROSELLINIA NECATRIX* IN GREECE

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KEY WORDS: Ficus carica, Rot rot disease, Armillaria mellea, Rosellinia necatrix

ABSTRACT

Armillaria mellea and Rosellinia necatrix were observed as the most aggressive rot pathogens of Ficus carica cultivar (Smyrna) in central Greece. Both pathogens cause fig rot root, stress old trees and kill young plants. Common symptoms shown by infected trees are, yellowing of the leaves, early leaf fall, premature autumn color, splitting of the bark, plant defoliation and plant death. Both diseases are confirmed by the presence of white mycelium found under the bark and on the infected roots. Infections are common in fig cultivars near the forest.

INTRODUCTION

Armillaria mellea and *Rosellinia* spp. is recorded all over the world as a root rot pathogen of forest and orchard trees, and is common in both temperate and tropical regions. *A. mellea* is a vigorous pathogen of many important trees (Arora 1986). The fungus lives as parasites on living host tissue or as saprophytes on dead plant material. *A. mellea* invades healthy trees via the roots and develops a white mat mycelium under the bark. An infected tree wilts and dies (Singer 1986).

Many species of the Genus *Rosellinia* occur as saprophytes, out of which some live endophytically and occasionally turn into pathogens and only a few species are known to occur as primary root pathogens (Hoopen and Krauss 2006). Among the most well-known root pathogen is *R. necatrix* Prill. (anamorph: *Dematophora necatrix* Hartig).

R. necatrix is a pathogen that causes root rot of many plants (Sivan and Holliday 1972), mainly trees, including forest trees (Anselmi & Giorcelli 1990) and orchard trees, such as almond, peach, plum, apple, pear, olive, cherry and avocado (Sztejnberg and Madar 1979; Sousa et al. 1995; Schena et al. 2002).

Apart of trees, there are numerous reports of serious infections caused by *R. necatrix* on a variety of crops, weeds and important plants over the world. There is no record of the disease on fig tree orchards. This research reports a new record of infection and symptoms caused by *R. necatrix* on fig trees.

In the northern region of the island of Evoia, Greece, fig seedlings and trees in fig tree orchards were reported to decline and die from an unknown disease. In May 2008 the problem was investigated and the disease was attributed to *A. mellea* and *R. necatrix*.

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RESULTS

Concerning disease symptoms, caused by *A. mellea* white mycelial fan of the fungus were observed under the bark at the base of the infected fig trees in a distance more than 15 cm up the stem (Fig. 1). Infected young trees wilt and died in 1-2 cultivation periods. Abundance of fungus fruits bodies, the brown mushrooms of *A. mellea* were observed under the base of the infected old tress (Fig. 2).

Concerning disease symptoms, caused by *R. necatrix* main roots of infested trees or seedling stem base, are covered by a white cottony mycelium and mycelia strands whereas leaves turn yellow. The pathogen attacks and kills seedlings and young trees in a few months and older trees in 1-2 cultivation periods.

The cultivation of fig tree (cv. Smirnis) is almost a monoculture in northern Evoia, Greece, for over of 80 years. In the past 4 years, many trees in this region showed a general decline and many of them died over prolonged warm summer periods in July and August. In summer 2008, typical disease symptoms were observed both on old (50 years old) trees and younger (10-15 years old) trees. Diseased trees were shown a general decline with yellow leaves (Fig. 3). When two years old trees were planted to replace dead diseased fig trees, were suddenly (in five days) died (Fig. 4), in all cases. All diseased trees were cultivated in soils with high moisture, next to a forest. Most of the diseased old fig trees have been planted on a place, after forest clearance.

The disease can be identified by the infected base of the tree trunk, at soil level (Fig. 5). In this area, on the exterior part the infected tree base appears white, cottony mycelium and mycelia strands surrounding the trunk (Fig. 6). Infested plant tissues were discoloured. A dark coloured mycelia strands (rhizomorphs) were observed on the surface of the infected roots (Fig. 7 and 8). Infected secondary roots were covered with white or grey dark cottony mycelium. In the high moisture almost saturated soils, the dead infected roots were completely destroyed, whereas a strong fruity-alcoholic odour was present. Dry root rot was observed on the main tree roots.

The identification of the casual disease agent was based on a direct observation with a hand lens and with microscopic observation of the vegetative mycelia structures, collected and cultivated onto Petri plates from the diseased tissues. Thirty infected 10-15 years old fig trees and 20, 50 years old ones were observed. Mycelia from all cases showed the typical pear-shaped hyphae (Fig. 9) and synnemata (Fig. 10), of *R. necatrix*.

Until now *R. necatrix* has not been reported as a fig tree pathogen. In this investigation it was showed that *R. necatrix* is also a fig tree pathogen that could be a potential thread of fig trees in warm areas with high moisture soils and especially in plantation on former forests that were cleared for cultivation.

DISCUSSION

To our knowledge, this is first report of *Ficus carica* rot root diseases caused by *A. mellea and R. necatrix* on cv. Smyrna in Greece

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Figure 1. *A. mellea* white mycelial under the bark of infected tree

Figure 2. *A. mellea* fruiting bodies


Figure 3. On the left, 50 years old fig tree infested and declined by *Rosellinia necatrix,* compared with a healthy vigorous fig tree on the right.


Figure 4. A two-years old fig tree killed by *Rosellinia necatrix*. Leaves are remaining attached on the tree.


Figure 5. Dry rot (dark in colour) of a *Rosellinia necatrix* infected fig tree trunk base.

Figure 6. White cottony mycelium of *Rosellinia necatrix,* surrounding an infected fig tree base at the soil level.

Figure **7.** White cottony mycelium and mycelium strands of *Rosellinia necatrix* on the surface of infected two years old fig tree base at the soil level.

Figure 8. White cottony mycelium of *Rosellinia necatrix*, grown in the soil surrounding the infected roots.

Figure 9. *Rosellinia necatrix* characteristic pear-shape hypha-cell.

Figure 10. Synnemata of *Rosellinia necatrix*.

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INFLUENCE OF THE ROOTSTOCK ON THE AUTUMN-WINTER DEVELOPMENT OF THE DIFFERENTIATING FLOWER BUDS IN TWO SWEET CHERRY CULTIVARS

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KEY WORDS: Prunus avium, rootstocks Gisela and Weiroot, flower bud formation, flower primordia, double pistils

ABSTRACT

The studies were conducted in 2003-2007 on 7-11 year-old trees of the cultivars 'Bigarreau Burlat' and 'Stella' grafted on the rootstocks P 1 (seedling of P. mahaleb L.), Gisela 5, Gisela 4, Weiroot 13 and Weiroot 72. From the beginning of September till the flowering the next year (every 7 days) spurs were collected from the two-year-old wood and their lateral buds were disclosed under a stereomicroscope. After the observations in the autumn it was established that under the influence of Gisela 5 there is the greatest number of flower primordia in one flower bud. Between 68 and 93% of the flower primordia initiated in winter in the separate variants have developed as flowers in spring, whereas the remaining ones have slowed their development or suffered frost damage.The greatest number of double pistils in the differentiating flower primordia have been observed in the trees on Gisela 5, Weiroot 72 and Gisela 4.

INTRODUCTION

The flower bud formation in the fruit trees undergoes three consecutive phases, the last one being the most prolonged, connected with the morphological differentiation of the flower buds (Buban, 1996).

In the sweet cherry the flowers are developed in the lateral buds of the spurs and in the buds growing in the basis of the longer shoots (Tromp, 2005). Initially the apical meristem of the buds produces only bud scales (Georgiev, 2001; Doleda et al.,1997; Tromp, 2005), and when their number in June - July reaches 22-25, bract and flower primordia appear (Guimond et al., 1998a), the real flower bud formation starts. Sepals, petals, stamens are consecutively differentiated on every one of the formed flower primordia, and finally the carpel appears. From the onset of the flower bud formation until the formation of the pistil parts (in September – October), according to the habitat and the temperature conditions in the respective year, from 67 to 90 days pass (Georgiev, 2001), whereas according to Faust (1989) – their number is from 86 to 112. A period of winter dormancy is followed again in spring by an accelerated course of bud development, which is similar in its rate to that of the summer months of the previous year (Tromp, 2005).

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The authors conducting research work in the field of flower bud formation in the sweet cherry have directed their attention mainly to establishing the onset of morphological differentiation of the flower buds and the factors influencing them in this respect (Guimond et al., 1998a; Georgiev, 2001; Doleda et al., 1997; Lichev and Garbatilova, 2005; Watanabe, 1982), this being easily explicable, taking into consideration the great practical application of this moment.

The studies referring to the development of differentiating flower buds in autumn and winter are very few. In this respect Georgiev (2001) has observed that in January in the cultivar 'Drogans gelbe' the flower stigmas are less explicitly widened, and the sepals, petals, stamens and styles are smaller compared with those of 5 other studied cultivars. According to the author this circumstance determines the higher hardiness of the flower buds of this cultivar.

It has been established that the initiation and development of the flower buds in the sweet cherry can be influenced by the meteorological conditions (Georgiev, 2001; Micke et al., 1983), the cultivars (Georgiev, 2001), the pruning (Guimond et al., 1998b).

The rootstocks probably (as a constituent part of the grafted fruit trees) influence the initiation and development of the flower buds of the graft. The influence of the rootstocks only on part of the cultivars included in the studies has been observed in the sour cherry (Elek, 1974) and the apple (Buban, 1967). As far as the sweet cherry is concerned, we did not discover data about studies, conducted along these lines in the literature available to us.

Taking into consideration all this, we set the task of conducting a study on the influence of 5 rootstocks (differing in their growth vigour) on the autumn-winter development of differentiating flower buds in two sweet cherry cultivars.

MATERIALS AND METHODS

The studies were conducted during the period 2003-2007 in the experimental plantation of the Fruit-growing Department at the Agricultural University in the town of Plovdiv. 7-11-year-old trees of the sweet cherry cultivars 'Bigarreau burlat' and 'Stella' were used grafted on the rootstocks P 1 (seedling of P. *mahaleb* L. selected in Bulgaria), Gisela 5 , Gisela 4, Weiroot 13 and Weiroot 72, which were planted at distances of 6,0 x 4,5 m using a randomized block design. The trees were trained as free-growing crowns; they were grown under the conditions of herbicide fallow and were gravity irrigated. They had winter pruning each year except the season 2004-2005.

For the sake of conducting observations on the development of the buds, weekly samples were collected from the beginning of September till the onset of flowering in the next year. In every one of the variants, 3 spurs in total were taken from 3 trees, disposed on the two-year-old wood in the south-east direction and well-lit by the sun.

The branches were immediately defoliated and their lateral buds were disclosed by means of a preparatory needle under a stereo-microscope, or were preserved for later observations in a solution of Formalin 70%, Ethyl Alcohol and concentrated Acetic acid in the ratio of 2:10:1. The number of flower primordia in the autumn was determined by the mean data of the microscopic observations in September and October. The length of the pistil was measured by a micrometer. The number of flowers in one flower bud was observed in the field the next year at the time of the appearance of the color of the flower, as for this purpose, 3 branches disposed on 3 trees were used in every variant. The percentage of double pistils was calculated on the basis of the microscopic observations during the whole autumn – winter period.

Some of the data obtained were statistically processed by the ANOVA method using the Student test.

The region of the experimental plantation is characterized by a comparatively mild winter and dry, hot summer, with maximum air temperatures in July and August often reaching 40^0C. The annual overall precipitation is 400-500 mm, distributed irregularly, predominantly in winter, spring and autumn. The soil is slightly alkaline with pH=7,50 and a moderately sandy-loam mechanical composition.

RESULTS AND DISCUSSION

The data from the microscopic observations in September – October reveal that both in the year 2004, and also in 2006, in both cultivars, the type of used rootstock has influenced the number of differentiated flower primordia in one flower bud. The greatest number of flower primordia is proved to be formed under the influence of Gisela 5, the smallest one – in P 1, whereas the remaining rootstocks occupy an intermediate position (Table 1). As far as the used cultivars are concerned, from the data we can observe that in the two years from all rootstocks (with the exception of Weiroot 13 in 2004) 'Stella' has a priority over the rest of them. A similar tendency has also been revealed in the flowers observed in spring (with the exception of Gisela 5 and Weiroot 13 in 2005) which, in combination with the number of flower primordia explains the greater fertility of the cultivar 'Stella', manifested in its growing in the fruit-bearing plantation.

The comparison between the data from the microscopic and field studies reveals that in the season 2004/2005 in the trees of the cultivar 'Bigarreau burlat' on P 1 and Weiroot 13, about 90-91% of the flower primordia have turned into flowers, whereas in the other rootstocks (which on principle are more dwarfing) the percentage of the grown flowers is comparatively lower – between 68% and 82%. The remaining flower primordia (which are between 9% and 32% for the separate rootstocks) have not turned into flowers because they have retarded in their development or have been damaged later on in winter to a different degree by the frosts.

This comparatively high percentage of the mortality of the flower primordia is probably due to the comparatively more unfavorable conditions for winter dormancy of the plants, manifested in the sudden fluctuations and critical values of the air temperatures in the season 2004/2005. Taken as a whole, the same tendency has also been observed in the cultivar 'Stella', where the formed flowers on the vigorous rootstocks are about 86-87%, whereas on the more dwarfing ones – it is between 75% and 78%. In the season 2006/2007, in spite of the favorable conditions for winter dormancy of the trees, the percentage of formed flowers in one fruit bud in the separate variants remains within the boundaries between 86% and 88% in the cultivar 'Bugarreau burlat', and from 83% to 93% in 'Stella'.

As, at an earlier stage of the vegetation, on the vegetative cone, the sepals, petals and stamens have differentiated, in September the separate parts of the pistil have also been formed. The growth of the pistil in both cultivars follows an ascending curve with a vigorous initial stage till the first ten-day period of November, when it subsides but does not interrupt, and in the first ten-day period of February again resumes its rate explosively (Figure 1). In this connection the opinion of Georgiev (2001), who, after studying 6 cultivars, has not established dormancy in the differentiating flower buds either, is topical. The author’s observation is based on the fact that in January the flower parts in the buds have been of a lager size in comparison with November the previous year.

In the course of our weekly microscopic studies we have been impressed by the fact that under the influence of some rootstocks, double pistils have been formed in the differentiating flower buds. Taking into consideration, that double fruit are subsequently formed from the double pistils, deteriorating the production quality, we consider it necessary to present the results obtained from this index too.

During the season 2003/2004 a greater number of double pistils has been observed only in Gisela 5, Weiroot 72 and Gisela 4 - between 6% and 9% for the cultivar 'Stella' and between 4% and 8% for 'Bigarreau burlat', whereas the remaining rootstocks have produced a quite weaker influence in this respect (Figure 2).

During the following two seasons the number of observed double pistils in all rootstocks for both cultivars, is insignificant. The greater number of double pistils in the season 2003/2004 is probably due to the higher mean 24-hour air temperature in the summer months (July, August and September) of 2003 - 22,6^{0}C in comparison with that in the year 2004 – 21,7^{0}C and in 2005 – 21,4^{0}C. The fact that, according to Micke et al. (1983) in the years with warmer summers, a greater number of double pistils are differentiated, gives us grounds for this assumption.

CONCLUSIONS

The percentage of the flowers grown in spring from one flower bud (compared with the number of the flower primordia in the autumn) in the trees on the studied rootstocks is between 68% and 93%. With comparatively more abrupt fluctuations and critical values of the air temperatures, the percentage of the flowers grown in spring in the more dwarfing rootstocks (Gisela 5, Gisela 4 and Weiroot 72) is smaller than that in the vigorous ones P 1 and Weiroot 13. Under favorable conditions for winter dormancy of the trees, the percentage of the formed flowers in one fruit bud in the trees on the separate rootstocks do not differ significantly.

Dormancy in the development of the differentiating buds in the autumn – winter period has not been observed. The growth of the pistil, being it at a slower rate, continues in the period from November to the middle of the first ten-day period of February too.

Every other (out of the three studied seasons altogether) a greater number of double pistils has been observed – under the influence of Gisela 5, Weiroot 72 and Gisela 4 they are between 6% and 9% for the cultivar 'Stella' and between 4% and 8% for 'Bigarreau Burlat', whereas the remaining rootstocks have exercised their rather weaker influence in this respect.

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Table 1.

Influence of the rootstock on the differentiated in the autumn flower primordia and the flowers developed in spring in 1 flower bud in two sweet cherry cultivars

Rootstocks	Season 2004/2005			Season 2004/2005		
	Flower primordia, number (2004)	Flowers, number (2005)	Flowers, % (2005)	Flower primordia, number (2006)	Flowers, number (2007)	Flowers, % (2007 г.)
'Bigarreau Burlat'						
P 1	2,37	2,14	90,29	2,48	2,13	85,89
Gisela 5	4,86	3,98	81,89	3,75	3,31	88,26
Gisela 4	3,20	2,48	77,50	3,02	2,67	88,41
Weiroot 13	3,70	3,38	91,35	2,51	2,16	86,05
Weiroot 72	4,05	2,76	68,14	3,31	2,86	86,40
LSD - 5 %	0,42	0,40	8,26	0,30	0,29	9,57
'Stella'						
P 1	2,82	2,46	87,23	3,33	3,10	93,09
Gisela 5	4,88	3,83	78,48	4,50	3,73	82,88
Gisela 4	4,37	3,40	77,80	3,65	3,26	89,31
Weiroot 13	3,51	3,02	86,03	3,50	3,20	91,43
Weiroot 72	4,35	3,30	75,86	4,08	3,56	87,25
LSD - 5%	0,40	0,29	7,40	0,41	0,36	11,10

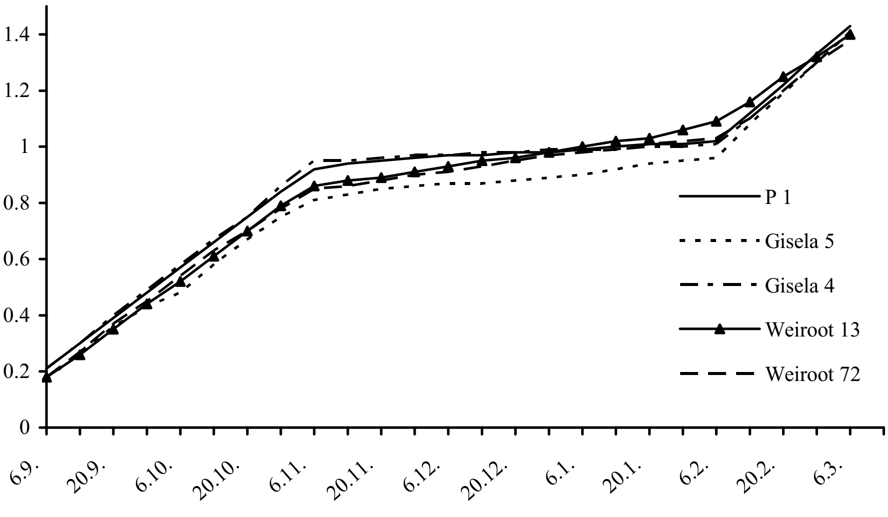

Figure 1. Growth rate of the pistil in the differentiating flower buds of the cultivar 'Bigarreau Burlat' on 5 rootstocks in the season 2004/2005

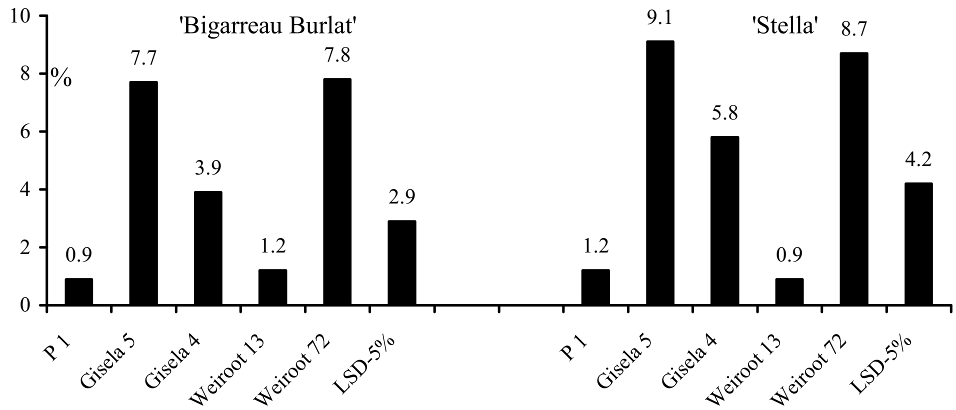

Figure 2. Influence of the rootstock on the percentage of the double pistils in the differentiating flower buds of the two sweet cherry cultivars in the season 2003/2004

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ECOLOGICALLY FRIENDLY SYSTEMS FOR MAINTENANCE OF SOIL SURFACE IN RASPBERRY AND BLACK CURRANT PLANTATIONS

Petko Minkov, Penka Mihaylova[1]

KEY WORDS: raspberries, black currant, ecologically friendly systems, cultural anti-erosion measures, anti-erosion efficiency

ABSTRACT

Raspberries and black currant are ones of the main fruit crops in the fore-mountain and mountain parts of our country. Most of these plantations are located in areas with considerable slopes. In addition, there are heavy rainfalls in these regions that are a prerequisite for intensive water erosion. From 1976 to 2008 in IMSA, Troyan several field trials were carried out in raspberry and black currant plantations to determine the most suitable ecologically friendly systems for their growing. It was found that they possess high anti-erosion efficiency. The cultural anti-erosion measures contribute to conserve natural fertility and create favourable conditions for expression of vegetative and reproductive characteristics of small-fruited species. Artificial grassing of inter-row spacings maintained through mowing, mulching in place and live mulch showed a very good effect against the weeds and created good conditions for development of raspberry and black currant plants and increase of their yields. The necessity for tillage was avoided, the quantity of used herbicides decreased and hence the danger of environment pollution.

INTRODUCTION

The main task to be solved by fruit-growing science and practice in our country is to increase the yields per unit area and improvement of quality of fruit production with the purpose of meeting the requirements of the international standards and home market.

The plantations of raspberries and black currant in Bulgaria are mainly situated on sloping terrains. In order to obtain high and regular yields from them, the system for soil surface maintenance is also of great importance together with the other cultural measures

The correctly selected system for soil maintenance in contemporary fruit plantations should provide in the first place a favourable nutrient and water-air regime necessary for normal functioning of root system of the plants (Stamatov, 1989). At the same time, this system should accomplish efficient weed control (Petkov et al., 1998), as well as soil protection from water erosion on sloping terrains (Mihaylova et al., 1995).

In the commonly applied technology for raspberry growing in our country the soil surface is maintained most often in black fallow through tillages or herbicide application (Ivanov, 1984). However the published data on raspberry grassing are contradictory and the results are not unidirectional (Catzeflis et al., 1987), (Sanderson et al.,1988).

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The studies of other authors (Petkov et al., 1998) showed that the grassing of the inter-rows in raspberries improved soil structure, humus balance and moisture supply of soil. Nutrient leaching decreased, mechanical loading of soil by the passing machinery was avoided. According to these studies the grassing of the inter-rows in plantations situated on sloping terrains decreased and in some cases completely excluded the soil erosion.

Georgiev et al. (2005) specified that with the implementation of the trench method of planting combined with grassing down of interrow alleys, the black currant cultivar Ometta had the most intensive growth, while the highest fruit yields were obtained from the red currant cultivar Rovada. It was found that the planting of currant together with grassing down of the interrow alleys enabled also the achievement of the desired high erosion control effect (Dinkova et al., 2005). The aim of the present study is the results from the investigation of non-traditional preplanting preparation and some new systems for maintenance of the soil in young raspberry and currant plantations to be summarized.

MATERIAL AND METHOD

Trial I – raspberries and black currant were grown by a traditional technology for 13 years on a terrain of 14% slope, on light grey forest, slightly eroded soil. The rows of both crops were located perpendicularly to the slope and the soil surface was maintained in black fallow. The following variants were studied in a raspberry plantation of cv. Samodiva (*trial II*): 1. Black fallow - control. 2. Planting of raspberries transversely to the slope (along the horizontals) and maintenance of inter-row spacing in black fallow. 3. Planting of raspberries along the slope and maintenance of inter-row spacing in black fallow 4. Planting of raspberries along the slope and grassing of 50% of inter-row spacing. A mixture of red fescue (Festuca rubra, L), Kentucky bluegrass (Poa pratensis, L), birdsfoot trefoil (Lotus corniculatus, L) was used. The parameters characterizing the anti-erosion efficiency in raspberry growing on sloping terrains and vegetative and reproductive activities of raspberry plants were determined by traditional methods.

Variants of *trial III*: 1. Raspberries planted in trenches and naturally sodded inter-row spacings, the rows were located perpendicularly to the horizontals; 2. Raspberries planted perpendicularly to the horizontals and inter-row spacings maintained in black fallow; 3. Raspberries planted in rows along the horizontals and inter-row spacings maintained in black fallow; 4. Control – black fallow.

The method of stationary flow grounds was used. Measurements were performed after every flow causing rainfall. The quantity of liquid and solid flow was determined by the method suggested by Onchev (1983) through the following formulas:

For solid flow: $A = (T – C) \times M$,

For liquid flow: $B = T – A$

The following variants (*trial IV*) for soil surface maintenance located in the raspberry inter-row spacing were studied: 1. Maintenance in black fallow through tillages; 2. Maintenance in black fallow through herbicides; 3. Artificial grassing, grass mowing and leaving of the green mass scattered in place as mulch;

Herbaceous species with shallow root system were used for grassing: red fescue (*Festuca rubra*, L), Kentucky bluegrass (*Poa pratensis*, L), birdsfoot trefoil (*Lotus corniculatus*, L) in a ratio of 1:1:1. The herbicides Stomp 33% + Simazine (Herbazine 50%) were used. Vegetative and reproductive characteristics were recorded according to the methods for studying plant resources (Nedev, 1979).

In a young raspberry (*trial V*) plantation located on light grey forest gley-like, slightly eroded, heavy sandy clay soil the following variants of soil surface maintenance were studied: 1. Control: maintenance in black fallow through manual tillages; 2. Soil surface maintenance through herbicides; 3. Artificial grassing , grass mowing and leaving of the green mass scattered in place as mulch; 4. Artificial grassing, grass mowing and taking out of the area; 5. Artificial grassing, sward maintenance as live mulch through herbicide treatment. We used the herbicide at a dose of 40 ml/da applied with a plot sprayer at water solution consumption of 20 l/da and grass height of 10-15 cm. The weeds were recorded by the quantity-weight method 30 days after herbicide application. The growth of marked raspberry shoots (a number of 10) was observed in a fruit-bearing plantation. In a young black currant (*trial VI*) plantation with cv. Ben Sarek located on light grey forest gley-like, slightly eroded, heavy sandy clay soil the following variants of soil surface maintenance were studied: 1. Control: maintenance in black fallow through manual tillages; 2. Soil surface maintenance through herbicides; 3. Artificial grassing , grass mowing and leaving of the green mass scattered in place as mulch; 4. Artificial grassing, grass mowing and taking out of the area; 5. Artificial grassing, sward maintenance as live mulch through herbicide treatment.

Kentucky bluegrass and birdsfoot trefoil sown at the generally accepted sowing rates were used for grassing. In 2004 in second variant the herbicides Devrinol 400 g/da + Herbazine 200 g/da were used at reduced doses after black currant planting, applied with a plot sprayer at working solution consumption of 40 l/da. The herbicides Stomp 500 ml/da + Herbazine 400 g/da were used in the same variant in 2005.

RESULTS AND DISCUSSION

Raspberries and black currant grown on sloping areas (*trial I*) radically changed the erosion situation and practically liquidated the erosion processes in them almost completely (Table 1). The average annual quantities of liquid and solid flow from the areas under raspberries and black currant were 5,6 and 6,1 times lower for the liquid flow and 175,5 and 399,8 times lower for the solid flow, respectively, as compared to those in black fallow. The anti-erosion efficiency of raspberries and black currant, as well as their flow-reducing efficiency resulted above all from the effect of the cover of aboveground part on the erosion capacity of the rains. As it is evident from the data, the flow erosion capacity in raspberries was 31,7 times and in black currant 67,9 times lower, as compared to pure black fallow. The C factor of the raspberries and black currant of anti-erosion efficiency was close to the efficiency of perennial grass vegetation.

In *trial II* the applied anti-erosion systems for soil surface maintenance under a raspberry plantation liquidated almost completely the migration processes in the soil of sloping terrains, conserved its natural fertility and contributed to increase usability of rain waters. That reflected favourably on vegetative and reproductive activities of raspberries (Table 2). Well-developed shoots were formed in a sufficient number that gave high yields and vice versa, the raspberry planting along the terrain slope considerably decreased the yield and fruit size.

The obtained results from the growing of raspberry plantations with grassed inter-row spacings (*trial III*) partially suppressed the raspberries. The most vigourous growth of raspberry shoots was recorded for the planting in trenches and growing with fallow rows. With this system for soil surface maintenance they formed 24.4% more shoots and 34,6% greater number of fruiting nodes, as compared to their number in the traditional growing technology. In 2005 variant 1 (black fallow maintained by tillages) had the greatest growth - 134,2 cm, followed by variant 2 (black fallow + herbicides) - 124,5 cm and the smallest growth was recorded for variant 4 (artificial grassing, mowing and taking the grasses out of the area) - 94,7 cm in cv. Samodiva. In cv. Shopska Alena variant 2 had again the greatest growth – 130,8 cm. In cv. Shopska Alena the soil treatment with herbicides and grassing had no significant effect on growth vigour of the raspberry plants. As compared to the hoed control, the highest annual growth was attained with the mulching of the grassed area (var. 3) and the lowest one with grassed inter-row spacing maintained in live mulch. The results of cv. Samodiva were identical. The annual growth of the shoots in the variant with mulching exceeded the control by 14% and it was 11% lower for live mulch.

The obtained yields from raspberries showed that in Shopska Alena the highest yield was obtained from grassing of the inter-row spacing with taking out of the green mass - 357,4 kg/da (106 % of the control) and in Samodiva from herbicide use– 546,0 kg/da (102 %) (Figure 1). The soil mulching (live mulch or ordinary mulching) suppressed the weeds to a great extent. The advantage of the mulching over the chemical weed control was that it decreased the risk of pollution of environment, fruits etc.

The data from the first weed recording in 2004 showed that as a result of powerful effect of soil herbicides the annual weeds in second variant were reduced to 9,6% of the control (before first hoeing). In the grassed variants their number was also reduced and in variant 3 they were 17,4%, in variant 4 – 22,5% and in variant 5 – 19,8% of the control.

In 2004 the sward in variants 3 and 4 was mown by hand once and in 2005 4 times. In order to maintain the sward in live mulch (variant 5) in 2004 it was treated once with Roundup 50 l/da and in 2005 2 times. The herbicide was applied with a plot sprayer at working solution consumption of 20 l/da and sward height of 10-15 cm.

The experimental area of the black currant plantation was heavily infested with both annual and perennial weeds. During the weed mapping before the laying out of the trials the number of recorded annual weeds was 333 per m^{2}. The experimental area was heavily infested also with perennial weeds. The prevailing species were wheatgrass (Agropyrum repens, L.P.) – 26 per m^2, thistle (Cirsium arvense, L. Scop.) - 12 per m^2 etc.

Analyzing the results of weed weight we concluded that whereas in the control the weeds developed vigourously, with very well developed stems, in the variant with herbicides and the grassed variants the mulching contributed to greater suppression of weed growth. The perennial weeds developed in a different way in the different variants. In second variant with application of soil herbicides the number of annual weeds considerably decreased, which led to compensation processes. The greatly decreased number of annual weeds did not compete with the perennial ones and they developed vigourously, which was evident from their weight and some of them, such as wheatgrass and bindweed exceeded in number and weight those in the control.

In the grassed variants where the sward had not developed yet completely and a dense sod had not been formed and which was not mown and treated with Roundup, the weed number was reduced to 25-28 % of the control, the weeds being suppressed in their development. The weed weight in the variant with herbicides exceeded the control by 47 %, whereas in the grassed variants it was 53 to 68 % of the control.

The analysis of the soil of black currant plantation showed that it has an acid reaction. The data on the active soil acidity (pH in water extract) varied from 5,3 to 5,8 for the two soil layers. The humus content was low, which is characteristic of the pseudopodzolic grey forest soils, its values being within the range of 1,50 to 1,72%. The content of available nitrogen forms (ammonia and nitrate) was also low: 14 to 20 mg/kg ammonia nitrogen and 10 to 16 mg/kg nitrate nitrogen. The soil was distinguished for medium supply of mobile potassium – from 16 to 20 mg/100 g. The data on the content of the studied active form of manganese showed good supply – 75 to 91 mg/kg.

CONCLUSIONS

The plantations of raspberries and black currant located in areas with a slope of up to 14% can limit completely the soil losses from the area water erosion to the admissible limits (for grey forest soils the rates of admissible erosion elaborated in our country are from 120 to 360 kg/da eroded soil) and in this way they can solve the problem of soil protection from erosion. The raspberry growing on sloping terrains through application of cultural anti-erosion measures contribute to conservation of natural fertility and create favourable conditions for expression of vegetative and reproductive characteristics of raspberry plants. The reduced number of tillages in growing of raspberry plantations did not influence negatively the growth and fruit bearing. Their planting in trenches and growing with sodded inter-row spacings had also a significant anti-erosion effect.

The artificial grassing of inter-row spacings in a young raspberry plantation maintained through mowing, mulching in place and live mulch showed a very good effect against the weeds. Good conditions for development of raspberries and increase of their yields were created. In the artificial grassing of raspberry plantations the necessity for tillage was avoided, the quantity of used herbicides decreased and hence the danger of environment pollution. The grassing of the inter-row spacing in a young black currant plantation of cv. Ben Sarek and sward maintenance through mowing, mulching and through live mulch greatly suppressed the weed development.

With the artificial grassing of the inter-row spacing in black currant plantations the necessity for tillage was avoided, the quantity of used herbicides decreased many times and hence the danger of soil and water pollution decreased.

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Table 1

Values of the main erosion characteristics according to years

Years	Liquid flow l/da			Solid flow kg/da			Cover %		R factor
	Black fallow	Rasp-berries	Black currant	Black fallow	Rasp-berries	Black currant	Rasp-berries	Black currant	
1976	104568	5363	3577	3667	35	5	44	42	21.814
1977	12771	1513	1349	111	0	2	46	35	12.096
1978	36107	6186	8847	388	0	0	56	45	10.231
1979	146331	10775	14167	1913	5	13	54	48	27.342
1980	11721	6774	6248	10	0	0	59	56	6.918
1981	12831	8449	9871	36	0	0	52	37	8.031
1982	111188	28628	22863	15751	44	41	67	54	19.900
1983	150058	35053	25396	10949	105	18	68	50	16.057
1984	30960	7094	7035	144	0	0	60	34	10.913
1985	61614	8087	7237	617	0	0	54	44	18.762
1986	17760	6321	7622	108	4	6	44	42	16.688
1987	14726	3183	2715	87	0	0	50	41	6.417
1988	625	0	0	0	0	0	35	32	0.000
Total for the period	711261	127425	116924	33780	191	84	-	-	175,169
Average for the year	54712	9802	8994	2598	15	6	53	43	13,475

Table 2.

Growth and reproductive behaviour of raspberry in the 1992-1999 period

Variants	Characteristics					
	New shoots (n/m)	Shoot height (cm)	Shoot thickness (mm)	Fruit-bearing nodes (n/shoot)	Yield (kg/da)	Fruit size (g)
Control, black fallow	27,12	212,34	10,48	29,91	856,850	2,680
Grassed inter-row spacings Row band in black fallow	25,03	190,60	10,03	27,29	750,387	2,495
Trenches, grassed inter-row spacings, row band in black fallow	33,25	283,64	12,47	40,25	1029,622	3,236

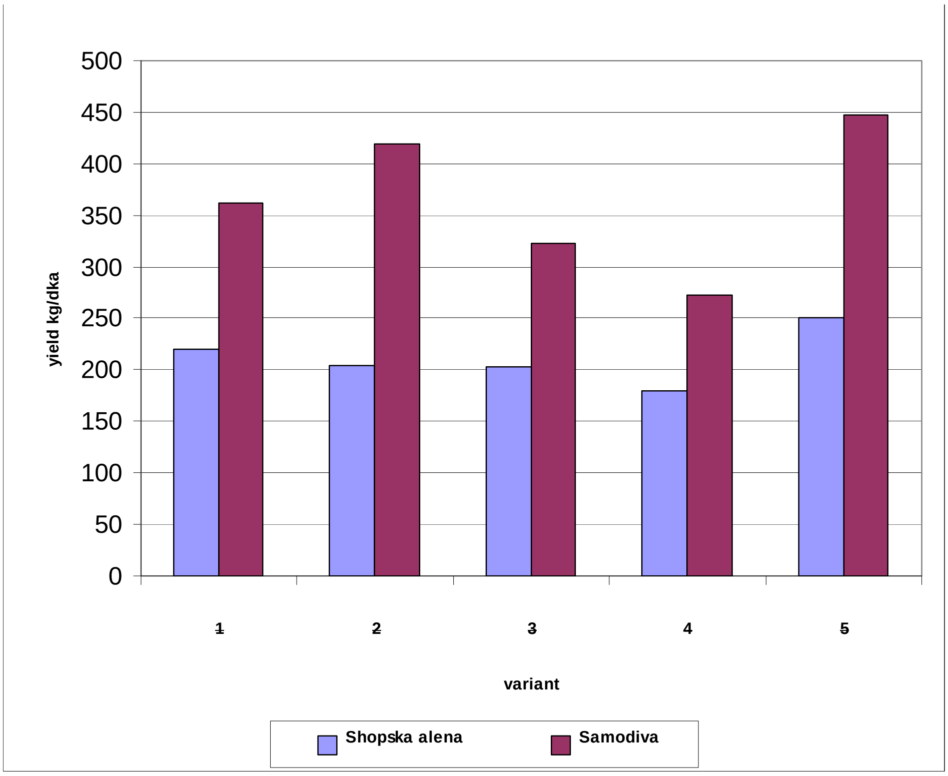

Figure 1. Yields from raspberries

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ROOT ROT ON ALMOND SEEDLINGS IN GREECE, CAUSED BY ROSELLINIA NECATRIX PRILL.

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KEY WORDS: Rosellinia necatrix, Dematophora necatrix, almond root rot disease

ABSTRACT

In spring 2008, almond seedlings in the region of Thessaly, central Greece, were infested by a soil borne pathogen that formed a white cottony mycelium and mycelia strands on the seedlings stem base or on the main roots of older plants and caused suddenly death. The pathogen was identified as Rosellinia necatrix Prill. This is the first record in Thessaly of R. necatrix on almond seedlings in Greece.

INTRODUCTION

Rosellinia necatrix Prill. (anamorph: *Dematophora necatrix* Hartig) is recorded all over the world as a root rot pathogen that causes root rot of many plants (Sivan and Holliday 1972), mainly of fruit trees such as almond, peach, plum, apple, pear, olive, cherry and avocado (Sztejnberg and Madar 1979; Sousa et al. 1995; Schena et al. 2002). Apart of trees, there are numerous reports of serious infections caused by *R. necatrix* on a variety of crops, weeds (Busto et al. 2004) flower crops (Guillaumin et al. 1982; Mansilla et al. 2002) and field crops (Sztejnberg and Madar 1979).

RESULTS - DISCUSSION

This research reports a new record of infection and symptoms caused by *R. necatrix* on almond seedlings (Fig. 1) in the region of Thessaly in central Greece.

Almond's infestation was observed in central Greece, in spring (in April) of 2008. The main roots and the stem base of the infested almonds seedling were covered by a white cottony mycelium and mycelia strands (Fig. 2). Seedlings were died in 5-6 days whereas leaves were remained detached (Fig 2).

Diseased plants were observed in patches and the pathogen was infesting neighbouring plants. All diseased almond seedlings were cultivated in soils with high moisture. Pear trees have been reported as a previous crop before almond.

The identification of the pathogen was based on a direct observation with microscopic observation of the vegetative mycelia structures, collected and cultivated onto Petri (PDA) plates from the diseased tissues. Fifteen almond seedlings were observed.

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Mycelia from all cases showed the typical pear-shaped hyphae (Fig. 3) and synnemata, of *R. necatrix*.

Until now *R. necatrix* in the central region of Thessaly has not been reported as an almond seedling tree pathogen. In this investigation it was showed that *R. necatrix* is also an almond pathogen that could be a potential thread in warm areas with high moisture soils in central Greece.

Figure 1. Almond seedlings infested by *Rosellinia necatrix.* Leaves are remaining attached.

Figure 2. White cottony mycelium and mycelium strands of *Rosellinia necatrix* on the surface of infected almond seedlings.

Figure 3. *Rosellinia necatrix* characteristic pear-shape hypha (arrow).

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PLUM CULTIVAR HANITA IN THE TROYAN CONDITIONS

Boryana Stefanova, Hristina Dinkova, Kalin Dragoyski[1]

KEY WORDS: plum, cultivar, rootstock, growth, fruit bearing

ABSTRACT

The study was conducted during the 2003-2007 period. In the Troyan conditions the plum cv. Hanita grafted on rootstocks SJ A, Fereley and Mirobolan has normal growth and fruit-bearing.

The tree shows moderate to vigorous growth, the branches sprout at acute angle towards the leader, the wood is very brittle inclined to breaking, which is the main disadvantage of cv. Hanita and requires developing of special prunings for short training.

The plum cv. Hanita has pox virus tolerance, early fruit-bearing, high fertility. The fruits are dark violet to blue coloured, covered with a wax coating. The stone is medium large (1.58 g) and is not completely free. The fruit flesh is golden yellow, thick, succulent, with a pleasant aroma and very good taste. It is suitable for fresh consumption and drying.

The cultivar deserves wider spread.

INTRODUCTION

The severe epidemiological situation with the plum pox virus in the Troyan region necessitated intense search for tolerant cultivars, with which to diversify the assortment. In the years 2001, 2003 German cultivars with high tolerance were imported to study them.

One of them is cv. Hanita developed by Dr. Hartman through crossing of President x Auerbacher. According to data in the literature the cultivar is pox tolerant showing slight symptoms on the leaves and very slight on the fruits; growth – moderate to vigorous; early and constant yields; self-fertile, with dark violet to blue fruits, with an abundant wax coating, completely freestone, suitable for drying and fresh consumption (Hartman W., 2002).

Grzyb, Z. S., Sitarek, M. (2004) studied cv. Hanita on different rootstocks.

In the Troyan conditions the cultivar has some specific characteristics (Dinkova et al., 2005).

The objective of this study was to determine the growth and pomological qualities of cv. Hanita with a view to its growing in the Troyan region.

MATERIAL AND METHOD

The observations were conducted during the 2003-2007 period in two demonstration plantations of IMSA Troyan established in 2001 and 2003, respectively with planting material vf imported from Germany. The trees were planted by the trench method

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with reserve organic fertilizing at spacings of 4x3 m; the system of formation was freely growing; the cultivation was without irrigation by a traditional technology (Dinkova et al., 1996). The experiment included 20 trees grafted on each of the rootstocks SJ A, Fereley (the plantation was established in 2003) and on Mirobolan planted in 2001; cv. Stanley was observed as a control.

Recorded characteristics:

Cross-sectional area of trunk; annual growth – average length of one branch and total; average weight of fruit and stone, yield per tree (kg), chemical composition of fruits.

RESULTS AND DISCUSSION

The trunks of the trees of cv. Hanita grafted on the vegetative rootstocks SJ A and Fereley due to their earlier age thickened much faster, as compared to those grafted on Mirobolan planted 2 years earlier (Table 1). Compared to 4, 5 and 6-year age the trunks of Hanita on the seed rootstock had close values to those of the vegetative ones. Initially the trees of cv. Stanley increased the trunk cross-sectional area at a similar rate to that of the vegetative rootstocks, but in the next ones (2005, 2006, 2007) their increase became much more dynamic (by about 10 cm^2 per year) due to the greater growth potential of the seed rootstock.

From first to fifth age the thickening of trunks of cv. Hanita trees grafted on the vegetative rootstocks SJ A and Fereley was much faster than those on Mirobolan (Table 1).

The leaf is large, rounded serrate, smooth, glossy on the upper side.

The total growth of cv. Hanita trees on SJ A and Fereley had high values in 2003 and 2004 and in 2005 it reached to 1956 cm and 4136 cm, respectively (Table 2). After beginning of fruit bearing of the trees in 2006 the total growth sharply decreased (96.78% for SJ A and 95.43% for Fereley). In 2003 and 2004 for Hanita on Mirobolan this parameter had lower values due to the fact that the trees had been planted earlier and had already begun fruit bearing. In 2005, like the control cultivar, Hanita had the maximum total growth on the three rootstocks and the reason for that according to us were the excessive rainfall during vegetation.

Cv. Hanita was characterized by great awakening of buds that are well formed, elongated and pointed, the branches has acute angles of sprouting from the trunk, rather brittle wood. That necessitates elaborating elements in the technology related to correction of the angles of sprouting and special pruningя for short training. Weaker growth was observed only for the rootstock SJ A.

The average length of branch varied in the different years for the different rootstocks, but most often it was greatest in Fereley (57.5 см). In 2006 when the trees were loaded abundantly with fruits there were total branch breakings.

The fruits of cv. Hanita have elliptical shape, with well-marked abdominal suture, dark violet to blue coloured skin, covered with a wax coating. The stone is medium large 1.58 g., which is from 3,59% to 8,02% of the fruit weight and it is not freestone. The pedicel is 17 mm. The fruit flesh is golden yellow, thick, succulent, with a pleasant aroma and very good taste (Table 4). It is suitable for eating fresh and drying. It is pox tolerant, with slightly pronounced symptoms on the leaves and without symptoms on the fruits.

CONCLUSIONS

The plum cv. Hanita has pox virus tolerance, early fruit-bearing, high fertility. The fruits are dark violet to blue coloured, covered with a wax coating. The stone is medium large (1.58 g) and is not completely free. The fruit flesh is golden yellow, thick, succulent, with a pleasant aroma and very good taste. It is suitable for fresh consumption and drying.

The tree shows moderate to vigorous growth, the branches sprout at acute angle towards the leader, the wood is very brittle inclined to breaking, which is the main disadvantage of cv. Hanita.

In the Troyan conditions the plum cultivar Hanita grows and bears fruit normally and in spite of the shown disadvantage, after development of some elements of the technology we think that it deserves to be spread.

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Table 1

Trunk cross-sectional area (cm^2)

Cultivar/ rootstock	TCSA (cm^2)				
	2003	2004	2005	2006	2007
Hanita/SJ A	3.08	3.90	12.00	17.13	28.86
Hanita/Fereley	3.13	4.30	17.30	23.01	30.79
LSD $_{0.05}$	0.43	0.74	3.12	15.68	16.07
Stanley/P. cerasifera	1.45	3.25	23.51	34.52	41.04
Hanita/Mirobolan	11.81	24.26	30.68	30.88	39.73

Table 2

Total growth (cm) and average length of branches (cm)

Year	Cultivar/ rootstock	Total growth (cm)	Average length of branches (cm)
2003	Hanita/SJ A	434	26,9
	Hanita/Fereley	751	44,5
	Hanita/Mirobolan	310	18,28
2004	Hanita/SJ A	761	35,3
	Hanita/Fereley	1374	57,5
	Hanita/Mirobolan	570	31,75
2005	Hanita/SJ A	1956	33,9
	Hanita/Fereley	4136	48,5

	Hanita/Mirobolan	773	51,57
	Stanley/p.cerasifera	1769	59.7
2006	Hanita/SJ A	63	9,87
	Hanita/Fereley	189	24,06
	Hanita/Mirobolan	458	15,46
	Stanley/p.cerasifera	273	25.22
2007	Hanita/SJ A	273	25,22
	Hanita/Fereley	107	16,23
	Hanita/Mirobolan	164	11,63
	Stanley/p.cerasifera	207	8.81

Table 3

Yield and fruit weight

Cultivar/rootstock	Fruit weight (g)			Fruit stone (g)			Yield (kg/tree)		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
Hanita /SJ A	34.85	32.55	20.56	1.74	1.17	1.65	2.4	18.3	5.6
Hanita /Fereley	34.66	26.83	20.48	1.87	1.43	1.54	2.1	22.0	8.3
Hanita/Mirobolan	32.20	34.61	26.85	1.81	1.30	1.60	20.1	30.0	3.5
Stenley/P. Cerasifera	36.00	33.00	22.28	1.58	1.70	1.58	3.2	12.2	25.3
LSD 0.05	3.28	3.80	3.35						

Table 4

Chemical content

Cultivar/ rootstock	Soluble solids %	Total sugar %	Inverted sugar %	Sucrose %	Total acids %	Tanini mg%
Hanita/SJ A	21.00	8.70	7.83	0.83	1.34	0.124
Hanita /Fereley	16.00	7.93	7.32	0.58	1.27	0.104
Hanita/Mirobolan	23.95	12.18	9.55	2.33	1.31	0.090
Stenley/P.Cerasifera	19.36	10.47	8.53	1.94	0.83	0.083

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REPRODUCTIVE CHARACTERISTICS OF RASPBERRY CULTIVARS GROWN IN THE REGION OF CENTRAL BALKAN MOUNTAINS

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KEY WORDS: *raspberry, cultivars, morphology, chemical composition*

ABSTRACT

The raspberry cultivars Shopska Alena, Samodiva, Balgarski Rubin, Newburg, Willamette, Meeker, Marlborough cultivated in the Central Balkan Mountain region characterized by favourable soil-climatic conditions for raspberry production, were studied. The study was conducted at 937 m altitude in nonirrigated areas. The time of ripening was found. The chemical composition of fresh fruits and yield in different cultivars were determined. Results from morphological studies of fruits, their weight and size were presented.

In 2008 the earliest ripening time (20.06) was found for Balgarski Rubin and the latest one (01.07) for Meeker.

Under the soil-climatic conditions and applied cultural practices the most suitable cultivars for growing are the cultivars Samodiva, Shopska Alena, Willamette.

INTRODUCTION

Raspberry is a profit-yielding fruit crop and when grown in suitable soil-climatic conditions and good cultural practices it is highly profitable. It thrives and develops better on terrains at greater altitude and higher air humidity (Hristov et al., 1973). They are suitable for processing into juices, jams etc., as well as for fresh consumption. The raspberry fruits have valuable nutritive and curative properties thanks to their rich chemical composition (Velkov et al., 1973). The efficiency of raspberry plantations is determined to a great extent by the choice of a suitable cultivar. In our country both Bulgarian and introduced cultivars are used to establish raspberry plantations. Every one cultivar is characterized by specific fruit qualities and phenological features (Kichina, 1984; Kazakov, 1980; Boycheva, 1999). The use of disease tolerant or resistant cultivars allow their growing with reduced plant protection, which results in obtaining of purer biological products (Stoyanova, 2000; Daubeny H & Pepin H. 1981; Pepin. H. S. et al. 1985). Irrespective of qualities and merits of a given cultivar, it shows its potentialities only in suitable regions and appropriate cultural practices (Ivanov et al., 1989; Yaroslavtsev, 1979).

The objective of the study was to investigate the morphological characteristics of fruits and reproductive activities of seven raspberry cultivars grown in the Troyan region and to find the most suitable ones for these soil-climatic conditions.

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MATERIAL AND METHODS

The studies were conducted in the region of Terziysko, Troyan municipality. The following cultivars were studied: Shopska Alena, Samodiva, Balgarski Rubin, Newburg, Willamette, Meeker, Marlborough in a raspberry plantation established on a light grey forest soil at 937 m a.s.l. They are grown without irrigation on a sloping terrain with northerly exposure. The cultural practices included hoeing of row band, herbicide application and mowing of inter-row spacings.

Morphological characteristics of fruits and their size, shape and weight were studied. The investigation included their qualities, colouration and main biochemical composition: total sugars, inverted sugar, sucrose, acids, tannins, anthocyans. The total sugars were determined according to Schoorl and Regenbogen. The acid content was established titrimetrically and dry matter refractometrically. The tannins in fresh fruits were determined according to Levental-Neuburg and anthocyans by the method of Fuleki and Francis.

Dates of reaching of picking ripeness of fruits were determined. Their behaviour to the main virus diseases on raspberry was established: spur blight and grey rot.

The obtained results were analyzed and the most promising cultivars for the studied region were selected. The studies were conducted according to the Methods for studying the plant resources in fruit plants (Nedev et al., 1979).

RESULTS AND DISCUSSION

In the last decade with the global change in climate the lasting droughts during the growing season became more frequent The Central Balkan Mountain region, the region of this study, has such conditions and here in the recent past 65% of the areas were concentrated and it is one of the main raspberry-producing regions of Bulgaria.

Raspberry is a crop of moderate climate. It needs sufficient precipitations for its good development and fruit bearing. Both soil and air humidity should be higher for obtaining of large sized and good-quality fruits. Therefore its location and spread should be performed at greater altitude in mountain regions. In favourable soil-climatic conditions and sufficient precipitations the average yields from great areas in the region were from 900 to 1200 kg/da. In the last decades with the socio-economic changes having occurred in our country, as well as with the change in climate the areas were drastically reduced. The yield decreased greatly and in some years with lasting drought and high summer temperatures during the growing season the crop failed. Under drought the shoot number and growth vigour are limited and they remain with smaller height and thickness. That reflects also on the yield during the next vegetation.

The raspberry fruits are suitable for fresh consumption and are important raw materials for processing. Their demand on the home and international market is unlimited. The trends in their use are determined by both biochemical composition of fruits and their appearance, size and consistence.

In years with lasting drought during the period of ripening, the fruits remained small sized and did not reach their normal dimensions. In 2007 the rainfall during the fruit formation were extremely insufficient (28,5 l/m^2). The high summer temperatures and atmospheric droughts caused damages to leaves. The formed shoots could not reached the dimensions that are characteristic of the appropriate cultivar. The fruits remained small sized. Their weight reached 60 to 85% of that in years with sufficient rainfall. Cultivars Newburg, Willamette, Shopska Alena were lower susceptible to the unfavourable conditions. In 2008, also characterized by lasting drought and great heats in the summer months, the obtained results from raspberry growing were better. That was due to greater rainfall amount in the beginning of the year and during formation and enlargement of raspberry fruits in June - 99,1 l/m^2. The greater rainfall amount in June 2008 influenced formation of larger fruits and higher yield, as compared to 2007. The fruit weight varied from 1,50 g in Marlborough to 2,90 g in cv. Willamette. All studied cultivars in 2008 had greater weight than that measured in 2007, but they were inferior to the characteristic dimensions of the cultivars grown in favourable conditions (Table 1). In both 2007 and 2008 the dimensions of the fruits of Willamette, Newburg and Shopska Alena were closest to the characteristic ones of the cultivars. The height of the presented cultivars in 2008 varied from 14,3 mm in Marlborough to 18,7 mm in Willamette and the width from 14,6 mm in Marlborough to 16,9 mm in Shopska Alena (Table 2). The height:width ratio of raspberry fruits determines their shape. The fruits of Shopska Alena, Samodiva, Newburg, Meeker, Marlborough are rounded. The shape of the other cultivars is conical.

A great part of the raspberry fruits for processing are used for preparation of juices and nectars. The better-coloured fruits have a more attractive appearance and are in great demand. The cultivars Willamette, Balgarski Rubin and Marlborough are couloured in dark-red. The other cultivars have light red to red colouration.

In the fruit species the time of fruit ripening is a characteristic pomological trait. In the different studied raspberry cultivars the difference in the time of ripening was 11 days. The beginning of picking period during the years was directly related also to the climatic conditions, varying about 25 days.

In 2008 the beginning of the picking period of the studied raspberry cultivars was 20 June for Balgarski Rubin and Samodiva. The fruits of cv. Meeker ripened latest – 1 July. The duration of the picking period for all cultivars was about 20 days (Table 1).

The efficiency of growing of the raspberry plantations is mainly determined by the obtained yield. The quantity of raspberry fruits is determined by a great number of factors. When the region for plantation establishment is well chosen and cultural practices are suitable, the rainfall is of decisive importance. When growing under nonirrigated conditions without enough rainfall the forming raspberry fruits, as well as whole flower stalks dry up. In 2008 Samodiva, Willamette and Newburg proved to be the highest yielding. The yields in 2008 were inferior to those in favourable years, but exceeded the yield in 2007 characterized by a drought during the period of fruit formation (Table 3).

A preferred direction for processing of the raspberry fruits is their "solo" freezing. The main requirement in raspberry picking for "solo" freezing is that the fruits be normally ripe, with strong consistence. Dry matter content is of particular importance. Among the studied standard cultivars, Meeker and Marlborough had the highest content (13,70% and 12,80%, respectively) and Newburg the lowest one (9,0%) (Table 4). The content of total sugars varied from 6,10 to 9,40%. The content of inverted sugar in the raspberry fruits was higher than that of sucrose. In the studied cultivars it varied from 3,27% in Samodiva to 6,87% in Marlborough. The organic acids were lowest in Meeker – 0,96%, but the variation between the cultivars was not within particularly wide limits. The tannins had the lowest values in cv. Balgarski Rubin - 0,093%. Meeker had the highest content of anthocyans (22,34%). It was relatively high also in cultivars Willamette (20,32%) and Shopska Alena (21,29%) (Table 4).

Susceptibility of the raspberry cultivars to some of the economically important virus diseases is mainly determined by the climatic conditions and mostly by the rainfall. In long rainy periods during the critical phenological stages the crop can fail, particularly when attacked by Botrytis. Among the studied cultivars low susceptibility to spur blight and grey rot was shown by Samodiva, Meeker and Willamette. Marlborough, Shopska Alena and Balgarski Rubin were susceptible.

CONCLUSIONS

The global changes having occurred in climate, frequent droughts and uneven precipitations in the last decades limited the possible areas for efficient raspberry production. Cultivars Samodiva, Shopska Alena, Willamette promised to be more adaptable to the present conditions. They allowed obtaining yields of 583 to 781 kg/da in years with a limited amount of precipitations. In order to guarantee the crop in the contemporary conditions the raspberry plantations should be established on irrigated areas, if possible.

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Table 1

Fruit ripening and weight

№	Cultivar	Beginning of ripening	End of ripening	Fruit weight g		
				In favourable conditions (on average for 1985, 1997 and 2002)	2007	2008
1	Shopska Alena	27.06.	17.07.	3,10	2,33	2,60
2	Samodiva	20.06.	10.07.	3,42	2,22	2,60
3	Balgarski Rubin	20.06.	10.07.	2,78	1,78	2,30
4	Newburg	29.06.	18.06.	2,80	2,38	2,50
5	Willamette	23.06.	13.07.	3,12	2,27	2,90
6	Meeker	01.07.	21.07.	3,30	2,29	2,70
7	Marlborough	29.06.	19.07.	1,90	1,15	1,50

Table 2

Morphology of raspberry fruits (2008)

№	Cultivar	Dimensions mm		Shape	Colouration
		Height	Width		
1	Shopska Alena	16,1	16,9	rounded	red
2	Samodiva	17,2	15,9	rounded to conical	red
3	Balgarski Rubin	17,7	13,8	conical	Dark-red
4	Newburg	16,1	15,6	rounded	червено Light-red
5	Willamette	18,7	16,3	conical	Dark-red
6	Meeker	17,9	16,0	rounded to conical	Light-red
7	Marlborough	14,3	14,6	rounded	Dark-red

Table 3

Yield of raspberry fruits

Cultivar	Yield		
	In favourable conditions (on average for 1985, 1997 and 2002)	2007	2008
Shopska Alena	1182	260	620
Samodiva	1266	270	781
Balgarski Rubin	677	120	580
Newburg	692	230	650
Villamette	673	220	583
Meeker	614	220	541
Marlborough	520	100	320

Table 4

Chemical composition of raspberry fruits (2008)

№	Cultivar	Dry matter %	Total sugars %	Inverted sugar %	Sucrose %	Acids %	Tannins mg%	Anthocyans mg%
1	Shopska Alena	12,5	6,37	4,70	1,59	1,11	0,122	21,29
2	Samodiva	11,50	6,10	3,27	2,68	1,03	0,133	13,53
3	Balgarski Rubin	11,00	7,12	3,70	3,25	1,14	0,093	14,11
4	Newburg	9,00	6,67	5,95	0,69	0,97	0,162	16,81
5	Willamette	10,20	9,40	5,75	3,47	1,23	0,144	20,32
6	Meeker	13,70	8,22	3,70	4,29	0,96	0,184	22,34
7	Marlborough	12,80	7,45	6,87	0,54	1,08	0,194	18,63

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EVALUATION OF QUALITATIVE PERFORMANCES OF FRUIT SAMPLES FROM THE ECOLOGICAL AREA OF OLTENIA

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KEY WORDS: fruits, cultivars, quality, fruit trees and small fruits

ABSTRACT

Oltenia region is one of the most favorable for temperate fruit tree crops (apple, plum, peach, apricot, walnut, etc.) This region has numerous micro zones (fruit tree areas) with optimal ecological conditions and tradition in fruit crop growing. There is economical and social interest in achieving qualitative and commercial performances at international level in the case of fruits grown in farms. Establishing of micro zones, of valuable cultivars assortments and applying of superior techniques allow the obtaining of high yields per hectare and high quality fruits. In the case of analyzed fruits from different species and cultivars the emphasize of the quality performances from point of vue morphology, taste, heavy metals (Cd, Pb and Cu) and residues from certain pesticides (Alpha-HCH, Gamma-HCH, PCB_{52}, PCB_{28}, PCB_{180}, HCB, Heptaclor, Aldrin, Epsilon-HCH, Heptaclor-epoxyd, Beta-Endosulphan, PP'-DDE, etc). The quality elements were followed in comparison with those used in E.U. and in the international trade. The apples, plums, peaches, apricots and walnuts obtained into the fruit growing areas of Oltenia correspond from morphological point of vue because the fruit size, weight, color and uniformity are achieved when growing into fruit tree micro zones and when using quality orchard management. The taste of fruits of Oltenia is superior to similar fruits from other growing areas. The fruits from Oltenia are commercially and health conform because the heavy metal content (Cd and Pb) is way below the maximum level accepted for E.U. fruits and the pesticide residues level is under the international levels accepted or residues are not present at all (Alpha-HCH, Aldrin, Epsilon-HCH, PCB 180). Other residues can be found in very low quantities in fruits and have no influence on the consumers. In order to assure high quality fruits in Oltenia a constant and responsible monitoring is required.

INTRODUCTION

The qualitative and commercial performances of fruits from fruit tree crops are very important and depend on the zoning and or micro zoning, on the ecological valences, technological level and professional knowledge of growers. The Oltenia region, which has a relative large area of land (over 25,000 km^2) and with multiple and different relief forms and certain ecological specificity, comprises numerous micro zones with historical tradition and social and economic interests in fruit tree growing.

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Numerous authors tried to evaluate the fruit tree competitively potential for Oltenia region (Ştefănescu, 1912, 1924; Rădulescu, 1922; Botez, 1938; Bordeianu, 1934, 1944; etc). The most interesting scientific paper regarding zoning also in Oltenia it is in titled „Fruit Tree Regions in România” and was written by Constantinescu N., Bordeianu T., Sonea V. and Ioniță C. In this paper Oltenia was divided in the 1st Fruit Tree Region (the hill area) and the 9th Region (the plain area). Completion of this important study has been made by various researchers, in most cases up to the micro zoning level (Cociu et al., 1985; Botu M., 1999, Botu I. et al., 2007). Due to ecological, soil and climatic and social diversity of Oltenia this region was divided into 7 fruit tree with specific characteristics (Rm.Vâlcea, Horezu, Tg. Jiu - Câmpu Mare, Turnu Severin, Baia de Aramă, Drăgăşani, Bălceşti, Craiova hills and Bistreț - Corabia (Botu I., 2007).

The present paper aim is to evaluate the qualitative performances of cultivars grown into different micro zones and to establish in which way it is influenced the composition of fruits by different heavy metals and chemical residues.

MATERIALS AND METHODS

The biological material used in the trials organized in conformity with experimental design was formed by 25 apple cultivars (from SCDP Vâlcea, SCDH Tg. Jiu, University of Craiova), 15 plum cultivars (from SCDP Vâlcea, SCDH Tg. Jiu, University of Craiova and SCDA CCDCPN Dăbuleni), 20 peach and 15 apricot cultivars (CCDCPN Dăbuleni and University of Craiova) and 10 walnut and strawberry cultivars (from SCDP Vâlcea). In this paper were taken into account only the cultivars grown on large scale into the area. Observations and determinations on plants were the specific ones, also specific quality issues of fruits were taken into account. Analysis were carried out on fruits in order to determine the presence of heavy metals with repercussions on quality (cadmium, lead, mercury and copper), besides of substances considered very dangerous by the Romanian legislation and E.U. directives (α-HCH, γ-HCH, PCB_{52}, PCB_{28}, PCB_{180}, HCB, Heptaclor, Aldrin, ε-HCH). Chemical analysis was performed in the laboratory from Polytechnic University in Bucharest (2006 - 2008 period).

RESULTS AND DISCUSSION

The ecological conditions of the Oltenia region are very different from one micro zone to another (average annual temperature is 8 -11°C; absolute minimum temperatures from -15°C to -30°C ; 450 - 800 mm annual rainfall; very different soil types, etc) and for this reason the temperate fruit crops behave different. As consequence, 7 micro zones (fruit tree areas) were established. Main fruit crops in this region are: plum, apple, peach, apricot, walnut and strawberry. Evaluation of main cultivars in the orchard of the region has been taken into consideration having the aim to increase the productive potential, fruit quality and to assure healthy consumption of fruits. Apple is an important crop in the fruit tree areas of Rm.Vâlcea, Horezu, Drobeta Turnu Severin - Baia de Aramă and Craiova hills. After evaluation of the main apple cultivars (Table 1) resulted that the productive potential is quite good (17.1 - 19.4 t/ha) with possibilities to substantially increase it through improving of orchard management. The most productive apple cultivars proved to be: ‘Florina‘, ‘Generos’, ‘Idared’.

Fruit quality is dependent on size (equatorial diameter over 60 mm), weight, intensity of fruit skin color, uniformity, etc. Most of fruits studied have the size that allows them to be marketable on every market. Exceptions are the fruits of ‘Golden Delicious’, ‘Jonathan’ and sometimes ‘Starkrimson’. When adequate technology is applied in the orchards (including irrigation) these cultivars produce superior quality fruits. In the case of apples a stronger intensity of fruit skin color can be observed at fruit from hill areas. Also, the micro zones from Oltenia region have a good influence on apple taste which is harmonious and pleasant. Plum is the major fruit tree crop in Oltenia. The productive potential when average technology is applied and without irrigation is over 16.7 t/ha in the orchards from hill areas and 12.5 t/ha in the sandy soil areas.

The fruits of plum cultivars have very good quality. Fruits of cultivars for fresh consumption have adequate size, weight (over 40 g) and taste, all of those fulfilling the requirements for international trade. Cultivars for drying like 'Agen 707', 'Andreea' and partially 'Anna Späth' provide the best quality prunes (with 22 - 24% dry matter content). Oltenia region was famous for the quality of plums and prunes for export mainly to Germany, Austria, Czech Republic, etc.

Peach and apricot find most favorable ecological conditions in the central and southern areas of the Oltenia region (Table 3). Peach cultivars grown in the sandy area of Dăbuleni and in the Craiova hill area produce profitable yields (15.6-19.4 t/ha) of very good quality fruits. The size and weight of the fruits fulfill the requirements of international markets. Walnut finds very favorable growth and yielding conditions in the northern area of Oltenia. The yields in the walnut orchards in the 7^{th} to 9^{th} leaf vary between 2.2 to 2.9 t/ha. The most productive cultivars are 'Jupâneşti' and 'Valcor'. Average fruit size overpasses the 1^{st} Class and Extra categories. In order to achieve yields of very good quality fruits it is necessary to irrigate the orchards in the southern part of Oltenia. The numerous chemical analyses carried out for various fruits compare the results with the maximum levels allowed in E.U. (Table 4). The content of heavy metals (cadmium, lead and copper) and pesticides with influence on human health (Alpha-HCH, Gamma-HCH, PCB -Hepta Chlorine Biphenyl, PCB_{28}, Beta Endosulphan, etc). Cadmium (Cd), lead (Pb), mercury (Hg) and selenium (Se) are tracked with priority because these heavy metals are the indicators of the pollution of environment. The lead and cadmium levels recorded for all species and cultivars analyzed were below the accepted levels in E.U. Also, the pesticide residues for analyzed fruits from Oltenia are lower than the maximum level accepted in E.U. In many cases of fruits the residues were not present; in some situations traces of them were detected. The doses were estimated as ng/l and can be considered as "equipment errors" or "interpretation errors". Those analyses will be repeated in order to elucidate these traces.

CONCLUSIONS

The following conclusions are to be mentioned after analyzing the fruits from different fruit tree areas of Oltenia:

- The fruits are of good quality for all the studied fruit crops when modern orchard techniques are applied and orchards are situated in the favorable micro zones;
- Fruits from Oltenia have superior taste comparative with those of the same cultivars from different areas of the world;
- The level of heavy metals (Cd and Pb) in fruits is under the maximum level admitted for trade and consumption in E.U.;
- The pesticide residue content of fruits is in accordance with the international regulations which makes the fruits obtained into the fruit tree areas of Oltenia to be of good quality and healthy for human consumption;
- Monitoring of fruit quality in Oltenia region and in Romania is constant, of great interest and responsibility having in view the growers and consumers interests for fresh fruits.

Table 1

Behavior of apple cultivars in different fruit tree growing areas from Oltenia

Fruit crop	Cultivar	Rm.Vâlcea				Horezu				Craiova hills			
		Averge yield (t/ha)	Fruits with diameter >60mm (%)	Average fruit weight (g)	Intensity of fruit skin coloration	Average yield (t/ha)	Fruits with diameter >60mm (%)	Average fruit weight (g)	Intensity of fruit skin coloration	Average yield (t/ha)	Fruits with diameter >60mm (%)	Average fruit weight (g)	Intensity of fruit skin coloration
Apple	'Florina'	28.3	79	182	very good	21.4	81	192	very good	19.7	74	174	good
	'Generos'	20.3	92	185	good	18.1	93	180	very good	18.7	89	170	light
	'Idared'	18.7	83	185	very good	18.5	90	207	very good	17.2	81	186	good
	'Golden Delicious'	18.0	24	168	good	13.7	31	176	good	16.4	33	166	good
	'Starkrimson'	15.3	42	179	very good	10.8	44	184	very good	15.7	45	172	good
	'Jonagold'	19.6	93	196	very good	18.3	94	188	very good	17.9	91	192	light
	'Jonathan'	15.6	35	153	very good	16.4	39	140	very good	14.2	40	144	light
	Mean	19.4	-	-		*16.7*	-	-		*17.1*	-	-	

Table 2

Behavior of plum and prune cultivars in different fruit tree growing areas from Oltenia

Fruit crop	Cultivar	Rm.Vâlcea			Tg. Jiu			Craiova hills			Dăbuleni		
		Average yield (t/ha)	Fruit size (mm)	Average fruit weight (g)	Average yield (t/ha)	Fruit size (mm)	Average fruit weight (g)	Average yield (t/ha)	Fruit size (mm)	Average fruit weight (g)	Average yield (t/ha)	Fruit size (mm)	Average fruit weight (g)
Plum and prune	'Centenar'	24.6	40.9	41.7	20.6	38.6	39.0	18.4	40.2	40.5	15.7	38.1	38.5
	'Tita'	15.2	41.7	41.7	-	-	-	-	-	-	-	-	-
	'Carpatin'	13.0	42.0	42.9	15.2	41.7	41.2	16.6	41.4	42.2	-	-	-
	'Silvia'	15.3	41.9	44.2	16.4	40.3	43.1	16.9	42.1	43.6	12.1	39.6	42.7
	'Tuleu gras'	15.6	36.2	29.6	16.1	35.4	30.3	14.8	35.7	29.6	13.5	35.4	30.1
	'Agen 707'	13.9	33.4	22.6	12.8	32.5	24.7	14.1	32.2	24.1	13.8	30.6	23.6
	'Stanley'	20.8	40.4	38.0	22.7	41,7	39.6	21.6	40.2	40.1	17.9	41.6	39.3
	'Andreea'	19.5	40.1	38.5	-	-	-	-	-	-	-	-	-

	'Anna Späth'	12.4	40.0	42.2	14.7	42.1	44.0	15.6	42.6	45.0	14.3	42.4	45.1
	Mean	*16.7*	-	-	*16.9*		-	*16.9*	-	-	*12.5*	-	-

Table 3

Behavior of peach, apricot and walnut cultivars in different fruit tree growing areas from Oltenia

Fruit crop	Cultivar	Rm.Vâlcea			Craiova hills			Dăbuleni		
		Average yield (t/ha)	Fruit size (mm)	Average fruit weight (g)	Average yield (t/ha)	Fruit size (mm)	Average fruit weight (g)	Average yield (t/ha)	Fruit size (mm)	Average fruit weight (g)
Peach	'Redhaven'	-	-	-	18.4	65.7	165	15.7	69.1	173
	'Superbă de toamnă'	-	-	-	17.2	68.3	205	18.4	72.3	236
	'Springold'	-	-	-	16.1	52.6	86	15.6	55.7	94
	'Romamer 2'	-	-	-	15.7	54.0	75	16.8	54.2	78
	'NJC 105'	-	-	-	17.5	66.7	140	19.4	68.7	160
Apricot	'Litoral'	-	-	-	-	-	-	16.4	44.6	53.3
	'Olimp'	-	-	-	-	-	-	15.3	46.0	66.7
	'Sirena'	-	-	-	11.8	37.1	25.0	12.7	39.6	26.7
	'Mamaia'	-	-	-	10.4	36.7	50.7	11.8	41.6	53.3
	'Umberto'	-	-	-	11.0	34.1	24.7	12.4	35.3	26.7
Walnut	'Jupâneşti'	2.7	31.2	11.8	-	-	-	-	-	
	'Valcor'	2.9	35.3	15.0	-	-	-	-	-	-
	'Mihaela'	2.4	33.4	12.3	-	-	-	-	-	-
	'Roxana'	2.6	33.3	16.9	-	-	-	-	-	-
	'Franquette'	2.2	36.8	12.6	-	-	-	-	-	-

Table 4

Comparison of the maximum levels admitted for pesticide residues and heavy metals in the fresh fruit samples from Oltenia (E.U. 90/642/CE and 86/3362/EEC Directives)

Fresh fruits	Specificare	Heavy metals (mg/100g of fresh fruits)				Pesticides (mg/100g of fresh fruits)												
		Cadmium	Lead	Mercury	Copper	Alpha-HCH	Gamma-HCH	PCB_{28}	Hepta Chlorine	PCB_{52}	Aldrin	Epsilon-HCH	Hepta chlorine epoxyd	Beta-Endo sulphan	PP'-DDE	PCB_{180}	124 Trichlorine Benzene	HCB
Apples	Level admitted in E.U.	0.05	0.05	0.05	5.0	0	0	0	0.01	0	0	0	0.01	0.3	0.05	0	0	0
	Detected	0.014-	0.2-	-	-	non-	0.0001	0.0011	0.0003	0.0006	-	-	0.0001	-	0.0168	-	0.0015	0,0018

	in Oltenia	0.005	0.06			detected												
Plums and prunes	Level admitted in E.U.	0.05	0.5	0.05	5.0	0	0	0	0.01	0	0	0	0.01	0.05	0.05	0	0	
	Detected in Oltenia	0	0	-	0.2-0.8	non-detected	traces	traces	non-detected	traces	non-detected	non-detected	traces	traces	non-detected	traces	non-detected	non-detected
Peaches	Level admitted in E.U.	0.05	0.05	0.05	5.0	0	0	0	0.01	0	0	0	0.01	0.05	0.05	0	0	0
	Detected in Oltenia	0	0.01	-	-	non-detected	traces	traces	-	0	-	-	traces	-	-	-	non-detected	non-detected
Apricots	Level admitted in E.U.	0.05	0.5	0.05	5.0	0	0	0	0.01	0	0	0	0.01	0.05	0.05	0	0	0
	Detected in Oltenia	0	0.04	-	-	non-detected	traces	traces	-	0	-	-	traces	-	-	-	non-detected	non-detected
Walnuts	Level admitted in E.U.	0.05	0.5	0.05	5.0	0	0	0	0.01	0	0	0	0.01	0.01	0.05	0	0	0
	Detected in Oltenia	0	0.06	-	-	non-detected	0.0003	0.0007	-	0.0011	-	-	0.0004	0.0003	-	-	-	0,0004
Strawberries	Level admitted in E.U.	0.05	0.5	0.05	5.0	0	0	0	0.01	0	0	0	0.01	0.05	0.05	0	0	0
	Detected in Oltenia	0.016-0.040	0.06-0.038	-	3.2-4.5	non-detected	traces	traces	non-detected	traces	non-detected	non-detected	traces	non-detected	non-detected	non-detected	non-detected	non-detected

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A NEW INTENSIVE PLUM CULTURE SYSTEM WITH MULTIPLE ECONOMICAL AND PRODUCTION ADVANTAGES

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KEY WORDS: plum, intensive culture, cultivars, fruit trees

ABSTRACT

The European plum culture (Prunus domestica) passes a critical period on world scale due to the low production level and fruit quality. The general tendency is to find technological elements and valuable new plum cultivars with commercial perspectives. During the 2004 – 2008 period new culture systems with technological and biological elements (plum cultivars, rootstocks, planting distances, summer pruning) have been tried. The planting distances used were 5.0 by 4.0 m (500 trees/ha) and 4.0 by 2.0 m (1250 trees/ha). Pruning in the orchard has been carried out during early spring and summer (beginning of June). The biological material used consisted in 5 plum cultivars ('Andreea', 'Centenar', 'Minerva', 'Tuleu gras' and 'Stanley') budded on 2 rootstocks ('Oteşani 8' and 'Mirobolan galben'). After 5 years from planting it was observed that cultivars budded on 'Oteşani 8' rootstock achieve 30% lower vigor (from point of vue trunk-cross sectional area) then those budded on 'Mirobolan galben'. Summer pruning of one year old wood (shoots were cut at 5 leaves at beginning of June) assured the coming into bearing fruits in the 3^rd^ leaf, especially for trees budded on 'Oteşani 8' and a cumulative yield (3^rd^ to 5^th^ leaf) of 38.7 t/ha and 20.4 t/ha respectively for plum trees budded on 'Mirobolan galben'. The average fruit yield was 12.9 t/ha in the case of trees on 'Oteşani 8' and 6.8 t/ha for plum trees on 'Mirobolan galben'. Comparative with the intensive system without summer pruning, the new growing system yields 14.1 and 7.1 t/ha respectively. Fruit quality in the case of the 2 systems is good and there is no difference between them. When over crop occurs, fruit thinning is required, in this manner small fruits and branch breaking are avoided. The intensive culture system for plum completed with summer pruning has multiple advantages and can be used in all types of plum orchards, no matter the size of those.

INTRODUCTION

Plum culture in România has an historic tradition and economical and social implications. In the last 2 decades, the European plum culture (*Prunus domestica*) faces a critical period al world level due to relative low production, fruit quality and consumers demands.

Numerous studies carried out in Romania and abroad emphasized the factors that lead to this situation and solutions for solving it (Cociu V., Botu I., Minoiu N., Pasc I., Modoran I., 1997; Coman Şt., 1962; Ghena N. and Branişte N., 2003; Botu I. and Botu M, 2003; Vangdal E., et al., 2007; Liu W., 2007, etc).

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The aims followed in main European plum growing countries (Romania, Serbia, Hungary, Germany, Bulgaria, Italy, Poland, etc) are: increasing the yield per hectare, improving the fruit quality and the crop efficiency. Main trends in plum culture are obtaining fruits for fresh consumption and for drying. The interest for using plums for distilling (for "ţuică") diminished significantly in the last years.

This paper has the aim of modernizing the plum culture in Romania and especially in the Oltenia region through increasing productivity, improving fruit quality and increasing the profit per hectare using some new biological and technological factors.

MATERIALS AND METHODS

The study was carried out at SCDP Vâlcea during 2004-2008 period. The plum trees in the trial are in the 5th leaf after planting. The experiment was designed as randomized block type, with 5 replications and 6 trees per plot.

The biological material used includes new and old cultivars grown in Oltenia and Romanian rootstocks:

a) plum cultivars: 'Andreea', 'Centenar', 'Tuleu gras', 'Minerva' and 'Stanley'.

b) plum rootstocks: 'Oteşani 8' and 'Mirobolan galben' (Yellow Myrobalan).

Planting distances were also studied in this trial:

a) 4.0 x 2.0 m (1250 trees/ha);

b) 5.0 x 4.0 m (500 trees/ha).

Starting with the 2nd leaf after planting, summer pruning was carried out at the beginning of June, when shoots had 30-40 cm long. All shoots were pinched at 5 leaves (reduction of 2/3 of the shoot length) every year.

Other technical works in the trial were in conformity with the classical plum orchard management. Observations and determinations referred to growth and fruiting of plum trees.

RESULTS AND DISCUSSION

In the hill area of Oltenia the European plum cultivars have normal behavior in the growth and bearing fruits processes due to the favorable climatic conditions (annual average temperature of 10.2°C, absolute minimum temperatures between -20°C to -27°C and 715 mm annual rainfall).

Yield level and fruit quality are heavily influenced by the soil conditions, orchard management and cultivars used.

The behavior of 5 European plum cultivars grafted on 2 rootstocks and planted at different distances were studied having in view the increasing of productivity and fruit quality, improving the trees precocity of bearing fruits.

After the first 5 years after planting the trees have trunk-cross sectional areas between 22.2 cm^2 ('Minerva' / 'Oteşani 8') and 41.0 cm^2('Andreea' / 'Mirobolan galben').

The plum cultivars grafted on 'Oteşani 8' achieve 23.8 cm^2 trunk-cross sectional area, which is 31,3% less comparative with those grafted on 'Mirobolan galben', which have 34,6 cm^2. The difference between the rootstocks is statistically positive significant.

Crown volume varies from 8.5 m^3 ('Andreea') to 11.0 m^3 ('Stanley') for the plum cultivars grafted on 'Oteşani 8' and from 24.9 m^3 ('Andreea') to 31.1 m^3 ('Stanley') at those on 'Mirobolan galben'.

The vigor and habitus of plum cultivars grafted on ‘Mirobolan galben’ are larger then ‘Oteşani 8’ was used as rootstock.

Study carried out on trees effective spaces occupied per hectare show that there are almost equal values for cultivars grafted on ‘Oteşani 8’ (4115 m^2/ha) and those on ‘Mirobolan galben’ (4394 m^2/ha). Same situation is due to higher density and lower vigor at grafted plum trees on ‘Oteşani 8’ (1250 trees/ha) comparative with ‘Mirobolan galben’, where densities are lower (500 trees/ha) and the vigor is higher.

Coming into bearing of trees in the 3rd leaf after planting was influenced by summer pinching carried out every June, cultivars and rootstocks (Table 2). Cultivars grafted on ‘Oteşani 8’ yielded 1.4 t/ha fruits in 3rd leaf and those grafted on ‘Mirobolan galben’ only 0,3 t/ha.

In the first 3 yielding years (3rd to 5th leaf) the cumulative yield of plums was in average 38.7 t/ha, and the annual mean of 12.9 t/ha for cultivars grafted on ‘Oteşani 8’ and 20.4 t/ha, respectively 6.8 t/ha for those grafted on ‘Mirobolan galben’ rootstock. ‘Stanley’, ‘Andreea’ and ‘Centenar’ plum cultivars proved to be the most productive on both rootstocks.

Lower yields were recorded for ‘Tuleu gras’ and ‘Minerva’ grafted on both rootstocks.

Plum yields increased progressively from 3rd leaf (1.4 t/ha) to 5th leaf (27.3 t/ha) when ‘Oteşani 8’ was used as rootstock and from 3rd leaf (0.3 t/ha) to 5th leaf (14.7 t/ha) for ‘Mirobolan galben’.

If the yields are analyzed when ‘Oteşani 8’ rootstock was used for all cultivars studied, with and without summer pinching, it is obvious that yields are larger where pinching was carried out (12.9 t/ha) then without pinching (8.2 t/ha) (Table 3). Same situation is for ‘Mirobolan galben’ (10.2 t/ha comparative with 6.7 t/ha).

Summer pruning is bringing a 3-year cumulative increase of 14.1 t/ha when ‘Oteşani 8’ was used and 7.1 t/ha for ‘Mirobolan galben’. For this reason, the new system is bringing a substantial profit comparative with the classical intensive system.

Fruit quality obtained in the two culture systems is very good and does not differ. (Table 4). Average fruit weight, average stone weight and flesh ratio for same cultivar have close values no matter the rootstock used. When over cropping occurs it is necessary to supply more water through irrigation and to apply fruit thinning, in this way small fruits and branch breaking are avoided. In the case of the plum cultivar ‘Andreea’, over cropping induces 10-15% decrease in fruit size and up to 20% less dry matter.

The modified plum culture system has multiple technical and economical advantages and can be relatively easy achieved and used in commercial farms, no matter of their size. Very good results can be obtained only when the technology is strictly followed and the biological material is of very good quality.

CONCLUSIONS

The new intensive culture system for plum can be applied in small or large orchards, with the condition of respecting the specific biological and technological condition.

Plum trees grown in this system are precocious (bear fruits in the 3rd leaf after planting).

Fruit yield of plum cultivars in the first 3 production years is 38.7 t/ha (annual mean of 12.9 t/ha) when ‘Oteşani 8’ is used as rootstock and 20.4 t/ha (annual mean of 6.8 t/ha) in the case of ‘Mirobolan galben’.

Fruit quality obtained in this system is similar to that from classical intensive culture with the condition of irrigation and fruit thinning in the years with over cropping.

The new culture system for plum brings economical advantages and increases the profitability of this fruit crop as result of high yields of quality fruits.

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Table 1

Behavior of some plum cultivars grafted on 2 rootstocks and in different growing systems (5th leaf)

Nr. Crt.	Cultivar	Rootstock	Trunk-cross sectional area cm^2	Dif. ±	Significance	Crown diameter (m)	Tree height (m)	Crown volume (m^3)	Crown canopy /ha (m^2/ha)
1	'Stanley'	'Oteşani 8'	24.6	Control	-	2.20	3.40	11.0	4317
2	'Andreea'	'Oteşani 8'	28.8	+4.2	**	2.00	3.20	8.5	3925
3	'Tuleu gras'	'Oteşani 8'	23.3	-1.3		2.00	3.25	8.6	3925
4	'Centenar'	'Oteşani 8'	20.3	-4.3	ooo	2.05	3.35	9.3	4083
5	'Minerva'	'Oteşani 8'	22.2	-2.4	-	2.10	3.30	9.7	4327
		Mean	23.8	-	-	2.07	3.30	9.4	4115
1	'Stanley'	'Mirobolan galben'	36.4	+11.8	***	3.45	3.85	31.1	4645
2	'Andreea'	'Mirobolan galben'	41.0	+ 16.4	***	3.20	3.60	24.9	4019
3	'Tuleu gras'	'Mirobolan galben'	33.4	+8.8	***	3.25	3.75	26.8	4120
4	'Centenar'	'Mirobolan galben'	30.1	+5.5	**	3.50	3.60	29.8	4808
5	'Minerva'	'Mirobolan galben'	31.7	+7.1	***	3.35	3.65	27.8	4378
		Mean	34.6	+10.8	*			28.1	4394

Cultivars comparison: LSD 5.0% = 3.12 cm^2 LSD 1.0% = 4.19 LSD 0.1% = 5.53
Mean Comparison cultivars/rootstocks: LSD 5.0% = 9.04cm LSD 1.0% = 14.18 LSD 0.1% = 24.14

Table 2

Fruit yield of several plum cultivars grafted on 2 rootstocks (3rd to 5th leaf from planting) and grown under intensive modified system

No.	Cultivar	'Oteşani 8' rootstock					'Mirobolan galben' rootstock				
		Yield (t/ha)					Yield (t/ha)				
		3rd leaf	4th leaf	5th leaf	$\sum_{3-5}$	Mean	3rd leaf	4th leaf	5th leaf	$\sum_{3-5}$	Mean
1	'Stanley'	1.5	11.0	30.3	42.8	14.3	0.5	6.2	16.7	23.4	7.8
2	'Andreea'	1.6	10.2	31.5	43.3	14.4	0.4	4.8	14.5	19.7	6.6
3	'Tuleu gras'	0.8	7.3	20.5	28.6	9.5	0.2	3.6	11.2	15.0	5.0
4	'Centenar'	1.9	12.7	29.9	44.5	14.8	0.2	7.7	17.2	25.0	8.4
5	'Minerva'	1.3	8.7	24.2	34.2	11.4	0.2	4.5	14.1	18.8	6.3
	Cultivar mean	1.4	10.0	27.3	38.7	-	0.3	5.4	14.7	20.4	-
	Rootstock mean					12.9					6.8

Table 3

Way of achieving fruit yield depending on plum culture system (t/ha)

Rootstock	'Oteşani 8'								'Mirobolan galben'							
Culture system	Intensive (4 by 2 m)				Modified (4 by 2 m)				Intensive (5 by 4 m)				Modified (5 by 4 m)			
Year	3rd	4th	5th	Sum	3rd	4th	5th	Sum	3rd	4th	5th	Sum	3rd	4th	5th	Sum
Cultivar mean yield	0.3	4.9	19.4	24.6	1.4	10.0	27.3	38.7	-	3.5	9.8	13.3	0.3	5.4	14.7	20.4
3-year mean	-	-	-	8.2	-	-	-	12.9	-	-	-	6.7	-	-	-	10.2

Table 4

Fruit characteristics depending on plum cultivar, rootstocks and culture systems

No.	Cultivar	Rootstock	Fruit size index (mm)	Average fruit weight (g)	Average stone weight (g)	Fruit flesh efficiency (%)	Extra and 1st grades fruit quality percentage (%)
1	'Stanley'	'Oteşani 8'	37.6	34.5	1.9	94.5	85
2	'Andreea'	'Oteşani 8'	38.4	39.5	1.5	96.2	84
3	'Tuleu gras'	'Oteşani 8'	37.9	34.8	1.3	96.3	67
4	'Centenar'	'Oteşani 8'	37.2	40.5	1.5	96.3	88
5	'Minerva'	'Oteşani 8'	36.2	34.7	1.2	96.6	72
1	'Stanley'	'Mirobolan galben'	38.2	37.1	1.9	94.9	87
2	'Andreea'	'Mirobolan galben'	42.3	43.5	1.9	95.7	86
3	'Tuleu gras'	'Mirobolan galben'	36.9	33.9	1.4	95.9	67
4	'Centenar'	'Mirobolan galben'	38.8	37.7	1.8	95.2	87
5	'Minerva'	'Mirobolan galben'	36.7	35.5	1.2	96.6	73

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THE DISTRIBUTION AND THE INCIDENCE OF THE PLUM POX VIRUS ON THE PLUM TREES IN THE SOUTH CARPATHIAN AREAS OF ROMANIA

Silvia Preda[1], Maria Isac[2], Silvia Poenaru[1]

KEY WORDS: Plum Pox, plum, virus

ABSTRACT

Plum Pox virus (PPV) is the most detrimental virus of plum trees because of its increasing virulence and of its possibilities of quick propagation and spreading. Among PPV biggest viral effects we note : the decreasing of the production and of the fruits size, the depreciation of the taste qualities and the generally debility of the trees. Through researches carried out during 10 years and from the laboratory analyses on the viral srains PPV-M, PPV-D si PPV- Rec resulted that the Plum Pox virus (PPV) was present in the majority of the plum orchards in the south carpathian areas of Romania.

Regarding the infection with PPV in natural and isolate conditions over 63 plum cultivars and rootstocks were investigated. From these evaluations resulted that the cultivars Andreea, Scolduş – 1, Mirabelle de Nancy, Vânăt românesc – 4 si Miroval were not infected, the cultivars Centenar, Valor, Diana, Dâmboviţa, Gras românesc, Tuleu timpuriu si Minerva showed PPV symptoms on the leaves and the cultivars Carpatin, Vâlcean, Agen 110, Record, Călugăreşti T2, Troianu 9 showed no symptoms on the fruits. The biological and the serological tests showed quickly and precisely the presence of the PPV on the infected biological material. For the propagation of the plum material free of PPV, in Romania, it is necessary to control the sanitary state of the trees from the mother plantations and from the nurseries.

INTRODUCTION

The Romanian pomiculture patrimony is made up of approximately 205000 ha of plantations, out of which the stony species occupy a surface of 118000 ha. (57%), and the plum is in the first place, with 56 640 ha (48 % of the stony group). In the South Carpathian areas of Romania, the plum tree may be found on a surface of 21 000 ha (37% of the plum tree surface), reason for which this area was selected for study figure 1).

The Plum pox virus (PPV) has been signaled in Romania since 1922, but its precise identification was made in 1941, by Tr. Săvulescu and his collaborators. Today PPV is spread in the culture areas of Prunus type, especially for Prunus domestica, causing major production damages regarding the fruit quality and quantity.

A series of curative and preventive measures were adopted in view of limiting the PPV attack through periodical controls in the areas where the plum tree is present on large surfaces.

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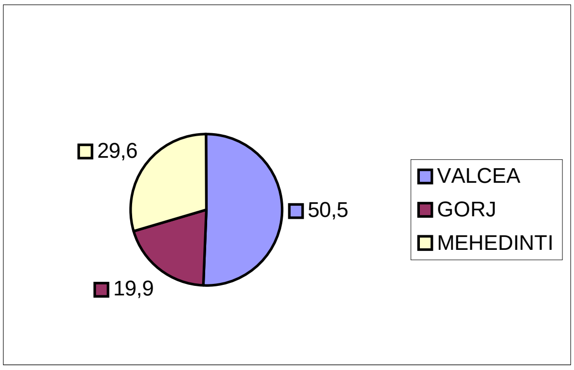

Fig. 1. Surface of plum trees in the South Carpathian areas of Romania

In the research program regarding the spreading of PPV virus in Romania, there are evaluations relating to: spreading in certain areas, most attacked species and varieties, presence of different strains.

During 2005 – 2008, the team of the Research and Production Station in Pomiculture has included in a study the South Carpathian areas of Romania, that are the regions Vâlcea, Mehedinți and Gorj.

These studies were necessary because urgent phytosanitary measures are required in view of limiting the attack of this virus at the plum tree species. The virus frequency is directly connected to the vegetation period, the sensitivity of the cultivated varieties and the presence of the vectors.

MATERIAL AND WORK METHODS

The most spread varieties in the three areas that were taken as biological material are : Tuleu gras, Stanley, Agen 707, Anna Spath, Centenar, Vânăt românesc, Tuleu timpuriu. In parallel, all existing varieties and biotypes existing in the collection of Valcea Research Center for Pomiculture (63 biotypes – present in natural conditions, but also in isolation conditions) have been studied.

For isolating the two strains of PPV, – M and – D, the G.F. 305 plants have been used (figure 2) as a witness in the analysis made.

The samples collected during the vegetation period were analyzed both serologically, with polyclonal and monoclonal antibodies (M, D), and moleculary (primers M and D). As work protocol, there have been used the one recommended by Mariano Cambra in the paper entitled „ Protocol for the diagnosis of quarantine organism ”

Fig. 2. Strain M and Strain D

RESULTS

Following the serological test undertaken with polyclonal antibodies in the first stage and with monoclonal ones in the second stage, the presence of the two strains of the Plum pox virus (M and D) was ascertained. For the samples where both strains were identified, molecular tests were undertaken too, which confirmed the results of the serological test. By analyzing table 1, one may observe the presence of this virus in all South Carpathian areas of Romania at various frequencies, depending on the sensitivity of varieties in these areas.

Table 1

Results of serological test for the varieties included in the study

No.	Variety / area		No. of samples tested	No. of samples infected						Observations
				total	%	Stem D	%	Stem M	%	
1	Tuleu Gras	Vâlcea	12	3	25	2	16,6	1	8,4	Strong attack on leaves and medium on fruits.
		Gorj	8	3	37,5	3	37,5	-	-	
		Mehedinți	8	4	50	3	37,5	1	12,5	
2	Stanley	Vâlcea	12	2	16,6	2	16,6	-	-	Week attack on leaves and medium on fruits.
		Gorj	6	2	33,3	2	33,3	-	-	
		Mehedinți	5	2	40	2	40	-	-	
3	Agen 707	Vâlcea	9	2	22,2	2	22,2	-	-	Strong attack on leaves and medium on fruits.
		Gorj	6	2	33,3	2	33,3	-	-	
		Mehedinți	4	1	25	1	25	-	-	
4	Anna Spath	Vâlcea	10	3	30	2	20	1	10	Week attack on fruits and medium on leaves.
		Gorj	8	3	37,5	3	37,5	-	-	
		Mehedinți	8	3	37,5	2	25	1	12,5	
		Vâlcea	10	1	10	1	10	-	-	Week attack

5	Centenar	Gorj	5	2	40	2	40	-	-	on fruits and medium on leaves.
		Mehedinți	5	2	40	2	40	-	-	
6	Vânăt Românesc	Vâlcea	9	3	33,3	3	33,3	-	-	Strong attack on leaves and fruits.
		Gorj	10	5	50	4	40	1	10	
7	Tuleu Timpuriu	Vâlcea	12	1	8,3	1	8,3	-	-	Medium attack on leaves and fruits.
		Gorj	6	2	33,3	2	33,3	-	-	
		Mehedinți	6	2	33,3	2	33,3	-	-	
	Total /area	Vâlcea	74	15	20,2	13	17,51	2	2,69	-
		Gorj	49	19	38,7	18	36,66	1	2,04	
		Mehedinți	36	16	44,4	14	38,85	2	5,55	
	Grand total		189	50	31,4	45	46,86	5	3,14	

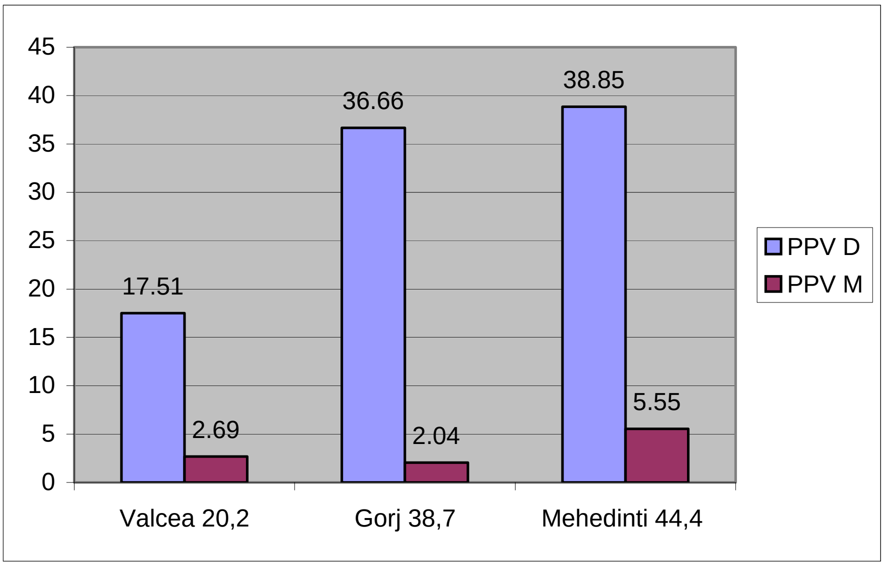

Fig. 3. Repartition of Plum Pox virus in the sub Carpathian area of Oltenia

In Valcea region it occurred at lower frequency – 20.2%, as compared to 44.4% plum trees attacked in Gorj region (figure 3). This is due to the fact that Vânăt românesc variety, one of the most sensitive varieties, was cultivated in Gorj region for a long period. Clone 4 is among the clones tracked down as being tolerant, but it does not correspond as to productivity.

At Valcea Research and Development Station for Pomiculture there is a national collection of varieties and port-grafts (table 2), in natural and isolate conditions, for the use of biological material in setting up mother plantations producing graft branches. From table 2, one may notice that only Centenar variety has been re-infected over time. Some form of resistance was shown by Andreea variety, which did not present symptoms of PPV neither in natural, nor in isolate conditions. Also the port – grafts Troianu 9, Călugărești T2 and varieties of Valor, Dâmbovița, Gras românesc, Tuleu timpuriu, Vâlcean and Record have been found infected in field conditions.

Table 2

Presence of PPV virus at the biotypes from Valcea

ELISA test for the detection of PPV virus at Plum tree					
No.	Biotype	Place of sampling	ELISA Value		Significance (+/-)
			At 30 min.	At 1 hour	
1	V. Românesc –d.4	Bio-depositary 2	0,454	0,481	-
2	Pescăruş – 37 R.P.	Bio-depositary 2	0,457	0,492	-
3	Stanley – Cl. 10	Bio-depositary 2	0,463	0,491	-
4	Anna Spath R.P.	Bio-depositary 2	0,489	0,546	-
5	H.-74-17-83-MUTAȚIE	C Culture	0,465	0,495	-
6	Rivers – DEV.	Bio-depositary 2	0,449	0,475	-
7	Sâmbăta-1-R.P.	Bio-depositary 2	0,481	0,509	-
8	T.Gras – Cl. 5/Mirob.	Bio-depositary 2	0,435	0,464	-
9	Stanley R.P.	Bio-depositary 1	0,443	0,470	-
10	Miroval R.P.	Bio-depositary 2	0,490	0,539	-
11	Silvia R.P.	Bio-depositary 2	0,440	0,462	-
12	Agen – Cl. 25/Mirob.	Bio-depositary 2	0,477	0,503	-
13	R. de Caransebeş – R.P.	Bio-depositary 2	0,427	0,448	-
14	V. Românesc R.P.	Bio-depositary 2	0,460	0,477	-
15	Sarmatic R.P.	Bio-depositary 2	0,447	0,474	-
16	Minerva/ C.	Bio-depositary 2	0,428	0,450	-
17	Diana–50/Mirob.–DEV.	Bio-depositary 2	0,455	0,475	-
18	Minerva–17/Mirob.-DEV.	Bio-depositary 2	0,452	0,482	-
19	Agen-10	Bio-depositary 2	0,435	0,463	-
20	C.P.C.-R.P.-Piteşti	Bio-depositary 2	0,415	0,434	-
21	TITA-Cl. 1-R.P.	Bio-depositary 2	0,432	0,457	-
22	Agen 48/Mirob.-DEV.	Bio-depositary 2	0,423	0,443	-
23	T.Gras-R.P.	Bio-depositary 2	0,442	0,461	-
24	Ialomița-R.P	Bio-depositary 2	0,449	0,472	-
25	9/24 - Piteşti	Bio-depositary 1	0,432	0,454	-
26	T. Timpuriu-Cl. 30/Mirob.	Bio-depositary 2	0,431	0,447	-
27	Centenar/mirob.-DEV.	Bio-depositary 1	0,434	0,457	-
28	Mirob. BN. 4 KR/C.-DEV.	Bio-depositary 1	0,432	0,453	-
29	Anna Spath/Mirob-DEV.	Bio-depositary 1	0,441	0,461	-
30	Pescăruş-Cl. 37-DEV.	Bio-depositary 1	0,461	0,485	-
31	T. Gras-R.P	Bio-depositary 1	0,461	0,487	-
32	Anna Spath/Mirob.-DEV.	Bio-depositary 1	0,469	0,492	-
33	Silvia-Cl. 35-DEV.	Bio-depositary 1	0,455	0,474	-
34	Silvia/Mirob.-DEV.	Bio-depositary 1	0,469	0,492	-
35	Ialomița/Mirob.-DEV.	Bio-depositary 2	0,469	0,488	-
36	Carpatin/Mirob-DEV.	Bio-depositary 1	0,455	0,477	-

37	Stanley-Cl. 40/C.	Bio-depositary 1	0,459	0,483	-
38	Centenar-Cl. 15/C.	Bio-depositary 1	0,433	0,455	-
39	Centenar/Mirob.-DEV.	Bio-depositary 1	0,778	1,028	+
40	Andreea-Cl. 10/C.	Bio-depositary 1	0,459	0,479	-
41	Anna Spath-Cl. 14/C.	Bio-depositary 1	0,425	0,445	-
42	Carpatin-R.P.	Bio-depositary 2	0,437	0,458	-
43	OT.-11	Pl. mother cuttings	0,430	0,447	-
44	OT.-8	Pl. mother cuttings	0,434	0,450	-
45	C.T. 163	Pl. mother cuttings	0,566	0,670	-
46	OT.-8	Pl. mother cuttings	0,526	0,619	-
47	Călugărești -T_2	C culture	2,400	2,442	
48	Troian 9	C Culture	1,684	1,716	
49	Rival	Pl. mother cuttings	0,455	0,472	-
50	H.N.C.	Pl. mother cuttings	0,421	0,440	-
51	Mariana G.F. 8-1	Pl. mother cuttings	0,428	0,445	-
52	H. 38-6-88	Pl. mother cuttings	0,498	0,552	-
53	H. 74-17-18	Pl. mother cuttings	0,442	0,646	-
54	OT.-11	Pl. mother cuttings	0,470	0,492	-
55	Scolduș 1	C culture	0,410	0,418	-
56	Mirabelle de Nancy	C culture	0,430	0,432	-
57	Valor	G culture	2,140	2,148	+
58	Dâmbovița	G culture	2,200	2,245	+
59	Gr. Românesc	G culture	2,666	2,668	+
60	T. timpuriu	G culture	1,834	1,840	+
61	Vâlcean	G culture	2,442	2,492	+
62	Record	G culture	2,320	2,450	+
63	NEGATIVE CONTROL		0,575	0,667	-
64	POSITIVE CONTROL		3,00	3,00	+

DISCUSSIONS

Taking into account that these investigations have been carried out in plantations for over 15 years, it is imperative that new plantations are set up using healthy biological material and varieties that are in neither case very sensitive (Vânăt românesc group). A rigorous check of the biological material produced in private and public nurseries through the authorized laboratories existing in the country it is obligatory. We must promote the varieties which are resistant and tolerant to this virus. The plum trees infected must be eliminated and the government must elaborate a program in view of supporting this action through the Ministry of Agriculture.

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APPLE TREE BREEDS AND ELITES OBTAINED BY INDUCED MUTAGENESIS, SUITABLE FOR ECOLOGICAL CULTURES

Valeria Petre[1]

KEY WORDS: apple breeds, genetic disease resistance, induced mutagenesis, gamma and X radiations

ABSTRACT

The researches performed at the Research and Development Station for Tree Growing Voineşti, with the use of some physical mutagenic factors (gamma radiations, X rays) on the biological material formed by apple pollen and seeds in repose or after maturity has materialized with a lot of sorts and apple picks and flowers with genetic disease resistance, with great economic value.

Redix sort (synonym 3/73-83 V) obtained from sexuate hybridization of Goldenspur and Prima (irradiated pollen with 1000 R), homologated in 2004.

Iris sort (synonym 8/94-82 V), obtained from Prima and natural pollination with the irradiation of dry seeds in dose of 8000 R, homologated in 2005.

Irisem sort (synonym 2/1-90 V) obtained from Prima and natural pollination with the irradiation of after maturity seeds in dose of 5000 R, homologated in 2006.

Real sort (synonym 9/78-82 V), obtained from Prima and natural pollination with the irradiation of dry seeds in dose of 8000 R, homologated in 2007.

INTRODUCTION

In the genetic improvement, the priority objective is constituted by the creation of new breeds with superior features under the aspect of productivity, disease and pest resistance, vigour, fruits quality etc.

The improvement of the genetic resistance against some diseases emerged as the principal objective in the improvement programs, having economical and ecological implications with an extraordinary impact on human life (V Cociu, 1999).

Both on a national and on global level, the methods used in the apple tree genetic improvement aim at the same purpose, the most used being the conventional methods ,the inter- and intra-specific hybridization and the selection of derived forms from the obtained hybrid seeds. Besides the classical improvement methods, also new, unconventional methods are used, like the induced mutagenesis, which presents some specific aspects, being realized with the help of the radiations of some mutagenic physical agent (gamma or X radiations), used in different doses on the used biological material (seeds, pollen, etc.).

By using dry or post-matured seeds of the natural pollination of the Prima (Vf) breed, irradiated with gamma rays in different doses, condition for the increase o the variability of obtained hybrid material and a strong stability in maintaining the features of the new breed were created (Valeria Petre, 1997).

[1] Research –Development Station for Tree Growing Voineşti

The dealt with methods and the researches performed at the Voineşti Station contributed to the increase of the genetic variability of the used biological material, finally concretised in obtaining and homologating of new apple tree breeds with genetic disease resistance.

MATERIAL AND METHODS

The researches regarding the obtaining of some new genetic disease resistant breeds by mutagenesis were initiated at the Research and Development Station for Tree Growing Voineşti starting with the year 1982, being e3xposed to irradiation biological material constituted of pollen, apple tree seeds in repose and post-maturated.

From the irradiated biological material, existing in the selection field, the most valuable elites were selected, based on the growth vigour, on traversing the blossoming phenol-phase, on precocity, productivity, fruit quality and the behaviour against the attack of the principal diseases, being grafted on the graft bearer MM 106 and being introduced in a competition micro-culture, created in the year 2001, with trees planted at a distance of 4 x 2 m (1250 trees/ha). The presented data are the object of the researches performed in the period 2004-2007, on recently homologated apple tree elites and breeds, existent in the competition micro-culture created in the year 2001.

Based on the production data, the growth vigour, the fructification type, the fruits quality, the maturation and consumption period, the recently homologated breeds and the perspective elites were characterized. There are also presented the main features and production date, calculated statistically for 4 recently homologated apple tree breeds.

The soil on which the apple contest cultures are located is brown eumezobazic weakly pseudogleised, with clay texture, with a weak acid pH (5.7 – 5.9). The humus content is average at the surface (2.0 – 2.9%), medium supplied with nitrogen and weakly supplied with phosphorus and potassium.

The climatic conditions were favourable to the growth and the fruit bearing of the trees, characterized by an average yearly temperature greater with 0.3^0C, as compared to the zone's normal one ($8,8^0$C), with a sum of yearly rainfalls transcending the normal ones of 782mm (in the year 2005, 1.113 mm were registered).

In the experimental field, the soil was maintained laid fallow on the intervals and clean of weeds on the tree rows. For the pest control, 6 – 8 treatments - only with insecticides - were applied. The other works were performed conforming to the technologies specific for the intensive apple orchards.

RESULTS AND DISCUTIONS

The studied biological material - obained following the irradiation of the dry or post- matured seeds, originated from the free pollenization of the Prima (Vf) breed, or from the hybrid combinaions realized with irradiated pollen at one of the partners - permitted the putting into account of some valuable apple elites, with genetic disease resistance, obtained by induced mutagenesis. The selected elites - and then the recently homologated breeds - contribute to the diversification of the genetic base and of the apple assortment, with benefical influences on people's health protection and on the environment.

The **Redix** breed (sin.3/73-83V), obtained by the sexuate hybridization Goldenspur x Prima (pollen iradiated with 1000 R), homologated in the year 2004.
The tree has a medium strength, with an exposed stance and a standard fructification. It is resistant to the attack of Venturia inaequalis and of Podosphaera leucotricha.

The production potential - 25-30 t/ha. The fruit has160 g., has the shape of a lengthened, truncated cone, resembling to the Starkrimson breed, with a red-purplish-blue coloured skin, a colour perfecting itself during the keeping. The pulp becomes white-yellowish, juicy, sweet-acidulated, tasty during the keeping. Being a winter breed, the fruits can be kept until February – March. It may replace the Starkrimson apple tree breed.

The **Iris** breed (syn.8/94-82V), obtained from Prima x natural pollenation, with dry seeds irradation in doses of 8000R, homologated in the year 2005.

The tree has a small - medium strength, is very precocoius and productive. It bears fruits on all branch categories in each year, regardless of the fruit quantity produced in the former year. It is resistant against the attack of Venturia inaequalis and it is weakly attacked by Posodphaera leucotricha.

The production potential is 35-40 t/ha. The fruit has 150g, is spherical, slightly flattened, with a yellow-greenesh coloured skin , 2/3 of the surface being covered with carmine-red. The pulp is white-yellowish, juicy, sweet – acidulated, tasty.

Being an autumn breed, the fruits may be kept until the end of November. It may replace the Frumos de Voineşti apple tree breed.

The **Irisem** breed (syn.2/1-90V), obtained from Prima x natural pollenation, with post-maturated seeds irradation in doses of 5000 R, homologated in the year 2006.

The tree has a small - medium strength, is precocoius, bearihng fruits preponderantly on short formations. It presents increased resistance against the attack of Venturia inaequalis and of Posodphaera leucotricha.

The production potential is 25-30 t/ha. The fruit has 209g, is very handsome, coloured in vivid red on the sunbathed side, with a very good taste. It is a summer breed with the maturartion period inthe first prima decade of September. The **Real** breed (syn.9/78 – 82**),** obtained from Prima x natural pollenation, with dry seeds gamma ray irradated in doses of 8000 R, homologated in the year 2007.

The tree has a small - medium strength and bears fruits on short formations, twings and offshoots. It is resistant against the atack of Venturia inaequalis and is weakly attacked by Podosphaera leucotricha. It bears fruits without fruit bearing alternation 25-30 t/ha. The fruit has 185 g., , has the shape of a lengthened, truncated cone and is red on 2/3 of its surface. The pulp is white–yellowish, juicy, sweet- acidulated, tasty. It is a summer breed, the fruit ripe at the end of August – the begining of September. It may be extended in culture alongsid eto the Prima breed.

The **elite H 3/5 – 90 (**Prima x natural pollenation with irradiation of the postmaturated (activated) seeds with gamma rays in a dose of 5000 R).

The tree has a weak vigour, with a globulous crown (shaggy aspect), wityh early fruit bearing and bears fruits cnstantly on short formations and annual branches. It is resistant against the Venturia inequalis ans weqakly attacked by Podoshaera leucotricha.

The fruit has 160 g, ahs a spherical form or aflattened spherical form, covered by red on 2/3 ofits surface. The pulp is white-yellowish, juicy, sweet - acidulated, tasty.

The harvesting maturation takes place in the third decade of September.

The **elite H 2/5 – 90 (**Prima x natural pollenation with irradiation of the postmaturated (activated) seeds with gamma rays in a dose of 5000 R).

The tree has a weak vigour, witth exposed stance ; it bears fruit early on short formations. It is resistant against the Venturia inequalis ans weqakly attacked by Podoshaera leucotricha. It has a great production capacity, needsn fruit thinning out in order to eliminate the tendency of fruit bearing periodicity. The fruit has 160g, a conic globulous form , de basic colour is yellow, covered with a vivid red on 2/3 of its surface. The pulp is white-yellowish, juicy, sweet - acidulated, tasty. The harvesting maturation takes place in the third decade of October, and tah of the optimual consumtion is until the firdt decade of march.

The synthetic data regarding the main features of the apple tree breeds obtained by induced mutagenesis, homologated in the period 2004 – 2007 are prersented in the table 1.

Table 1

The principal characteristics of the apple breeds obtained by induced mutagenesis

Breed	Strength	Production potential		Fruit weigth (g)	DS %	Maturation period	Consumption period
		t/ha	Dif. ±				
Redix	medium	38.6	$+ 9.0^{***}$	160	12.5	20-30.IX	01.X-10.III
Iris	medium – weak	34.6	$+ 5.0^{***}$	150	14.0	10-20.IX	21.IX-30.XI
Irisem	weak - medium	19.9	$- 9.7^{000}$	209	14.7	01-10.IX	11.IX-30.IX
Real	weak – medium	25.5	$- 4.1^{000}$	185	12.9	20-31.VIII	01.IX-15.IX

DL 5% = 1.30; DL 1% = 1.99; DL 0.1% = 3.18

The reference term is represented by the average of the 4 apple breeds.(29,6 t/ha).

The recently homologated apple breeds, obtained through induced mutagenesis, are of medium or medium – weak vigour and are appropiate for densities of 1000 – 1250 trees/ha, grafted on the MM 106 graft support. The apple tree elites descibed before present superior features, which designate them as future apple tree breeds with genetic resistanc against diseases, suitable for ecologiccal cultures.

The production potential and the fruit quality, expressed by the aspect and the taste quality, are arguments for the multiplication and the extension in the commercial plantations. Under the natural keeping conditions with natural cooling, the fruits of the Redix breed resist until the first decade of March, and those of the Iris breed – untill the end of November. The Irisem and Real breeds complete the variety conveyor of the breeds with summer – autumn maturation.

CONCLUSIONS

1. The new apple breeds obtained by induced mutagenesis at the Voineşti Station, homologated in the perioad 2004-2007, present o series of superior features, expressed firstly by the genetic resistance against the principal diseases, but also by the supeior fruit qualities, the high productive potential, with important economical advantages.

2. As compared with the standard, disease sensible apple assortment, that needs 14 - 16 treatments for the maintenance of a suitable phitosanitary status, for the presented apple assortment 6-8 treatments - only with insecticides - are necessary for pest control. In the years with abundant rainfalls, also 1-2 treatments with fungicides for Gleosporium control may be applied.

3. The exclusion of the fungicide products, the use of insecticides with a high selectivity degree, correlated with the quality and the productivity of the new homologated apple breeds, represent the basical arguments for the promotion and for the extension in the new orchards to be created in our country.

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THE PRODUCTION OF QUALITY APPLES BY PROMOTING OF SPECIFIC TECHNOLOGICAL SEQUENCIES

Gh. Petre, Valeria Petre[1]

KEY WORDS: Specific and technological sequences, chemical and manual thin out, foliare fertilization, quality.

ABSTRACT

The fruit quality, obtained according to the trading standards - and the size uniformity of those in the tree crowns is obtained through supplementary application of some specific and technological measures: chemical and manual thinning out of the fruits, foliare fertilization technological sequences which have to be part of the fruits production technology.

Through the chemical and the manual thin out of the fruits, with the help of five treatments with foliare fertilization, the production (profit) was with 36%-43% bigger for the Generos breed and with 27%-40% for the Florina breed. The weight of the fruits was much higher, exceeding the control weight with 8-34g at the Generos breed and with 18-24g at the Florina breed.

Over 90% (percent) of the production was obtained as extra quality and as first quality.

INTRODUCTION

The natural frame, very propitious to the tree culture, in consecrated zones, the tradition and the necessity to use the earth more intensively by producing quality fruits in big lots, creates the development premises of a modern tree growing in Romania.

Unfortunately, during the last years, the tree growing patrimony has drastically been reduced , a large part of the orchards are in decline, others have been abandoned – and only about 50% of the surface is exploited. On these no uniform technology is applied, so that a great part of the tree growers realize fruit productions at modest quality parameters.

The putting into account of the fruit production encounters great difficulties on the internal market, due to the reduced percentage of extra quality fruits, which hardly compete with massive fruits imports, with superior quality - as commercial aspect - as compared to those obtained in our orchards. Conforming to the trading standards and to the new regulations of the Law 348/2003, the producers, the owners, the traders and of the categories of operators, shall not expose for vending and trade fresh fruits, unless these fulfil the requirements imposed by the quality standards.

In order to become competitive on the internal and on the European market, it is necessary to integrate and to generalize in the exploitation technology of the fruit bearing orchards some technological sequences, which lead to the increase of the apple quantity and quality. Great quality productions are obtained by the optimal application of then whole range of technological measures, regardless of the surface owned by each tree grower.

The fruit quality represented no major objective in the period before 1989, due to the lack of an internal competition system (Isac, 2002).

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The supplementary technological sequences, which have a significant contribution to the growth of the apples quantity and quality, are represented by the chemical and manual thinning out of the fruits, the foliare fertilization – which unfortunately are applied sporadically or even at all in the apple orchards (Petre and others, 2006).

The researches performed ay the Research and Development Station for Tree Growing Voinesti aim the integration and the generalization of the specific technological sequences in the exploitation technology of the fruit bearing apple tree orchards, which lead to the fruit quantity and quality increase, the growth of competition putting into account level, corresponding to the trading standards imposed by the market's requirements – and obtaining of supplementary revenues for the apple tree growers.

MATERIAL AND METHODS

The experimentation of foliare fertilizers, of the thinning out products and of the manual thinning out in order to increase the apples quality, was performed at the Research and Development Station for Tree Growing Voinesti in the years 2004 – 2007, at the Generos and Florina apple tree breeds, grafted on the graft bearer MM 106. The trees were 11 to 14 years old, were planted at a distance of 4 x 3 m (833 trees / Ha), the crown form being freely flattened on the tree row.

The following variants were organized:

V_0 – untreated witness; V_1 – chemical thinning out;

V_2 – manual thinning out; V_3 – chemical thinning out + manual revision;

V_4 – chemical thinning out, manual revision, foliare fertilization.

For the foliare fertilization, at the first 2-3 treatments the product Agrofeed in a dose of 1% was used, having in its composition the 3 fertilizing elements (NPK) in the ratio 19:19:19. At the treatments 4 and 5, administered before the fruits harvesting, the product DELTA E (5:45:30+ME), in a dose of 0.5%, was used.

For the chemical thinning out the product Rarex (Amid 80 Cluj) in a dose of 0,1% was used when the fruits in the centre of the blossoming had a diameter of 10-14 mm – and the manual thinning out was performed near the physiological downfall, when the fruits reached a diameter of 16-18mm.

On the control trees of both apple tree breeds, Generos and Florina, the differentiation degree with fruit bearing buds after performing the cutting and the fruit binding degree were determined – the timing for applying the thinning out products and for the manual thinning out were established, the production and the fruits dimensional repartition (55-60mm, 65-70mm and 75-80mm) was registered.

The production data were statistically interpreted after the randomized blocks method.

In the experimentation period (2004 – 2007), the climatic conditions were favourable for the growth and the fruit bearing of the trees, being characterized by a medium annual temperature greater by $0,3^0$C with regard to the zone's normal ($8,8^0$C), with a total of annual precipitations which surpassed the normal of 782 mm (in the year 2005 - 1.113mm were registered).

The soil on which the researches were performed is brown eumezobazic, weakly pseudogleized, with a clayish texture, with a weak acid pH (5.7 – 5.9). Thehumus content is medium at the surface (2.0 – 2.9%), medium furnished with nitrogen and weakly furnished with phosphorus and potassium.

In the orchard, the soil was maintained laid fallow on the interval and clean of weeds on the tree row. The other works were performed according to the technology specific for the intensive apple tree orchards.

RESULTS AND DISCUSSIONS

Besides the classical; technological measures, respectively the soil works, the soil fertilization, the fruit bearing cuttings ,the phyto-sanitary treatments – an important part in the apples quantity and quality increase at the Generos and Florina breeds is played by some specific technological sequences, consisting of:

- foliare fertilization (at least 5 treatments with foliare fertilizers: 1 before the blossoming, 2 after the blossoming and 2 before the fruits harvesting).

- fruit fertilization (chemical with the product Rarex in a dose of 0,1%, when the fruits in the blossoming centre have a diameter between 10 and 14 mm, completed with manual thinning out, when the fruits in the blossoming centre have reached a diameter between 16 and 18 mm).

The pointed out sequences must be integrated into the fruit production technology at any of the cultivated apple tree breeds. All these, followed by the respecting of the other requirements regarding the harvesting, the keeping, the conditioning and the putting into account, lead to an increase of the competitive level on the market and to the preparation of the tree growing production for the integration into the EU.

a) *Fruit thinning out.* The breeds productive potential and the production level, realized in the present year, is closely related to the differentiation degree with fruit bearing buds, this being decisive for the applying of the chemical fruit thinning out products and of the just formed blossoms or fruits. The potential with fruit bearing buds was comprised between 43.3 and 51.3% at the Generos breed and between 38.0 and 42.8% at the Florina breed, assuring a good blossoming degree in the years 2004 - 2007.

The Rarex product (0,1%) acted differently on the fruit thinning out, depending on the breed. At the chemically, chemically + manually thinned out or only manually thinned out variants, the fruit binding percentage at harvesting was situated between 8,7 and 13,2% at the Generos breed and between 12.5 and 15.4% at the Florina breed. The percentage of the bound fruits at harvesting was much diminished at the chemically and chemically + manually revised thinning out variants. At the witness variant the binding percentage at harvesting was 16.3% at the Generos breed and 18.3% at the Florina breed.

As compared to the witness variant, without any special intervening, at the variants where the chemically, the manually and the chemically + manually revised thinning out were applied, the production increase was situated between 36 and 40 % at the Generos breed and 27 - 39% at the Florina breed. To the same degree the fruit quality increased, fruits weight increases from 165 to 173-192 g at the Generos breed and from 142 g to 160-164 g at the Florina breed being registered (Table 1).

b) Foliare fertilization. Represents a complementary measure, having the advantage that the fertilizing products enter much faster in the plant metabolic circuit, as compared with the radicular fertilization, which it cannot yet replace. The foliare fertilizers are applied simultaneously with the chemical thinning out or with the phyto-sanuitary treatments, avoiding the mixing with copper based products. The foliare fertilization can be applied in 4 - 6 stages in the vegetation period, taking care that those containing nitrogen shall be given in the first 2 - 3 treatments immediately after the blossoming.

Based on the applying of 5 treatments with foliare fertilizers, the production increase was greater by 43 % at the Generos breed and by 40% at the Florina breed. Tyhe fruit weight was much superior, surpassing the witness with 34 g at the Generos breed and with 24 g at the Florina breed. The statistically interpreted data point out, at the Genenros breed, distinct significant positive differences at the variants 1,2,3 - only with the fruit thinning out – and very significant positive ones at the variant 4 ,with fruit thinning out and foliare fertilizing (table 1). At the Florina breed, the differences are very significant positive at the 4 studied variants, as compared to the witness variant.

Table 1

The influence of the specific technological sequences on the apples quantity and quality

Breed / variant	Apple production			Medium apple weight (g)	Fruit size categories (%)		
	T/ha	Dif. as comp. to witness (T/ha)	%		55-60mm	65-70mm	75-80mm
Generos breed							
V_0 – untreated witness	33.8	-	100	165	16	35	49
V_1 – chemical thinning out	47.0	$+13.2^{**}$	139	191	5	15	80
V_2 – \manual thinning out	47.4	$+13.6^{**}$	140	173	10	24	66
V_3 – chemical thinning out + manual revision	46.1	$+12.3^{**}$	136	192	0	7	93
V_4 – chemical thinning out, manual revision, foliare fertilization	48.3	$+14.5^{***}$	143	199	0	5	95
Florina breed							
V_0 – untreated witness	30.7	-	100	142	18	48	34
V_1 – chemical thinning out	39.8	$+ 9.1^{***}$	129	162	8	27	65
V_2 – \manual thinning out	39.1	$+8.4^{***}$	127	160	10	30	60
V_3 – chemical thinning out + manual revision	42.6	$+11.9^{***}$	139	164	5	32	63
V_4 – chemical thinning out, manual revision, foliare fertilization	43,0	$+12.3^{***}$	140	166	3	28	69

Generos breed: DL 5% = 6.10; DL 1% = 9.03; DL 0.1% = 13.94.
Florina breed: DL 5% = 3.14; DL 1% = 4.64; DL 0.1% = 7.17.

In all variants and demonstrative lots, organized at the Generos and Florina breeds, almost the whole fruits quantity registered per hectare represented fruits with a diameter of above 65 mm, which are capable to cope with the commercial pressure on the Romanian market. A percentage of 6 - 8% was registered at the 55-60 mm category at the witness variant, without special interventions.

c) The production costs. The applying of all agro-technical measures of the exploitation technology of the fruit bearing apple tree orchards, including the specific supplementary sequences for the fruit quantity and quality increase is realized with great financial efforts, but which can be recovered and important profits can be obtained, under the conditions of orchards in full economical potential, with breeds with high commercial value (table 2).

The fruit harvesting out-turn is higher, due to the greater fruit dimensions and their size uniformity, the apple quantity harvested by each harvester increases, so that at equal or greater productions, the apple harvesting costs may be equal or even lower.

Table 2

The comparative production costs, on technological chain loops

Breed / Variant	Apple produc-tion (t/ha)	Costs for classic tech-nologie * (lei)	Apple harves-ting (lei)	Costs for specific works -lei -			Total costs (lei)	Pro-duc-tion costs ** (lei/kg)
				Che-mical thin-ning out	Ma-nual thin-ning out	Fo-liare treat-ments		
Generos breed								
V_0 – untreated witness	33.8	9859	2292	-	-	-	12151	0.359
V_1 – chemical thinning out	47,0	9859	3188	750	-	-	13797	0.293
V_2 – \manual thinning out	47.4	9859	3215	-	1800	-	14874	0.314
V_3 – chemical thinning out + manual revision	46.1	9859	3127	750	1800	-	15536	0.337
V_4 – chemical thinning out, manual revision, foliare fertilization	48.3	9859	3276	750	1800	900	16585	0.343
Florina breed								
V_0 – untreated witness	30,7	9859	1708	-	-	-	11567	0,377
V_1 – chemical thinning out	39,8	9859	2214	750	-	-	12823	0,322
V_2 – \manual thinning out	39,1	9859	2175	-	1800	-	13834	0,354
V_3 – chemical thinning out + manual revision	42,6	9859	2370	750	1800	-	14779	0,347
V_4 – chemical thinning out, manual revision, foliare fertilization	43,0	9859	2372	750	1800	900	15701	0,365

* Cutting, soil work, soil fertilization, phyto-sanitary treatments

** keeping, putting into account, administration costs are not included

By applying of specific technological sequences the exploitation costs increase, but these are recovered and even a greater profit is registered, as compared to the conditions of applying the classical technology, due to increase of the apple quality and their putting into account at much more advantageous prices.

So, by obtaining of productions of 47,0-48,3 t/Ha, at the variants with specific technological sequences, as compared with the witness variant with 33,8 t/Ha, at the Generos breed the total costs registers values comprised between 11,567 lei and 16,585 lei, the great values being at the improved variants. At the Florina breed, at productions of 30.7 – 43.0 t/ha, the total costs au varied between 12,823 lei and 15,701 lei, as compared to 11,567 lei at the witness variant.

Under the present conditions, the tree culture, especially the apple tree culture, becomes profitable only by obtaining of productions surpassing at least 25 t/ha – and over 80% of the fruits have to be of the extra + I-a quality.

The cost price, calculated on technological loops, is comprised between 0.293 and 0.377 lei/kg, (the keeping, the putting into account, the administration costs were not included into the calculation), being lower by applying the specific technological sequences ,due to the realization of quantitative superior productions.

The supplementary financial efforts, registered by applying the specific supplementary sequences, can be recovered and important profits can be obtained due to the apple quality increase and their putting into account at much more advantageous prices. The production increases with 13 - 22% at the Generos breed and with 13 - 44% at the Florina breed.

CONCLUSIONS

1. In order to increase the apple quantity and quality to the level of the Romanian trading standards, harmonized with the requirements of the European Union, it is required to integrate into the exploitation technology of the apple tree orchards with resistant breeds - and not only these, a series of specific technological sequences, supplementary to the classical technology, respectively the chemical and manual thinning out of the fruits, the foliare fertilization.

2. By the chemical and manual thinning out of fruits, based on applying of 4-5 treatments with foliare fertilizers (simultaneously with the phyto-sanitary treatments), the production increase was greater by 43% at the Generos breed and by 40% at the Florina breed.

3. The exploitation costs increase by applying the specific technological sequences (the chemical and the manual thinning out of the fruits, the foliare fertilization), but the profit is higher due to the apples quality increase and their putting into account at much more advantageous prices.

4. The quality increase of the apples of the Generos and Florina breeds contributes to the increase of the apples putting into account level and the overcoming of the competition pressures on the Romanian market, simultaneously with obtaining of important profits, concretized by a production value increase of 13 – 44% at both apple tree breeds.

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THE ECONOMICAL AND ECOLOGICAL IMPORTANC E OF THE BREEDS WITH GENETIC RESISTANCE AGAINST DISEASES IN THE APLLE TREE PLANTATIONS

Gabriela Unchiasu, Cecilia Bolbose[1]

KEY WORDS: apple breeds; resistance against diseases; pollution; production cost

ABSTRACT

Ionathan, Golden delicious and Red delicious make up the majority in the present apple orchards. These old apple breeds showed a good yield potential and a high level of fruits qualities but in the same time, a very high sensibility to the main diseases (scab and mildew).Both field diseases, especially " the scab" affect quantitative and qualitative the harvest, until to compromise it, in very favourable climatic conditions. The means used against the apple scab or the fowder mildew, different fests and mites, include crop sanitation, biological, biotechnical, chemical and genetic measures. The assortment of used pesticides (12-20 formulations each year) and a high number of applied treatments (12-14 in a year), assure the fruits quality, but they have some bad effects: very high yield prices and an important pollution level in the soil or in the trees.

INTRODUCTION

It is known that the creation of a tree growing plantation represents an important investment, accomplished in a long period – and one of the principal criteria had in view at the realization of such an investment is the economical efficiency. Also known is the fact that one of the important factors in the realization and the success of a tree growing plantation is represented by the selection and the planting of an as valuable as possible assortment. The introduction into culture of new breeds, created in our country or in foreign countries represents, as compared with the classical assortment (Ionathan, Golden delicious, the Red delicious group, etc.) a series of superior features, concretized by: genetic resistance against diseases, good production potential, superior fruit quality. These features determine themselves important economical advantages.

Among the enumerated features, the resistance against diseases represents a special importance, being directly related to the economical efficiency. In the case of the breeds resistant against diseases (scurf, mildew), the genetic resistance makes the manifestation of the attack against the tree organs (leaves, off-shots, fruits) impossible; the breeds at which the genetic resistance ahs not reached the level of immunity, present a weak attack degree, maintaining themselves much under the economical damage threshold.

Under the conditions of the introduction into culture of disease resistant breeds, the economical effect manifests itself immediately by the totals or partial elimination of the treatments with the fungicides needed in order to maintain a good phyto-sanitary status in the plantations with standard breeds - and implicitly superior quality productions are

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obtained. The breeds created and introduced into the assortment after 1970 in the USA, France, England (Prima, Florina, Priam, Liberty, Priscilla, Mcfree) – and more recently in our country (Voinea, Pionier, Generos, Ciprian, Luca, Chindia), answer to the wish for increasing the economical efrficie3ncy of the apple tree cultures and for the pollution reduction of the environment and of the fruits.

MATERIAL AND METHODES

The study was performed in a period of 2 years (2006-2007) on a lot comprising both breeds of the sensible assortment (Ionathan, Golden delicious, Idared) and of the disease resistant assortment (Generos, Florina, Ciprian). The tree planting distance is 4/ 2.5 m, and the tree age is 14 years. The technology applied on this lot is that specific for the apple tree orchards – with the exception of the resistant breeds, where only 2-3 treatments with specific fungicides for mildew and storage diseases were applied; the climatic conditions in those years were favorable for the development of these diseases.

The number of phyto-sanitary treatments applied on the lot with sensible breeds was 14 (2006), respectively 13 (2007) – and in the lot with disease resistant breeds 8 treatments were applied in both years (2006 - 2007). The applied solution quantity was the same in both lots (1500 l / ha). The economical efficiency calculations were performed at the end of each year, having as a starting point the calendar of the treatments performed at warning during the whole year on both lots. There were also considered the actual prices of the used insecticides-fungicides.

RESULTS AND DISCUSIONS

In the year 2006 treatments program scheme for the sensible breeds, 14 fungicides were used and in 2007 - 10 fungicides, as compared with the disease resistant breeds, where the fungicides number was 4 in 2006, respectively 2 in 2007 (table 1)

Table 1

Pesticides used at the phyto-sanitary treatments in the studied lots (2006-2007)

2006		**2007**	
Sensible breeds	**Resistant breeds**	**Sensible breeds**	**Resistant breeds**
Fungicides	**Fungicides**	**Fungicides**	**Fungicides**
Thiovit jet	Alcupral 50 PU	Super Champ 250 SC	Dithan M 45
Alcupral 50 PU	Dithan M 45	Thiovit jet	Carbiguard 500 SC
Dithan M 45	Merpan 80 WDG	Chorus 75 WG	
Chorus 75 WG	Bavistin 50 DF	Merpan 80 WDG	
Merpan 80 WDG		Score 250 EC	
Clarinet		Folpan 80 WDG	
Antracol 70 WP		Shavit F 72 WP	
Score 250 EC		Dithan M 45	
Shavit f72 WP		Systhane C	
Systhane C		Goldazim 500 SC	
Bavistin 50 DF			
Carbiguard 500 SC			
Insecticides	**Insecticides**	**Insecticides**	**Insecticides**
Carbetox 37 CE	Oleocarbetox super	Confidor oil	Confidor oil
Oleocarbetox super	Karate zeon	Karate zeon	Karate zeon
Karate zeon	Sinoratox 35 CE	Sinoratox 35 CE	Reldan 40 EC
Sinoratox 35 CE	Calypso 480 SC	Calypso 480 SC	Calypso 480 SC
Calypso 480 SC	Reldan 40 EC	Proteus 110 OD	Proteus 110 OD
Envidor 240 SC		Dantop	Envidor 240 SC

Calypso 480 SC	Reldan 40 EC	Proteus 110 OD	Proteus 110 OD
Envidor 240 SC		Dantop	Envidor 240 SC
Reldan 40 EC		Seizer	
		Actara 25 WG	

The data presented in the table 2 demonstrate that between the 2 cultivated assortments significant differences were pointed out, regarding the total treatments number needed for the maintaining of an optimal phyto-sanitary status during a year, the pesticide quantities applied per ha and the afferent costs (table 2) .

Table 2

Data regarding the reduction of the treatment number and of the material costs afferent to the performing of the phyto-sanitary treatments in the apple tree orchards with resistant assortment, as compared with the disease sensible assortment (costs /orchard ha /year)

Specification	2006				2007			
	Classic breed	Resis. bred	Cost reduc . as comp. to classic Breed	%	Classic breed	Resis. bred	Cost reduc . as comp. to classic breed	%
	Ionathan Golden Idared	Generos Florina Ciprian			Ionathan Golden Idared	Generos Florina Ciprian		
Applied phyto-sanitary treatment	14	8	6	42,9	13	8	5	32,46
Insect. -fung. Value	3375,66	1262,63	2113,03	62,6	6450,66	3153,78	3296,88	51,11
Physical fuel consumption	84	48	36	42,86	78	48	30	38,4
Value of fuel consumption	252	144	108	42,86	249,6	153,6	96	38,4
Works consumption for treatment application	63,84	36,48	27,36	42,86	71,76	44,16	27,6	38,46
Grand total	**3691,5**	**1443,03**	**2248,47**	**60,91**	**6772,02**	**3351,54**	**3420,48**	**50,51**

So, on the lot with standard breeds (sensible to diseases) the number of performed phyto-sanitary treatments was 14 in the year 2006 respectively 13 in the year 2007,I whereas on the lot with resistant against diseases, 8 treatments were applied in both years (2006 - 2007). The value of the insecticides-fungicides used on the lot with resistant breeds was reduced with 62,6% in the year 2006, respectively with 51,11% in the year 2007, as compared with the lot with standard, sensible breeds. A substantial reduction is registered on the lot with resistant breeds also regarding the fuel and manpower costs (48,86% in the year 2006; 38,4% in the year 2007). Per total the costs regarding the phyto-sanitary treatments applied during a year, in the lot with resistant breeds were reduced by 60.91% in the year 2006 and by 50,51% in the year 2007, as compared to the lot with sensible breeds, with a mean of 56,86%, which means that in the orchards with disease resistant breeds by 50% less treatments are applied – and their value is approximately 3 times lesser as compared to the orchards with a classical sensible assortment. There must be also mentioned the fact tat both in the year 2006 and in the year 2007, favorable years for the mildew attack, also in the lot with resistant breeds, 2 fungicide treatments where applied, whose value was included into the respective calculation. Regarding the production potential and the fruits quality, the data in the table 3 point out the fact that the fruits production and also the fruits quality at the disease resistant apple tree breeds, are included in the normal parameters for an commercial breed, they being close, as value, to those of the standard breeds (table 3).

Table 3

The production potential and the principal fruit features at the apple tree breeds with genetic resistance against diseases, as compared with the classical ones.

Soiul	Fruit prod. (mean in 3 years)		Chemical components					
	Kg/ tree	To/ha	Dry subst. .%	Sugar total gr %	Acid. tot. gr. %	Vit. C mg %	Co-lour	Keeping period
Rezistant breeds								
Ciprian	33.3	27.7	14.2	10.4	0.4	6	Dark red	IX-1 -III-1
Generos	25.5	21.2	14.4	10.1	0.3	5.2	Ruby	X.1-III.3
Florina	28.5	23.7	15.1	11.0	0.4	7.3	Red	X.1-IV.3
Sensible breeds								
Ionathan	30.1	25.1	16.2	14.2	0.7	5.3	Red	X.1-III.3
Gelden delicios	33.5	27.9	16.4	13.7	0.6	3.3	Yel-low	X.1-IV.3
Idared	29.5	24.6	15.6	11.1	0.7	5.8	Red	X.1-IV.3

Besides of very significant economical effects, a series of favorable effects for the agro-ecosystems of the tree growing orchards must be mentioned: the reduction of the physical soil degrading phenomena by the reduction of the passing numbers of the spraying units, the protection of the entomo-fauna by the reduction of the environment pollution in the plantations. The reduced number of treatments leads to the reduction of the toxic residues accumulated in the fruits, with beneficial effects on the consumer's health. The study was performed on the breeds more spread in culture.

CONCLUSIONS

1. On the whole, the reduction of the treatments number on the lot with resistant breeds, implies the quantitative and value diminution of insecticides-fungicides, fuel and manpower by 60,91% (2006), respectively by 50,51% (2007) per orchard hectare, as compared to the lot with standard breeds;
2. The production potential and the fruits qualities are comprised in the normal parameters for a commercial breed, they being close, as value, to those of the standard breeds;
3. The reduction of the environment pollution, of the toxic residues in the fruits, the protection of the entomo-fauna in the plantations, the reduction of the physical soil degrading phenomena – are only several of the beneficial effects of the application of a reduced treatment number in the plantations with resistant breeds;
4. The modern tree growing, based on a new economical and ecological technology, supposes the promotion and the extension in culture of disease resistant apple tree breeds.

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ELIMINATION OF *PPV* VIRUS THROUGH *IN VITRO* CULTURE IN SOME VARIETIES OF PLUM

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KEY WORDS: Plum pox, virus, culture media, plum tree

ABSTRACT

In the experiments established at I.C.D.P. Pitesti-Mărăcineni, to find the optimal parameters that would lead to efficiency in vitro culture in eliminating the virus PPV varieties tested. The use M & S, WPM and Fossard culture media has thrown emphasized that the varieties Grase romanesti, Negre de toamna, Vanat romanesc Busuioace de Geoagiu, Gras ameliorat, Pescarus, Stanley, French improved, Agen 707, and Hamanova Svetska cultivars have responded different from concentration macro and microelements. An important factor in the ability regenerativon as well as the elimination of the virus has been a size explant. The regenerative capacity is inversely proportional to the level of virus free plant obtained: the explants size of 0.2-0.3 mm is made of a number less than plants differentiated case against when used explants with the size of 0.8-0.9 mm, but a larger number of virus-free plants.

INTRODUCTION

In vitro morphogenesis requires the inducing of some autoregulate phenomena that are autonomous and depend on new heterothrophe conditions that were created. In conformity with literature (Boxus and Druart, 1989) the explants have minim (limit) size for manifested cells totipotentiality under *in vitro* conditions. Other factor for successful of *in vitro* culture is represented by media compounds. This is typical for every species or cultivars, the requests are different even depending on the explants used (Isac, 1983). Together with basic culture media, the current methods used to *in vitro* culture in order to induct and sustain of organogenesis have as practical and theoretical base the hormonal balance concept. Dilley (1969) showed that the influence of hormons was manifested as their single action and through the change of ratio between stimulator hormones and inhibitor hormones. The present paper exhibits *PPV* elimination level for *in vitro* culture using apical meristems.

MATERIAL AND METHODS

Biological material: was represented by meristem from – meristematic dom with 0.8 -0.9 mm size, obtained from apically buds from anual branches and – meristematic dom with 0.2 - 0.3 mm size from Grase romanesti, Negre de toamna, Vanat romanesc,

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Busuioace de Geoagiu, Gras ameliorat, Pescarus, Stanley, French improved, Agen 707 and Hamanova Svetska cultivars.

Disinfections of biological material consists of washing with water + liquid detergent + Tween 80 for 5 min; immersion in alcohol 96^o for 15 min and immersion in calciu hypoclorite for 10 min, washing with distilled and sterile water 3 x 10 min.

Culture media were represented of M &S (1962), Fossard (1977), Lepoivre (1977) and WPM (Lloyd G.B., McCown B.H, 1981). The organic carbon source was assured using sacharose (30 g/l) and agar like gelifiant agent (6 g /l). So resulted the variants:

-for the differentiation phase

V1= M &S + 0.01 mg/l IBA + 0.3 mg/l GA_3

V2 = WPM + 0.01 mg/l IBA + 0.3 mg/l GA_3

V3 = Fossard + 0.01 mg/l IBA + 0.3 mg/l GA_3

-for the multiplication phase

V1 = Fossard + 1mg/lBAP + 0.1 mg/l GA_3 + 0.2 mg/l ANA

V2 = M&S + 1mg/lBAP + 0.1 mg/l GA_3 + 0.2 mg/l ANA

V3 = Lepoivre + 1mg/lBAP + 0.1 mg/l GA_3 + 0.2 mg/l ANA

The explants were put in glasses to laminar air hood. Culture conditions consisted of temperature of 22-23^0 C photoperiod: 16 hours light (2000-2500 lx) and 8 hours dark.

The observations were made for 30 viable explants for every treatment.

Checking the level of obtained virus free plants was done by the serological method TAS-ELISA, Adams AN (1978), Clark, M.F., Adams, A.N. (1977) with the kit-products company SEDIAG.

RESULTS

In vitro explants evolution has been different depending on the size of the explant, the type of culture media and variety (Table 1):

Table 1

Explants differentiated level (%) after 3 weeks of culture

No	Variety	Size explant (mm)	Culture media variants		
			V1	V2	V3
1	Grase romanesti	0.2-0.3	-	-	-
		0.8-0.9	-	-	70
2	Negre de toamna	0.2-0.3	-	-	-
		0.8-0.9	30	-	30
3	Vanat romanesc 300	0.2-0.3	20	-	-
		0.8-0.9	70	-	30
4	Busuioace de Geoagiu	0.2-0.3	60	-	20
		0.8-0.9	100	60	30
5	Gras ameliorat	0.2-0.3	40	-	-
		0.8-0.9	90	-	30
6	Pescarus	0.2-0.3	-	-	-
		0.8-0.9	30	-	60
7	Stanley	0.2-0.3	-	-	-
		0.8-0.9	30	-	80
8	French improved	0.2-0.3	-	-	-
		0.8-0.9	30	-	60

9	Agen707	0.2-0.3	30		30
		0.8-0.9	70		50
10	Hamanova Svetska	0.2-0.3	-	20	20
		0.8-0.9	40	80	60
	Diferentiation media/assortment	0.2-0.3	**15**	**2**	**7**
	Diferentiation media/assortment	0.8-0.9	**52**	**14**	**50**

- *variety*: the ability of regeneration depending on variety was different. Thus, under the same given conditions: variant of the culture media (V1), explant size (0.8-0.9 mm) the recorded values ranged between 100% differention plants of the Busuioace Geoagiu variety, 90% differentiation explants the variety and only improved Gras 30% differentiation explants the French improved varieties, Stanley, Pescarus and Negre de toamna.

- *explant size* had a great influence in the regenerative capacity with significant differences on the same type of culture medium (V1), Vanat romanesc 300 variety the recorded with 50 % more differentiation explants to size of explant by 0.8-0.9 mm versus 0.2-0.3 mm. There have been situations when the explants with the size of 0.2-0.3 mm have not differentiated: Negre de toamna , Gras ameliorat, Stanley, French improved, Hamanova Svetska variety. At explants with the size of 0.8-0.9 mm the recorded to a situation in which only explants have not differentiated from the Grase romanesti variety on V1 and V2, obtained this variety but only V3 culture media were differentiation of 70%.

- *culture media*: the best results were obtained on the culture media V1 with an average of 52% explants differentiated and 50% explants differentiated on V3. The culture media WPM (V2) has provided inadequate conditions for most varieties of range except Hamanova Svetska variety which differentiated in proportion of 80% and Busuioace de Geoagiu variety with a differentiation of 60% for the explants of 0.8-0.9 mm. The establishment of culture for multiplication was made on variants V1 and V2 culture media. In the second subculture was identified a slight tendency for vitrification this phenomenon show the more intense the variety of Busuioace Geoagiu (figure 1). On the culture on the basis of macro and micro M & S (V2), a low rate of multiplication was obtained (table 2). So after the second subculture, plants have been transfered to the culture medium on the basis of elements Lepoivre (V3) (Table 2) where the multiplication rate was between 1:3 to Busuioace de Geoagiu variety which has been the most severely affected by vitrification at 1:7 and Grase romanesti and Gras ameliorat varieties.

Table 2

The rate of multiplication obtained depending on the culture media

No.	Cultivar	Media variants		
		V1	V2	V3
	Grase romanesti	1:7	-	1:7
	Negre de toamna	1:3	-	1:5
	Vanat romanesc 300	1:4	-	1:5
	Busuioace de Geoagiu	1:5	-	1:3
	Gras ameliorat	1:6	1:2	1:7
	Pescarus	1:2		1:4
	Stanley	1:2	1:2	1:4
	French improved	-	-	-
	Agen707	-	-	-
	Hamanova Svetska	1:4	-	1:4

Figure 1 - The phenomen of vitrification of the Busuioace of Geoagiu variety

After the fourth subcultura TAS-ELISA (Triple-Antybody Sandwich Enzymes Linked Immunosorbent Assay) test was conducted in order to determine the degree of virus free biological material at this time.

This test uses antybodies which are bound to the surface of the microtiter plate to capture the antigen. The presence of the antigen is detected using specifc antibodies. Then, the immunological complex is revealed by adding of an anty-species antibody coupled with alkaline phosphatase. Finally the addition of the substrate of the enzyme induces a yellow product, detectable at 405 nm, when the antigen is present (figure 2).

Figure 2 -Color reaction in case of positive samples

Analysis of data obtained with Duncan test has showed that differences have appeared depending on variety and size of the type of explant (figure 3 and figure 4), there by use explants of 0.2-0.3 mm size established three classes as follows:a = 63.3% of infected plants (Grase romanesti, Negre de toamna, Hamanova Svestka varieties), b = 50% infected plants (Vanat romanesc, Gras ameliorat, Pescarus, Stanley varieties) and c = 46.6% plants infected (Busuioace de Geoagiu variety). For the explants with 0.8-0.9 mm size were established four classes: a= 76.6% plants infected (Grase romanesti, Gras ameliorat, Pescarus varieties) b = 70% infected plants (Negre de toamna , Stanley and Hamanova Svestka varieties), c = 63.3% (Busuioace de Geoagiu variety) and d = 60% infected plants (Vanat romanesc variety).

Duncan`s multiple range test P<5%

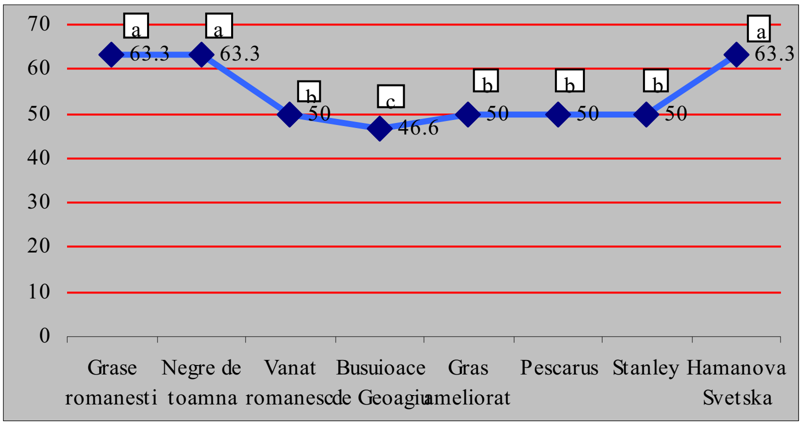

Fig. 3 - The level of infection with *PPV* after the fourth subculture to material biological obtained from the explants with the size of 0.2-0.3 mm

Duncan`s multiple range test P<5%

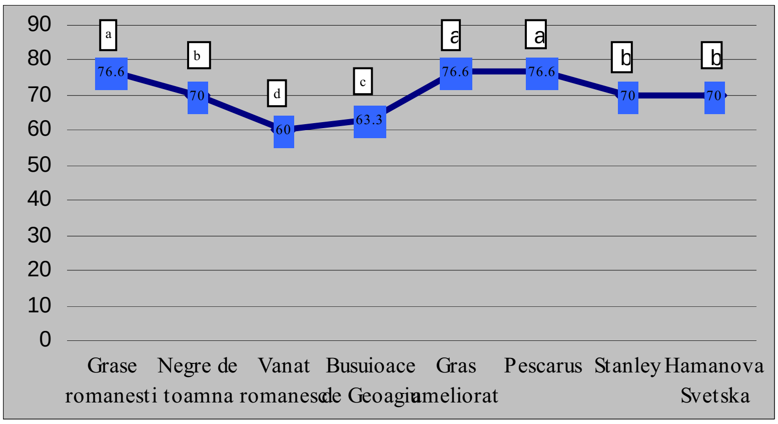

Fig. 4 - The level of infection with *PPV* after the fourth subculture to material biological obtained from the explants with the size of 0.8-0.9 mm

CONCLUSIONS

1. For explants differentiation has operated a complex of factors has operated: culture media through its components, explant size and variety.

2. The culture media which provided the best multiplication conditions was Lepoivre, on the Fossard culture media vitrification conditions occurred the M & S culture media offering poor conditions for the multiplication.

3. The use of the explants with 0.2-0.3 mm size to obtain a differentiation slower compared with the explants with 0.8-0.9 mm size as a result of lower regenerative capacity but get a better yield to virus free plants, the maximum amount of plants being infected by 63.3% compared to 76.6% from plants from explants of 0.8-0.9 mm size.

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THE INFLUENCE OF THE LATE FROSTS IN SPRING UPON THE FRUIT BINDING DEGREE OF SOME APRICOT VARIETIES IN BANAT'S PLAIN CONDITIONS

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KEY WORDS: apricot, phenophases, fruit binding degree, late frosts

ABSTRACT

The apricot varieties in our country are diversified, including at the same time local and foreign varieties, varieties having quality fruits, very productive, some of them having a good resistance to low temperatures during pause period, but also to late spring frosts, which, in the past years, are more frequent in the western Romania.

By this paper work we present 12 studied apricot varieties, cultivated at the Didactic Station Timisoara: Earlyryl, Dana, Neptun, Saturn, Cea mai bună de Ungaria, Venus, Callatis, Sulina, Favorit, Selena, Silvana and Olimp, varieties having different maturation periods. There were observed the deployment of phenophases and the behavior of the varieties, concerning the fruit binding degree in the climatic conditions of Timisoara.

INTRODUCTION

The apricot is one of the most important fruit culture species because of its fruit qualities.

The Romanian apricot homologated collection includes 47 varieties out of which 39 are local varieties and 8 are from abroad. These varieties have high quality fruits, they are very productive and some of them have a good resistance to low temperatures during the pause period and to late spring frosts. In the past years the late spring frosts are more and more frequent in this part of the country and this is a fact that might reduce considerably the productions obtained.

MATERIAL AND METHOD

The experiment has developed during the years 2006, 2007 and 2008 in the fruit plantation of the Didactic Station of our University in Timisoara.

There were observed 12 apricot varieties cultivated in the orchard: Earlyryl, Dana, Neptun, Saturn, Cea mai bună de Ungaria, Venus, Callatis, Sulina, Favorit, Selena, Silvana and Olimp. The apricot trees were planted in the spring of 1997, having a distance of 5 m between the rows and 4 m between the trees on a row, with a density of 500 trees/ha.

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The working method was a stationary one having two steps: the first step in the field was based on observing the fruit binding degree, counting the fruits and weighting them and the second step in the laboratory was based on calculating and interpreting the collected data.

RESULTS AND DISCUSSIONS

The studied parameters were the number of flowers, the percentage of bind fruits, the number of fruits left on the tree after the physiological fall and the percentage of harvested fruits.

Table 1

Apricot fruit binding degree in 2006

Variety	No. of flowers	No. of bind fruits	Fruit binding percentage	No. of fruits after the physiological fall	Percentage of harvested fruits
Earlyryl	878	680	77.44	312	45.88
Dana	2100	885	42.14	415	46.89
Neptun	1360	735	54.04	388	52.78
Saturn	1150	845	73.47	420	49.70
Cea mai buna de Ungaria-w.	1815	966	53.22	475	49.17
Venus	4700	1415	30.10	625	44.16
Callatis	1075	815	75.80	585	71.77
Sulina	4015	1380	34.37	618	44.78
Favorit	3100	1265	40.80	595	47.03
Selena	815	600	73.60	490	81.66
Silvana	2007	1100	54.80	560	50.90
Olimp	1620	988	60.98	495	50.10

In 2006, the highest fruit binding degree was obtained for Earlyryl variety, of 77.44%, while Venus variety had the lowest percentage of bind fruits of only 30.10%. A good fruit binding degree was observed for Callatis, Selena and Saturn varieties of over 70% of bind fruits, while Sulina, Favorit and Dana varieties had a fruit binding degree of almost 40%.

In 2007, the fruit binding degree was lower than the previous year because the trees started the vegetative period earlier in spring (due to the high temperatures) and they were strongly affected by the late frosts.

The lowest fruit binding degree was observed for Dana variety, of 7.48% and Olimp variety of only 10.58% bind fruits. The other varieties had percentages of 19.49% to 44.80% bind fruits. Callatis variety had the highest percentage of bind fruits, which is 80%.

Table 2

Apricot fruit binding degree in 2007

Variety	No. of flowers	No. of bind fruits	Fruit binding percentage	No. of fruits after the physiological fall	Percentage of harvested fruits
Earlyryl	3412	665	19.49	100	15.03
Dana	3850	288	7.48	103	35.76
Neptun	1885	375	19.89	187	49.86
Saturn	1720	344	20.00	125	36.33
Cea mai buna de Ungaria	2251	987	43.84	158	16.06
Venus	5971	2560	42.80	220	8.50
Callatis	2715	2172	80.00	205	9.43
Sulina	5257	1980	37.66	196	9.89
Favorit	4635	1512	32.62	178	11.77
Selena	887	398	44.80	80	20.10
Silvana	3116	1144	36.13	186	16.25
Olimp	2975	315	10.58	65	20.63

Table 3

Apricot fruit binding degree in 2008

Variety	No. of flowers	No. of bind fruits	Fruit binding percentage	No. of fruits after the physiological fall	Percentage of harvested fruits
Earlyryl	1680	720	42.85	69	9.51
Dana	1915	350	18.20	14	4.00
Neptun	1658	520	31.36	72	14.00
Saturn	1518	380	25.00	55	14.50
Cea mai buna de Ungaria	1950	885	45.38	199	22.50
Venus	2810	930	33.09	260	27.90
Callatis	2325	783	33.60	49	6.33
Sulina	3110	1030	33.10	52	5.00
Favorit	2980	985	33.20	99	10.00
Selena	987	715	72.40	139	19.40
Silvana	2935	890	30.30	142	16.00
Olimp	1830	620	33.87	108	17.50

In 2008, the fruit binding degree was better than in 2007, but because of the late frosts that affected the bind fruits the percentage of harvested fruits was lower than normal. The best results were observed for Selena variety with 72.40% bind fruits, while Dana variety had only 18.20% bind fruits and Saturn 25%. The other varieties had a percentage of bind fruits around the values of 30% to 40%.

CONCLUSIONS

During the three studied years 2006, 2007 and 2008 we could observe among the varieties high differences concerning the fruit binding degree of apricot trees. Though in 2007 the number of flowers was higher than in the other years, most of the varieties were affected by the late frosts in spring.

The year 2006 was the best year concerning the presented parameter and this is also because it had the highest percentage of harvested fruits. In 2008, the fruit binding degree was better than in 2007and lower than in 2006, but because of the late frosts that affected the bind fruits the percentage of harvested fruits was lower than normal. So in 2006 the percentage of harvested fruits was between 44.16% for Venus variety and 81.66% for Selena variety, in 2007 was of 8.5% for Venus variety and 49.86% for Neptun variety and in 2008 it had values of 5.00% for Sulina variety27.9% for Venus variety.

We can conclude that the best behavior of the varieties to the late frosts could be observed for Selena, Silvana, Cea mai buna de Ungaria and Venus, varieties that were constant during the studied years.

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GEOGRAPHIC CONSIDERATIONS OF THE POMICULTURE IN ROMANIA CONCERNING THE PERIOD BETWEEN 1938-2006

Costela Iordache[1]

KEY Words: pomiculture, geographic repartition, Romania

ABSTRACT

The present study has as purpose the analyze causal-evolutional of Romanian pomiculture in the last 7 decades. It tails to emphasize the mutations which interfered in fruiter surface, in pomiculture structure and in fruits production. Also, there are analyzed the frequency of the fruiter species on the districts and their production. The pomiculture zonation, the fruits industrialization, the evolution of the fruits consumption per habitant constitute the objectives of this article.

INTRODUCTION

The pomiculture is a traditional productive activity, it is important both in terms of food, economic and environmental. Due to their chemical composition complex, rich in carbohydrate, vitamins, mineral elements, cellulose, organic acids, fruits have a high nutritional and energy value, which makes them indispensable in a balanced supply. Wood from cherry and walnut trees is very valuable in the furniture industry. The ecological importance is expressed by the climatic role and also by the role played against the erosion.

MATERIAL AND METHODS

The research methodology was based on the use of several methods (classical and modern) and groups of methods. Data processed years correspond to characteristics of the period 1938-2006. To monitor the dynamics of surfaces and production in the pomiculture sector have used working methods and the interpretation of data. It has been calculated the average, the maximum and minimum of some representations. A special part it had the statistico-mathematics, history, graphics, monograph, statistical method and qualitative fund (drawn).

RESULTS AND DISCUSSION

The geo-ecological conditions of our country are favourable to a wide range of fruit trees and bushes specific to the temperate climate, but also the subtropical. During 1938-2006, the assets pomiculture has reduced its area from 247 thousand hectares (1,04% of the national territory) to 213,4 thousand hectares (0,9%). The evolution was fluctuated,

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constantly ascending between five and seven decades when reached the maximum of 413,8 thousand hectares (1,8%) followed by a continuous decrease until a half-life at the end of the range analyzed (Table no. 1).

Analysis of data above lead to the identification of two distinct stages in the evolution of fruit growing. First is the *post-war period* and especially that of the mid-'50 when the concerns begin to develop fruit growing consisting in the expansion of the orchards area, the creation of nurseries and the modernization of the old ones, the zoning and the territorial micro-zoning of fruit species, the foundation of research stations for the creation of valuable species, the introduction of new agro-technical methods, the use of specialized labor, the import of high productive species, the more complex recovery of fruit on the domestic and foreign market, broaden the industrialization of fruit.

The second stage is marked by structural changes that have occurred *since 1990*, following the passage from state and cooperative property to private property. Major fruit farms (with the surfaces of several hundred hectares) were divided through restitution, in small plots (0,3-2,0 ha / owner). Due to the fact that the new owners hadn't the necessary technical, financial means or had no interest in the care of orchards, most plantations were abandoned, the trees were cut and very few have benefited from the maintenance works, the total area related to fruit growing decreased with 32,0% in 2006 compared to 1990.

The trees of Romanian orchards are old, the rhythm of regeneration being practically very low. At a required annual 7-8 million trees (planting stock) the Romanian nurseries produce around 1-1,5 million trees; the only proof is the 2457 hectares of young plantations reviewed in 2006. The Romania tree growing culture is far removed from European standards : the number of holdings viable, specialized farms around 10-20 hectares, is practically non-existent; the culture systems are still extensive for example at apple tree, the densities at hectare are 800-1200 trees compared to 2500 -3500 in western plantations (Isac I., 2002). In the year 2006, compared to a national average of 1,4% which was owned by the lands with a fruit growing destination in the total agricultural area, in the county is being registered a minimum of 0,04% in Calarasi and a maximum of 6,6% in Arges. Among the territorial administrative units with higher values are : Valcea, Prahova, Dambovita, Gorj, Salaj. *Reported to the national land* occupied by fruit crops, the biggest weights were held by the South-Muntenia with 21,9% and South-West Oltenia. with 21,1%. The vounties with high percentages in fruit-tree growing in Romania in terms of area were: Arges (10,7%), Valcea (6,5%), Prahova (5,9%), Caras-Severin (5,5%), Buzau (5,1%), Dambovita (4,4%), Timis (4,3%), Bistrita-Nasaud and Gorj (4,1% each one). In diametrically opposed positions were the plain counties in south-east of the country (having under 1000 hectares): Ialomita (0,2%), Teleorman, Giurgiu, Braila (0,3%).

The natural factors in correlation with the socio-economic and technical scientific ones led to the obtaining variable productions (Table no.1). Thus, if the total production in 1938 was 1380,0 thousand t in the next decade lowed vertiginous, to relaunch in the'80s when it was reached a record level of 1958,4 thousand t in 1985. Starting with the transition period towards a market economy, the production was established, the multi annual average is about 1,500 thousand t, and the year 2003 was the most productive (2,0884 million t).

In the last year analyzed, the share of regional development in national production fluctuate between 18,2% in the Northeast and 0,6% in Bucharest-Ilfov. Large quantities of fruits were obtained in the districts: Arges (over 116 thousand t meaning 7,8% of national production), Dambovita (about 94 thousand t, 6,3%), Mures (over 62 thousand t; 4,2%), Caras-Severin (about 60 thousand t, 4,0%), Iasi, Suceava. With less than 1% share from the total production output the counties of Romanian Plain and southeastern Transylvania: Teleorman (0.3%), Calarasi (0.4%), Braila, Covasna, Brasov (Fig. 1 - Culture of fruit trees).

Table 1

The dynamics of surface and fruit production (1938-2006)

Specification	M.U.	Year								
		1938	1950	1960	1970	1980	1989	1990	2000	2006
Area	Thousands of hectares	247,0	184,2	214,3	431,8	356,6	318,0	313,4	254,6	213,4
Total production	Thousands of tons	1380,9	401,1	843,9	1172,7	1327,8	1580,2	1453,0	1301,0	1486,4
Average production	Kg/ha	5590,7	2177,5	3938,0	2718,2	3723,5	4969,2	4636,2	5110,0	6965,3
Production per inhabitant	Kg/inhabitant	88,5	24,6	45,9	58,0	59,8	68,3	62,6	58,0	68,9

Source: Statistical Yearbook of Romania, 1992, 1994, 2007 - processing; I.N.S. Bucureşti

Table 2

The dynamic structure of fruit production (1938-2006)

Specification (%) / Year	1938	1950	1960	1970	1980	1989	1990	2000	2006
Plums	19,8	57,5	58,8	59,4	43,6	31,2	30,9	42,2	40,3
Apple	41,0	19,0	13,2	15,0	29,5	44,1	47,0	37,7	39,7
Pears	10,0	3,7	5,4	4,6	5,8	5,3	5,1	5,4	4,1
Peaches and nectarines	1,1	0,4	0,7	2,4	4,2	5,1	3,6	1,4	1,2
Cherries and sour cherries	8,7	5,8	6,6	5,2	5,1	5,1	4,7	5,7	7,1
Apricots and ungrafted apricots	5,8	1,8	3,0	4,0	2,5	3,1	3,3	2,2	2,6
Nuts	9,3	4,4	5,8	2,8	2,6	1,5	1,8	2,4	2,6
Strawberries	-	-	1,7	2,7	2,4	1,9	1,3	0,9	1,5
Other fruit	4,3	7,4	4,8	3,9	4,3	2,7	2,3	2,1	0,9

Source: Statistical Yearbook of Romania, 1992, 1994, 2007 - processing; I.N.S. Bucureşti

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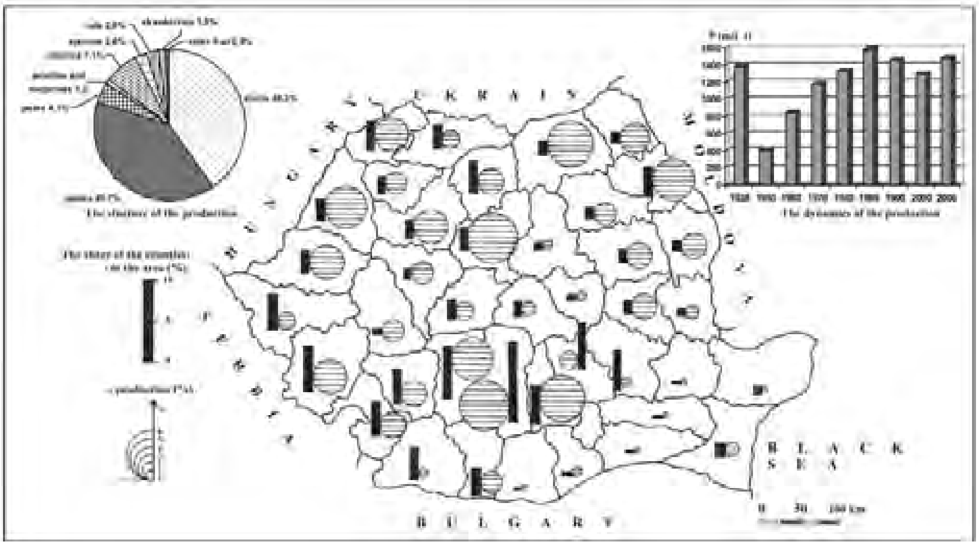

Fig. 1. The culture of fruit trees (2006)

Regarding the *structure of pomicultural assets* were recorded significant changes especially in the second half of the XX century. (Table no. 2)

If we see only the state statistics of the transition period we find the doubling of the share of the cherry and sour cherry and the progression in the case of walnuts (44.4%), plums (30.4%) and strawberry (15.4%). Significant regression were recorded at peaches and nectarines (66.7%) and other fruit (60.9%); too, dropped the weight of apricots and ungrafted apricots (21.2%), pears (19.6%) and apples (15.5%). These developments indicate the tendency to reduce the tips of Romanian fruits, and revealed massive imports of fruits belonging to temperate continental climate.

According to *the Law no. 348/2003* concerning to the fruit growing, in our country grow the following fruit species: a) *fruit trees*: apple, pear, quinces, plum, cherry, sour cherry, apricot, peach and nectarin, nut, almond, hazelnut, chestnut trees b) *fruit bushes*: black, red and white currant, semolina, raspberries garden, thus culture, blackberry garden, sweet briar, rose for petal, Lonicera caerulea c) *strawberry*.

Frequency in the territory of the fruit species is dependent on geo-ecological conditions: fito-climatical area, the relief by altitude, the exhibition and the slopes inclination (15-40%), multi annual average of 8-10^0 C, average rainfall of 500-800 mm/year. Depending on the favorability of these conditions were structured the fruit growing areas whose frequency is higher in Subcarpatii Getici and Curburii.

The plum culture (Prunus domestica) is practiced throughout the country, but bigger productions are obtained in field areas and hills with altitudes of 200-500 meters, with average annual temperature 9-10^0 C and rainfall of 600-700 mm/year. The largest areas planted with plum can be found in Muscelele Argesului, Subcarpatii Prahovei, Buzaului, Vrancei, Valcii, Moldovei, Doagnecei Hills, Oravitei, Oradei, Depresiunile Carasului, Hategului. In 2006, among the counties with the largest productions are: Arges (about 70,000 t, 11.5% of the total production of the country), Caras-Severin (over 40,000 t, 7.2%), Dambovita, Valcea, Gorj.

The apple (Malus pumila) has a large ecological plasticity , the most favourable conditions are linked to annual average temperature of 8-9^{0}C and precipitation of 700-800 mm/year. It is grown in Subcarpatii Prahovei, Buzaului, Moldovei, Plateau Moldova, Transylvania. Depression Baia Mare, Culoarul Timis-Cerna. In the production of apples in 2006 are detached the districts: Dambovita (about 50.000t, 8.4%), Mures (over 47,000 t, 8%), Suceava and Bistrita Nasaud (over 35,000 t, 6.1%), Maramures, Arges, Arad, Iasi, Vrancea, Bacau, Valcea.

The pear (Pyrus communis) has an ecological lower plasticity, with certain thermal requirements (July-August the difference of the temperature should be 10-26^0 C). The North-east and South-Muntenia regions respectively Subcarpatii and Moldova, Subcarpatii and Getic Plateau are the main areas of the culture. Among the big producers of pears we remember the counties : Arges (over 6.3 tonnes; 10.1%), Dambovita (over 5t, 8.1%), Suceava, Neamt, Bacau, Bihor, Iasi.

The cherry (Cerasus avium) and *the sour cherry* (Prunus cerasus) are grown on all forms of relief; large surfaces occur in the east of the Moldova Plateau, the south of Subcarpatii Moldovei, Subcarpatii Curburii, the area near the capital and the northwest of the Transylvania. In 2006, the first producing counties were: Vaslui (about 15 t, 13.9%), Iasi (about 13t; 12.3%), Vrancea (5.5%), Neamt (5.1%), Galati, Botosani, Bacau, Mehedinti.

The peach (Piersica vulgaris) has favorable conditions in Western Hills and Plain, Romanian Plain and Dobrogea. In the production of peaches and nectarines are detached the districts : Constanta, which owns 23.5% of national production and Bihor with 17% at a high distance being Timis, Arad, Satu Mare.

The apricot (Armenica vulgaris) prefers areas with long brightness of the Sun, favourable conditions being in the Western Plain, the Romanian Plain, Dobrogea and the central-eastern part of Moldova Plain. Large production were obtained in Constanta (over 5t; 13.8%), Braila (2.6 t, 6.7%), Giurgiu (2.4 t, 6.1%), Dolj (2.3 t, 6 %), Galati, Tulcea, Vaslui, Teleorman, Calarasi Timis, Olt.

The walnut (Juglans regia) is grown in hilly regions belonging to Subcarpati, Moldova Plateau and the Western Hills. In 2006, a large quantity of nuts was held in the next counties : Vrancea (over 2.5 t, 6.7%), Bacau (1.9 t, 4.8%), Prahova (1.8 t), Gorj. Botosani, Iasi, Suceava, Vaslui.

The other species of fruit trees occupy more small areas: *hazel tree* (82 hectares), *almond tree* (68 hectares), *chestnut tree* (25 hectares); the location of these cultures is dependent on weather conditions; according to M.A.P.D.R., in 2006, the exploitation area of these species is much smaller and, as a consequence the production is reduced.

Strawberry (Fragaria moschata) is grown on 1884 hectares obtaining 21,612 t (in the year 2006). It has an very limited area of culture, fact showed by the concentration of production in several counties: Satu Mare (56.8%), Giurgiu (10.9%), Valcea (8.7%), Arges (5.7%) Gorj, Calarasi, Vrancea and Bihor. Besides these species there are also grown *fruit bushes*, large areas having the currant, the blackberry, the gooseberry.

The fruit industrialization recorded a drastic regression after 1989, some units were closed and the others one have reduced their activity. Canned fruit juices, fruits, dried fruit are produced in Bucharest (Fraga), Raureni (Ramnicu Valcea), Baiculesti (Arges county), Neamt (Silva Fruit), Ploiesti (Ruscoprod), Suceava (Consuc), Ramnicu Sarat (Partenofrutta), Cluj-Napoca (Mib Prodcam), Roman (Fructcons), Buftea (Conserv), Husi (Vitacons).

Regarding the relationship between the fruit production and the number of inhabitants, meaning, hypothetical, *the fruit consumption per inhabitant* is established the following evolution: 88,5 kg/loc (in 1938); 24,6 kg/loc (1950); 68,3 kg/loc (1989); 62,6 kg/loc (1990); 60,3 kg/loc (2000); 76,2 kg/loc (2006). (Source: Statistical Yearbook of Romania, 1992, 1994, 2007 - processing; I.N.S. Bucureşti)

CONCLUSION

Like other fields of national economy, fruit-tree growing has been influenced by the social and political systems that have succeeded. If in the seven and eight decades of the last century this agricultural sector has undergone a considerable development with large plantations areas and intensive plantations, with specialized work force, with the input of the researchers from the research station-fruit tree development, after 1989 the fruit tree heritage recorded significant transformations. The breadth of some phenomena such as the abandonment of some plantations, the decreasing yields per hectare, the waiver of certain phyto-sanitary treatment, the depreciation of the quality fruit, etc. justify the initiation of some measures to revive the agricultural production. These measures should be based on a new approach of the tree species in which the apple, the pear, the peach, the cherry trees that have a larger share by the reducing of plum and ungrafted apricots share which, in terms of economic efficiency are less profitable.

We believe that through financial support and by an organization responsible of the activity in this area of agriculture, standing at the current assets it can be relaunch the fruit production in the main areas of culture both quantitatively and qualitatively.

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THE STRUCTURE, EVOLUTION AND REPARTITION OF THE CATEGORIES OF AREASES'S USE IN DESNĂŢUI PLAIN

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KEY WORDS: agricultural areas, land fund, structural dynamics, Desnatiu Plain.

ABSTRACT

Desnăţui Plain have been shaped a place which order important land resources generated by favorable physic geographic conditions. In 2005, the agrarian resources of Desnăţui Plain counts 357.374 ha and there were prevailing formed by land fund followed, in almost equal proportions, by buildings terrains, roads, waters, unproductive spaces and the difference of 10,1% represents the forest surface. The article presents the dynamics of how the fields are used in Desnatui Plain in the transition period.

INTRODUCTION

Part and parcel of oltenian plain which central zone it occupies Desnăţui Plain is localized between Podisul Getic (at North), Lunca Dunarii (at South), Drincea (at Wes) and Jiu (at East). The field's categories that can be use are determined by geo ecological characteristics of the place and by the social economical conditions (work force, the works against soil erosion, floods).

The lands use is reflected in the toponymy too, many names derived from vegetation denomination: Livezi (Podari), Măceşu de Sus, Măceşu de Jos, Bujor (Vârvoru de Jos), Cornu and Teiu (Orodel), Urzica Mare and Urzicuţa (Urzicuţa) , Brânduşa (Bistreţ), Făget (Breasta), Mărăcinele and Perisor (Perişor), Sălcuţa and Plopşor (Sălcuţa), Braniştea (Podari). The big frequency of the toponyms "La Vii, Dealul Viilor, La Arătura" attests the structure of the land use.

MATERIAL AND METHODS

For the preparation of this study I used as basic material the statistical data from the Regional Direction of Statistics Dolj and from the Agency for Agriculture and Sustainable Development Dolj. The processed data correspond to the period 1990-2005, the last two years being the reference in appreciation of the mutations in how the land are used. The methodology of research focused on the use of the following methods: statistico-mathematics, statistics graphics, analysis and synthesis.

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RESULTS AND DISCUSSIONS

The ways that a land can be use are determined by geological particularities of space and socio-economic conditions (works force, the works against soil erosion, floods). In 2005, the financial resources of the Plain Desnatui counts 3570374 hectares and were made up predominantly of agricultural land (79.4%), followed in almost equal proportions by lands with buildings, roads, water, unproductive areas (10.5%), and a difference of 10.1% represents the forest area.

In terms of structure and area between 1990 and 2005, the agricultural fields of Plain Desnatui recorded the following changes. (Table no. 1, Fig. no. 1)

In the whole, the structure of the land fund in the transition period hasn't been marked by major changes. Unlike the year 1990, it established a insignificant decrease (11 hectares) of the land fund area, taking into explaining the administrative-territorial reorganization of the common.

Compared with 1990, the most important change refers to the decrease of the *agricultural area*. This category of agricultural fields decreased by about 700 hectares, because of the capacity-incomplete of the owners to use the land. The need of work force was lacking mainly in the south of the plain, where villages have small population, aged and with poor working means were surrounded by fallow land. Dropping the agricultural area at the whole plains a feature to the period 1990-2005 has gone against the backdrop of the general available working population, while increasing the share of aged population in rural areas. Thus, the population of Plain Desnatui decreased from 206,109 inhabitants in 1990, to 204,054 inhabitants in 2005, in conditions in which the active population in agriculture in 1990 was 76,614 persons, and in 2005 was 83,520 people (an increase of 16.6%). During the reference, 1990 and 2005, the balance of the work force was registered by a negative showing, considering that the needs of work force was much larger in all the period analyzed, than active population. This explains the incomplete degree of the use of land, fallow areas or poorly used and with productions, often very small.

Secondly, fleet of tractors, agricultural machinery and equipment were insufficient in relation to the requirements of the agricultural specific to the crops and to the cultivated area and to the size of the cultivated area.

In the end, the legal circulation of land registered a slow rhythm, which has not allowed the proper access to the use of the arable, wine or fruit areas.

Regarding *the geographical distribution of the agricultural lands* we find that most territorial-administrative units have agricultural areas between 4,000 and 7,000 hectares and even over 10,000 hectares, as it is the case of the communes of Motatei, Poiana Mare and Goicea. The largest share of agricultural land (over 90% of the total fund) can be found in 18 localities including: Darvari, Giubega, Intorsura, Oprisor, Barca, Macesu de Jos, Macesu de Sus, Unirea, Silistea Crucii.

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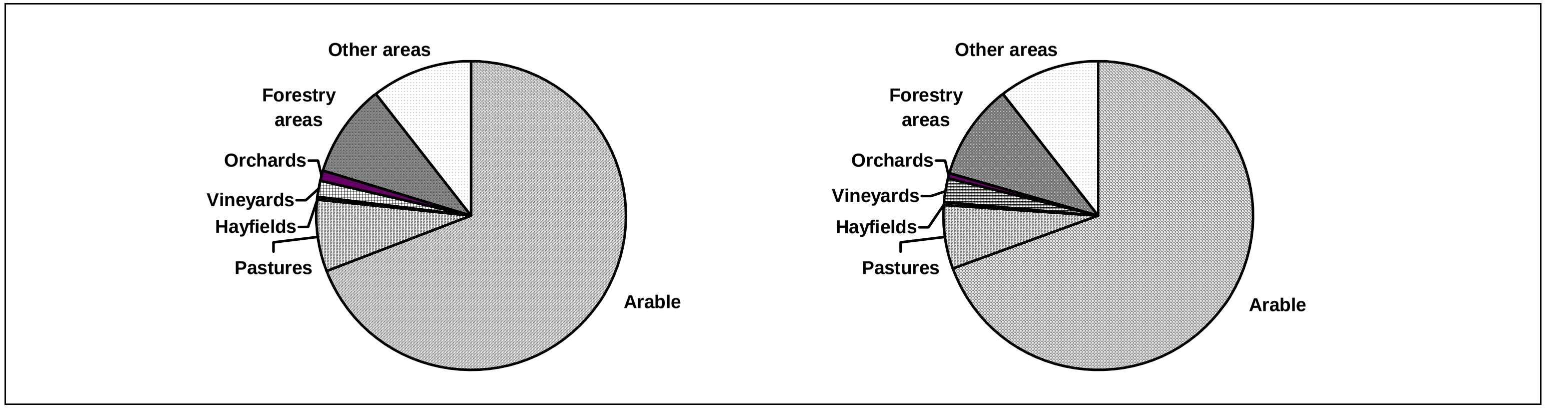
Table 1

The structure of the land fund between 1990 and 2005

Year	Total area (ha)	Agricultural area												Forestry areas		Other areas	
		Total		Arable		Pastures		Hayfields		Vineyards		Orchards					
		Ha no.	%	Ha no.	%	Ha no.	%	Ha no.	%	Ha no.	%	Ha no.	%	Ha no.	%	Ha no.	%
1990	357.385	284.321	79,6	247.032	86,9	26.704	9,4	1106	0,4	6284	2,2	3195	1,1	35024	9,8	38040	10,6
2005	357.374	283.662	79,4	247.841	87,4	23590	8,3	1151	0,4	8952	3,2	2128	0,7	36095	10,1	37.617	10,5

Source : Department for Agriculture and Sustainable Development Dolj - processing



a. b.

Fig. 1. Total land fund by use: a - 1990; b – 2005.

The lowest weights register are found in Piscu Vechi (44.0%), Persisor (51.2%), Desa (56.1%) and Bucovat (56.2%). Unlike the beginning of the analyzed interval in 2005 were recorded growth of the agricultural area in Desa (315 hectares), Gangiova (95 hecate), Poiana Mare (15 hectares). The reductions of this category land were recorded in the communes Gighera (409 hectares), Macesu de Jos (380 hectares), Bistret (300 hectares).

The arable lands represents the largest category of agricultural use, having 87.4% of the total agricultural land of the plain. In some cases exceed 95% of the agricultural area, as is the case in Darvari (99.0%), Macesu de Sus (97.9%), Motatei, Urzicuta, Valea Stanciului, Afumati, Galicea Mare, Giurgita. If in the whole plain, in the period analyzed came into use 809 arable hectares, at the level of the administrative unit were recorded either doublings of the area (as it is the case of Radovan, from 2,407 hectares to 5,083 hectares) or smaller increases: Gighera (620 hectares), Maglavit (236 hectares), Calopar (126 hectares). Among the communes which have passed the agricultural fields into another use we remember: Desa (763 hectares), Bistret (553 hectares), Tuglui (213 hectares), Plenita (151 hectares). (Fig. no. 2)

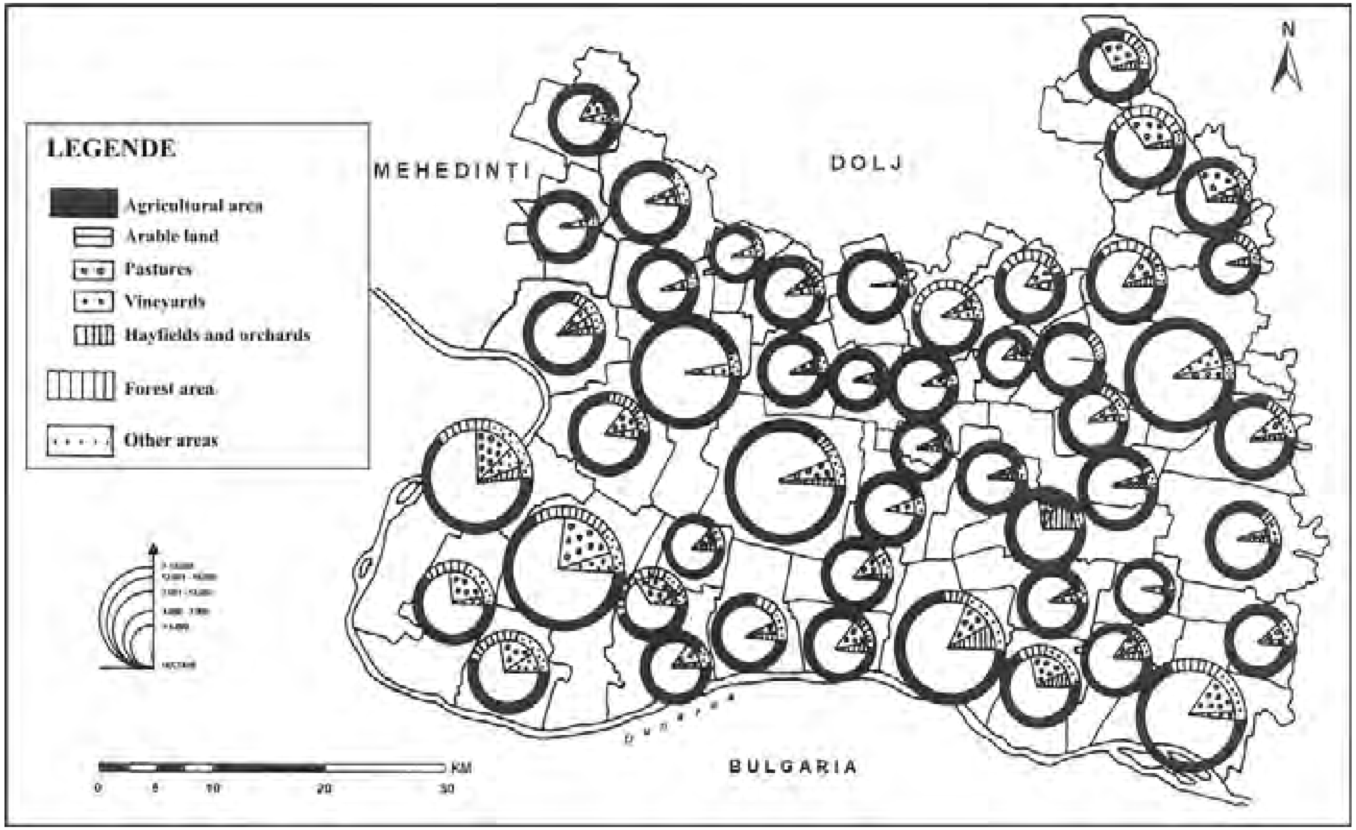
The weighting of *the pastures* dropped in 2005 with 11.7% compared to the first year of reference. If at the beginning of the period studied there was no village to have this category, in 2005, at Giubega, Macesu de Sus and Unirea the pastures had already another use. The territorial repartition is very variable. Thus, in 1990 there were villages which had under 50 hectares of pastures (Darvari, Macesu de Sus) or over 2000 hectares (Ciupercenii Noi). In 2005 these discrepancies maintain, and there are recorded decreases of pastures share in the total of the agricultural land as it is the case of Ciupercenii Noi (from 34.5% to 25.1%), Bistret (from 19.5% to 10.5%).

The geo morphological and climatic conditions, there are restrictive for *the hayfields* so can be explain the share of only 0.4% which its own (is the only constant category throughout the period examined). The largest surfaces can be found at Seaca de Camp (about 200 hectares), Desa (171 hectares), Barca and Rast (about 135 hectares each).

The vineyards and the wine nurseries represents only 3.2% of the total agricultural fields, having the largest share in the agricultural fund in the localities: Segarcea, Desa, Motatei, Poiana Mare Goicea, Galicea Mare. Geo-ecological conditions that characterized the city Segarcea have allowed the individualization of the well-known wine centre which covers an area of about 800 hectares (7.9%). In the territorial plan, the share of the vineyards shows a maximum of about 6.2% in Caraula and 0.1% in Carna. The evolution of the vineyard has been positive in the communes Afumati, Barca, Bistret, Cetate, Gighera, Giurgita, Motatei, Tuglui and negative in Breasta, Valea Stancilui, Radovan, Giubega.

The orchards and fruit plantations decreased both in absolute data as well as relative. They have a great territorial dispersion, in 26 administrative units this agricultural category is not existing. The highest weights are registering in the villages Carna (8%), Bistret (6.4%) and Podari (4.5%). Reported at the situation from the beginning of the period in 2005 were reported regressions on orchards in Afumati, Breasta, Bucovat, Lipovu, Maglavit.

Forestry areas were extended slightly toward the year 1990, presently the largest share in the total area of the administrative units are in Perisor (44.1%), Bucovat (39.1%), Piscu Vechi (37.9%) Radovan (35.9%), Calopar (29.9%), Desa (23.3%) and Poiana Mare (22.3%).



Source of the data: Direcția pentru Agricultură și Dezvoltare Durabilă Dolj

Fig. 2. Total land by use (2005)

Surfaces with other uses decreased to less than 500 hectares in the last year of reference, the highest weights being found in the land fund of the villages Carna (22.1%), Desa (20.6%), Bistret (19.8%), Ciupercenii Noi (18.6), Gighera (16.9%) and in the city Calafat (21.1%).

CONCLUSION

The structure of land use is required to consider because it defines the predominantly character of the rural economy. This structure has been conditioned in the first row by physical and geographical characteristics of the Plain Desnatui and, in the second row by the anthropogenic activities. During the transition, from centralized agriculture to the competitive one, agricultural market, the structure of the land fund has not recorded significant changes. The small changes made over the plain can be found on the level of administrative units too. It maintains the same hierarchy of the villages with the largest share of the agricultural areas (Darvari) and forestry (Perisor).

The dynamics of using the agricultural land put in evidence an increasing share of arable area to the detriment of other categories of agricultural land. The reducing of the areas occupied by pastures led to the drastically reduction of the communal water, with negative effects on the growth of the animals. The fruit growth assets also recorded a decrease of more than 1,000 hectares; in the total of the agricultural area were positioned, with the largest share of the use of the land for the cultivation of fruit trees the villages: Carna, Bistret, Podari, Intorsura, Macesu de Jos, Breasta. In some administrative units there were produced changes in the fruit tree fund by decommissioning some areas covered with fruit trees, the assets being affected greatly, and this is likely the explanation for the fact that 26 villages are not included in 2005 with orchards or fruit nurseries.

The assets wine has increased by over 2600 hectares in the entire area studied. There are localities where this heritage has been reduced as a result of decommissioning of some low productive vineyard lands and the replacement with other culture or of the abandonment of other vineyard spaces because the absence of the force work and the means of work. In some villages the vineyard surfaces are missing or are reduced, which is why they represent small share.

The forest area had a positive evolution both as surface and share, noting the fact that if in 1990 there were 13 villages without forestry fund, at the end of the range analyzed their number was reduced to 9.

The agricultural potential which has Plain Desnatui generated early a major agricultural activity that must be supported by a sustainable agricultural system.

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HERITABILITY OF QUANTITATIVE TRAITS OF INTEREST FOR PRODUCTION OF JUICE IN AUTUMN - AND WINTER APPLE CULTIVARS AS TO THE CONDITIONS AT CLUJ-NAPOCA

Roman Ioana[1]

KEY WORDS: Heredity, juice production, autumn apple, winter apple, genetic effects

ABSTRACT

The experimental study carried out aimed at establishing the heritability coefficients in broad sense (H) for thirteen traits of interest in juice production. Traits were analyzed in view of nominalization of variants with which the genetic effects are highest in the phenotypic expression.

INTRODUCTION

The heredity (heritability, that is) index will show the extent of the phenotype is determined by the genotype – on one hand – and by the impact of environment, on the other. The plant breeder –practically – is leaning selection mainly on the values of phenotypic variance of the chosen trait; the heredity index points to the extent in which a chosen plant has the chance of providing for plant descendents possessing approximately the same mean values of the trait under study.

MATERIAL AND METHODS

The biological material utilized in the experiments that have been carried out were represented by five autumn apple cultivars and twelve of winter, to be found with the cultivar collection of the *University of Agricultural Science and Veterinary Medicine(UASVM)* of Cluj-Napoca .

The calculation of heritability coefficient (H) in broad sense was done with the aid of the variance analysis in the series of experiments, starting out from the presumption that the overall phenotypic variance is made up of the variance of variants, variance of interaction between variants and years of experimentation and, the variance of errors. Thus, there resulted the following formula of computation for the overall (total) phenotypic variance (S^2_{PT}) (adapted from Allard, 1967).

$$s^2_{PT} = s^2_V + \frac{s^2_{V\times A}}{a} + \frac{s^2_E}{n\times a}$$

Where: s^2_V = variance of variants;

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$s^2_{V \times A}$ = variance of variants x years-interaction;

s^2_E = error variance;

n = numbers of repeats;

a = numbers of experimentation years;

and $s^2_G = s^2_V$; s_G = genetic variance.

$$\text{Thus, } H = \frac{s^2_G}{s^2_{PT}} = \frac{s^2_V}{s^2_V + \frac{s^2_{V\times A}}{a} + \frac{s^2_E}{n \times a}}$$

RESULTS AND DISCUSSIONS

Nominalization as genitor of the most valuable cultivars in the collection of autumn- and winter apples was not possible without knowing the extent to which the respective traits were ascertained preponderant-genetically or, by environmental conditions. Such a measurement is represented by the variability coefficient in broad sense, which was possible to be calculated on basis of the data obtained with the checked traits, during the three experimental years.

The values of heritability coefficients in broad sense (H) with the autumn- and winter apple cultivars studied are introduced by tables 1 and 2.

Table 1

Coefficient of heredity (H) in broad sense in certain quantitative traits of interest for juice extraction with five autumn-apple cultivars, Cluj-Napoca

No. crt.	*Character*	Coefficient of heredity (H)
1.	Fruit yield (t/ha)	0,72
2.	Dry matter (%)	0,84
3.	Juice production (hl/ha)	0,90
4.	Juice output (%)	0,84
5.	Fruit weight (g)	0,58
6.	Fruit volume (cm^3)	0,66
7.	Fruit density (g/cm^3)	0,89
8.	Total sugar (%)	0,72
9.	Titrable acidity (%)	0,84
10.	Vitamine C (mg/100g fruct)	0,72
11.	Juice density (g/ml)	0,80
12.	Output index	0,84
13.	Losses (%)	0,80

Data in Table 1 obviously tell that heritability with most of the traits checked – with the autumn-apple cultivars – recorded small- to mean values (H= 0.58 – 0.90). As expected, fruit weight and volume are the characteristics with the lowest heritability index, while fruit density, juice output, dry-matter content and juice extraction have it the highest.

Special attention should be granted on fruit yield and vitamin-C content of these, two extremely important characteristics for ensuring high juice extraction, and of the best quality. Both characteristics display heritability values in broad sense between mean to small (0.72), suggesting the possibility of serious difficulties in the process of melioration directed towards creating new apple cultivars of adaptability to juice extraction in the highest degree possible.

In so far as heritability with the thirteen traits studied in the winter-apple cultivars, there has to be revealed right from the very beginning, that the values of heritability coefficients are lower than with the autumn ones (H= 0.56 – 0.88).

With the winter-apple cultivars too, characteristics such as fruit yield, fruit weight, fruit volume, vitamin-C content displayed values in heritability coefficient classifiable as mean to small (o.56 – 0.64). These data stand witness to the previously made assertions regarding the possibilities of severe difficulties in creating certain new winter-apple cultivars with the highest readiness to juice extraction.

Table 2

Coefficient of heredity (H) in broad sense of certain quantitative characters of interest in juice extraction in 12 winter-apple cultivars, Cluj-Napoca

No. crt.	*Character*	Coefficient of heredity (H)
1.	Fruit yield (t/ha)	0,64
2.	Dry matter (%)	0,72
3.	Juice production (hl/ha)	0,84
4.	Juice output (%)	0,80
5.	Fruit weight (g)	0,56
6.	Fruit volume (cm^3)	0,64
7.	Fruit density (g/cm^3)	0,80
8.	Total sugar (%)	0,85
9.	Titrable acidity (%)	0,88
10.	Vitamine C (mg/100g fruct)	0,66
11.	Juice density (g/cm^3)	0,84
12.	Output index	0,72
13.	Losses (%)	0,72

There has to be underlined that the heritability indices obtained by us possess values very close to those obtained by Brown (1975), Decourtye (1967), Lespinase (1992), Ardelean et al., (2006), with most of the traits discussed. With all these authors, the limits in the variability of the heritability coefficients are wider than those obtained in our experiments; however, the absolute values in the respective coefficients are – as already asserted – very much similar to those obtained by us.

CONCLUSIONS

Based on the results introduced by the research work there can be outlined the following conclusions:

- Similarly with other culture plants, with the apple too – both with autumn- and winter apple cultivars – the characteristics possessing a simpler hereditary determinism (as for instance the dry-matter content, juice extraction, fruit density) have the highest heritability coefficients. Such a fact deserves to be remembered as the respective characteristics have an outstanding impact upon the quality of the apple juice.

- Other characteristics such as: fruit yield/surface unit, fruit weight, fruit volume, total sugar- and vitamin-C contents have displayed mean- to small values in the heritability indices. Such a result was foreseeable when one takes into consideration the fact that the respective traits possess – to an almost certain degree - polygenic genetic determinism, of the quantitative type.

- By corroborating the results obtained in the study on the heritability of traits with the performances recorded with the apple cultivars regarding the thirteen traits of interest for juice extraction, it is possible to assert that the variants *Pătul, Florina* and *Generos* of the autumn-apple cultivars, and *Poinic, Goldspur, Starkrimson,,Jonathan, Jonagold, Idared* of the winter-apple cultivars, can be taken for potential genitors, valuable for the creation of apple varieties possessing high readiness degree to juice extraction.

- Of the varieties previously mentioned, *Pătul* and *Poinic* are not recommendable for genitors when the apple - breeding programme follows the creation of cultivars of dual use (desert fruit and juice extraction); the other varieties mentioned possess likeable qualities both for desert-fruit production and for the production of fruit for juice extraction.

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GENERAL- AND SPECIFIC ABILITY OF COMBINATION FOR QUANTITATIVE TRAITS OF INTEREST TO JUICE PRODUCTION WITH THE F_1 APPLE POPULATIONS UNDER STUDY

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KEY WORDS: Genitors, juice production, genetic determinism, general and specific combination capacity

ABSTRACT

The main objectives pursued by the researches are materialized in the following aspects:

- Computation of CGS and CSC effects on the traits taken into study in view of elucidating some aspects regarding the genetic determinism of the respective traits and the ways of utilizing such improvement scope.

- Formulation of conclusions and recommendations for the apple improvement programmes in view of obtaining new cultivars of high fruit qualities fit for fresh consumption (dessert fruit), as well as for juice production.

INTRODUCTION

Rendering valuable - *via* processing – of plant raw-materials is a permanent aim of research in the field of horticulture, being generated by the necessity for a balanced range of foodstuffs all the year round (Gherghi, 1999). Brown (1975) opined that little has been done in the area of apple melioration, to obtain varieties meant for processing ; for such an aim, however, one encounters the tendency to imply varieties destined to consumption in fresh state, in the processing. Thus, Brown's hint that the task of creating varieties fit mostly for processing is not to be looked over. As for now, programmes of apple research include objectives referring to obtaining varieties for processing and identifying cultivars meeting the demands of processing entirely.

MATERIAL AND METHODS

The biological material used in the experiments has been represented by a number of five apple genitor varieties, which was selection autumn-apple varieties and twelve of winter apple varieties, to be found in the variety collection of the University of Agricultural Science Cluj-Napoca. For selection of genitors, there was utilized a nonparametric method of classifying varieties on ground of ranks recorded for each of the respective varieties for the coefficient of repeatability of each of the thirteen traits of the varieties under study. Potentially valuable genitors were considered varieties presenting the highest sum of ranks for the coefficient of repeatability (CR) of traits of interest for juice production (fruit yield –

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t/ha; DM content-%; juice yield- hl/ha; juice output-%; total sugar content- %; vitamin C content- mg/100 g fresh fruit).

Trough results obtained from three tested years of F1 hybrids we have had calculated the value of general combination capacity (GCC), specific combination capacity (SCC) and constants of specific combination capacity. The calculation methodology is come from Kempthorne (1969) and Masjukova (1979).

As with the parental forms and hybrids, there were followed the thirteen traits considered to be of real interest in the creation of varieties adapted for the production of juice or mixed varieties (for dessert and juice).

RESULTS AND DISCUSSION

The analyzed results regarding the heredity of quantitative traits studied within the F_1 apple populations may be rounded by the introduction of certain additional experimental results referring to the values of the general combination capacity (GCC) and of those of the specific combination capacity (SCC).

These items provide additional information extremely valuable regarding the weight of the additive effects (illustrated by the GCC values) and of the interaction effects (illustrated by the SCC values) in the phenotypic manifestation of a quantitative trait. The value of GCC and SCC effects and SCC constants of fruit characters of interest in apple juice production, Cluj-Napoca, are presented in (tab. 1).

There should be underlined the fact that, for the large majority of the quantitative traits taken into study, there have been stumbled upon significant effects of the general ability of combination.

Most of the quantitative traits studied display a typically quantitative-additive heredity in which the effects of general ability of combination plays the most important part (fruit yield, DM-content, sugar content, titrable acidity and vitamin C).

CONCLUSION

With the above mentioned traits the effects of general ability of combination can show up both in positive direction (increasing trait values) and in negative one (decreasing trait values.) Such a finding makes necessary the exact knowledge of direction in which each variety utilized as genitor can exteriorize the effects of the general ability of combination.

There are several analyzed quantitative traits with which the effects of the general ability of combination are entirely insignificant (juice yield), fortunately, however, with most of these, the effects of specific ability of combination are high and very high.

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Table 1

GCC and SCC effects and SCC constants of fruit characters of interest in apple juice production, Cluj-Napoca

No crt	*Character*	*Genitors*	Florina	Generos	Goldspur	Idared	Starkrimson	GCC Effects	SCC Constants
1	*Fruit yield* (t/ha)	Florina	-	-9,568	-10,676	10,051	10,193	-0,930	31,9083
		Generos	-9,568	-	10,837	-10,204	8,934	-0,043	31,9083
		Goldspur	-10,676	10,837	-	9,559	-9,720	-1,493	31,9083
		Idared	10,051	-10,204	9,559	-	-9,406	1,544	31,9083
		Starkrimson	10,193	8,934	-9,720	-9,406	-	0,922	31,9083
		DL 5% = 1,329; DL 1% = 1,752; DL 0,1 % = 2,249							
2	*Dry matter* (%)	Florina	-	-3,783	-4,660	4,350	4,094	-0,445	7,8793
		Generos	-3,783	-	3,824	-3,994	3,954	-0,388	7,8793
		Goldspur	-4,660	3,824	-	4,501	-3,664	0,590	7,8793
		Idared	4,350	-3,994	4,501	-	-4,857	-0,279	7,8793
		Starkrimson	4,094	3,954	-3,664	-4,857	-	0,522	7,8793
		DL 5% = 0,509; DL 1% = 0,671; DL 0,1 % = 0,862							
3	*Juice production* (hl/ha)	Florina	-	46,954	57,456	-56,148	-48,262	0,908	92,235
		Generos	46,954	-	-48,779	53,681	-51,856	5,301	92,235
		Goldspur	57,456	-48,779	-	-56,687	48,010	-1,675	92,235
		Idared	-56,148	53,681	-56,687	-	59,154	-3,612	92,235
		Starkrimson	-48,262	-51,856	48,010	59,154	-	-0,922	92,235
		DL 5% = 8,891; DL 1% = 11,720; DL 0,1 % = 15,042							
4	*Juice output* (%)	Florina	-	21,717	-22,956	-20,879	22,118	0,347	9,5317
		Generos	21,717	-	-21,806	20,998	-22,909	-0,743	9,5317
		Goldspur	-22,956	-21,806	-	21,537	23,226	-0,264	9,5317
		Idared	-20,879	20,998	21,537	-	-23,045	1,106	9,5317
		Starkrimson	22,118	-22,909	23,226	-23,045	-	-0,446	9,5317
		DL 5% = 1,010; DL 1% = 1,331; DL 0,1 % = 1,709							

Table 1 – continue

GCC and SCC effects and SCC constants of fruit characters of interest in apple juice production, Cluj-Napoca

No crt	*Character*	*Genitors*	Florina	Generos	Goldspur	Idared	Starkrimson	GCC Effects	SCC Constants
5	*Total acidity* (%)	Florina	-	-0,123	-0,090	0,104	0,109	0,008	0,01293
		Generos	-0,123	-	0,127	-0,108	0,105	0,019	0,01293
		Goldspur	-0,090	0,127	-	0,102	-0,139	-0,025	0,01293
		Idared	0,104	-0,108	-0,108	-	-0,098	-0,015	0,01293
		Starkrimson	0,109	0,105	-0,139	-0,098	-	0,013	0,01293
		DL 5% = 0,025; DL 1% = 0,033; DL 0,1 % = 0,042							
6	*Vitamine C* (mg/100g fruct)	Florina	-	-1,107	2,012	-3,006	2,101	0,187	4,65892
		Generos	-1,107	-	-2,820	2,901	1,026	0,376	4,64004
		Goldspur	2,012	-2,820	-	2,819	-2,011	-0,892	5,97588
		Idared	-3,006	2,901	2,819	-	-2,714	0,451	8,16891
		Starkrimson	2,101	1,026	-2,011	-2,714	-	-0,122	4,19769
		DL 5% = 0,337; DL 1% = 0,444; DL 0,1 % = 0,570							
7	*Sugar content* (%)	Florina	-	-3,892	-3,893	4,054	3,730	-0,672	15,0639
		Generos	-3,892	-	3,707	-3,628	4,092	0,156	15,0639
		Goldspur	-3,893	3,707	-	3,520	-3,334	0,723	15,0639
		Idared	4,054	-3,628	3,520	-	-3,947	-0,232	15,0639
		Starkrimson	3,730	4,092	-3,334	-3,947	-	0,025	15,0639
		DL 5% = 0,721; DL 1% = 0,950; DL 0,1 % = 1,220							
8	*Fruit weight* (g)	Florina	-	-61,796	-57,602	55,769	63,630	2,167	55,6673
		Generos	-61,796	-	51,991	-50,963	60,769	-5,056	55,6673
		Goldspur	-57,602	51,991	-	68,741	-63,130	-11,333	55,6673
		Idared	55,769	-50,963	68,741	-	-61,268	13,301	55,6673
		Starkrimson	63,630	60,769	-63,130	-61,268	-	0,922	55,6673
		DL 5% = 9,491; DL 1% = 12,511; DL 0,1 % = 16,058							

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RESEARCHES REGARDING THE ESTABLISHMENT OF THE INTENSIVE AND SUPER-INTENSIVE CULTIVATING TECHNOLOGY OF THE PEACH-TREE IN ORADEA FRUIT-GROWING AREA

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KEY WORDS: Peach-tree, varieties, planting distances, the behaviour of the flower buds, thick growing of the trunk, fruit production

SUMMARY

The peach-tree is one of the most appreciated fruit-growing to the special qualities of the fruit and to the biological possibilities of the tree.

The intensive and super-intensive peach-tree growing raises a number of questions regarding regarding the possibility of applying the system, because in the case of the peach-tree, there are no reduced vigour varieties or mother plants in production, which could easily allow the appliance of those systems on a large scale.

Taking into account the general tendency of intensifying the tree-growing, it is raised the problem of trying and finding solutions of making possible, in the case of peach-tree, too, the planting of more trees on a hectare, promoting the intensive and super-intensive cultivating system.

This way, researches were performed in Oradea, using varieties and planting distances, on their basis being decided the intensifying degree of the peach-tree.

INTRODUCTION

The peach-tree belongs to the most valuable fruit-growing species.

Taking into account their savour, the peaches are placed immediately after the grapes, oranges and apple, they have a complex chemical composition and can be eaten both fresh varieties prove a spaced.

Peach-tree varieties prove a spaced out ripening, beginning with the 15th - 20th of June until the end of September, covering a period of more than 100 days.

The peach-tree shows some technological advantages: it is extremely precocious and productive; it hasn't got any response at fertilizing and irrigation; lower sensibility in case of hoar-frost compared to the apricot-tree; fruit are easily carried and handled.

Among the disadvantages of the peach-tree, the following could be pointed out: high demands for light and heat as well as for the soil; pretension to cutting very sensitive in case of blistering, reduced longevity and a certain percentage of early perishing.

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MATERIAL AND METHOD

The biological material consisted in 3 peach-tree varieties: Springold, Redhaven and Autumn Gorgeous, grafted on a month plant, Oradea 1, which represented a factor during the experiment.

The trees were planted leaving a distance of 4 meters between the rows and 3, 2, 1 and 0,5 meters between the trees in a row, having as result variants with planting distances comprising 833, 250, 2500, 5000 tree planted on a hectare, representing variants of intensive and super-intensive cultivating systems.

The soil in the orchard was maintained in good conditions as an early autumn ploughing long before and using the dish harrow.

Regarding the rigorous maintenance of soil as ploughing, during the last 2 years, there was noticed a certain reducing of the strictness applied to the appearance of many weeds, beginning especially with the second part of the summary.

The fertilization of the poet was done by the yearly usage of N_{100}, P_{100}, K_{100} Kg doses of active substance per hectare, and disease and pest control was done according to the technology applied in the production farms.

In order to notice the behaviour of the trees depending on planting distance, the growth of the tree thickness and the loss quality and quantity ; and the loss of flower buds was given in percentage of the total amount of the analysed buds.

At the same time, when spring began, it was found out the way the flower buds passed the winter, by means of gathering the fruit-behaviour branches and gathering the fruit-bearing branches and deciding upon the buds viability.

RESULTS AND DISCUSSIONS

1. The resistance of the varieties to the frost

Taking into account the temperature during the winter 2005 – 2006 and 2006 – 2007 we found out the way in which the varieties analysed were influenced by these values of the temperature.

The researches of the data obtained during the spring of 2006 showed that all the varieties studied were strongly influenced by the low temperatures during the winter, which practically destroyed the crop 100%.

The behaviour of the buds when confronted with negative temperatures in 2007 is presented in table no 1.

Table 1

Behaviour of the buds when negative temperatures – 2007

Variety	Number of analysed buds	Number of variable buds	Number of dead buds	Percentage of dead buds
Springold	100	12	88	88
Redhaven	83	67	16	13
Autumn Gorgeous	40	16	24	60

When looking at data in this table it can be noticed that, during the winter 2006 – 2007, when the lowest temperature only came close to the limiting value of resistance at the peach-tree, there was also registered an important loss of flower buds.

The loss differs depending on the variety, finding that the Radhave behaved the best out of the 3 varieties studied, having 13% loss, which places it between the common limits, from the practical point of view.

A more serious situation can be noticed at Springold with early ripening, which showed a loss more of more than 80% of the flower buds, so that there is a strong reason for compensation cutting.

Between the 2 varieties the Autumn Gorgeous is placed, with loss of 60%

There can be noticed that the resistance at lower temperatures is strongly influenced by the biological factors and variety being established the fact that both the variety with early and late ripening show a strong sensibility when confronting low temperature.

2. The growth in thickness of the truck

The growth in thickness of the truck was obtained by measuring the truck was obtained by measuring the truck at about 30 cm above the ground, at the end of vegetation period using sliding callipers; after that, the results were counted for the surface of the truck's section expressed in cm.

Table 2

The surface of the truck's section at the peach-tree depending on the variety and the planting distance at the beginning of 2007

Variety	4x3 m 833 trees/hectare	4x2 m 1250 trees/hectare	4x1 m 2500 trees/hectare	4x0,5 m 5000 trees/hectare	Mean of variety and planting distance	%
Springold	26,9	23,4	22,2	14,1	21,6	118
Redhaven	16,2	17,5	14,3	11,7	14,9	81
Autumn Gorgeous	21,1	20,8	17,6	13,5	18,3	100
Mean	21,0	20,6	18,0	13,8	18,3	100
% given 4x3 m	100	98	86	66	-	-

Table number 2 shows that the 3 varieties behave differently regarding the vigour expressed by the surface of the truck's section.

This way, Springold proves to be the most vigorous, overcoming by 18,3% the being of the 3 varieties taken as witness, being followed by the Autumn Gorgeous , its vigour equalized the mean of the 3 varieties.

When tacking into account the Redhaven variety, we noticed a reduced vigour by 19% confronted with the varieties mean, an extremely important fact for the success of intensive and super-intensive plantation, as it is known that the peach-tree doesn't expose less vigorous mother-plants and varieties. The reduced vigour of the Redhaven variety can also be noticed when referring to the height of the trees as well as to the length of the mixed branches, which are shorter than those belonging to the other 2 varieties under researches.

As concerns the behaviour of the varieties under the influence of the planting distances, it can also be noticed, a strong difference, that is the reducing of the trunk to the extent of the reducing the planting distance, in turn, and increasing the number of trees planed on a hectare.

This way, compared to the trees planted at 4x3m (833 trees/hectare), the trees planted at 4x2m prove to be 2% less vigorous, those planted at 4x1m are 14% less vigorous and those planted at 4x0,5m are 34% less vigorous.

This progressive decrease of vigour, as the number of trees planted on a hectare increases, can be explained by the fact that the trees, possessing smaller and smaller nutritions space turn to account less and less light, food and water but the reduced vigour of trees planted at small distances doesn't have negative effect on the production, on the contrary, the reduced growth being a factor which stimulates the fruit-growing expressed in tons, per hectare.

Beginning with the data in this table which show that if we plant the trees at 4x1m and using the Redhaven, we obtain 14 – 19% less vigorous trees, it is proved we can use in future the intensiveness of the peach – tree growing, using the bilological materials existing in the culture.

3 .Fruit production

On the basis of those presented in table no.3, we can notice that the variety with the best production is Autumn Glamorous, very closely to it coming the Radhaven, which produces an average of almost 15 tons/hectare during a fixed period. The lowest production is given by the Springold, this being a direct consequence of the fact that it has fruit with an early ripening and a great sensitiveness towards lower temperatures.

As the planting distance concerns, it can be noticed that, during the whole period and counted mean researched, the fruit producing increases as the decreasing of the planting distance, simultaneously with the increasing of the number of trees planted on 2 hectare.

This way, given the trees planted at 4x3m distance, by planting them at 4x2m the production grows with 41%, and by planting at 4x1m and 4x0,5m distance, the production is doubled and tripled.

It can also be noticed that among the trees planted at 4x1m, 1x0,5m distance, the level of the crops comes closer at Springold variety, as a consequence of the fact that, it being more vigorous, the production of the trees planted a 4x0,5m remains the same or even decreases.

Comparing the data of the trunk's growth with those of the production given the planting distance, it can be noticed the existence of a reversed relationship if it depends on the production counted for each hectare, meaning that the less vigorous the trees are, the richer the fruit production is, this growth being more striking than reducing the trees vigour.

Table 3

Production of fruit depending on the planting distance and variety of the peach-tree, in the conditions of Oradea region (tones/ hectare)

Variety	Year	Planting distance (m)				Variety and distance mean	%
		4x3 m 833 trees/hectare	4x2 m 1250 trees/hectare	4x1 m 2500 trees/hectare	4x0,5 m 5000 trees/hectare		
Springold	2004	3,2	6,5	13,8	12,7		
	2005	1,2	3,4	3,0	4,2		
	2006	12,3	27,5	34,1	35,4		
	2007	2,0	3,1	6,3	12,5		
Mean		4,7	10,1	14,3	16,2	11,3	82
Redhaven	2004	4,5	8,3	10,6	11,6		
	2005	2,9	3,1	4,9	7,6		
	2006	16,9	25,6	51,4	50,2		
	2007	5,0	7,6	15,2	21,0		
Mean		7,4	11,2	18,0	22,5	14,8	108
Autumn Gorgeous	2004	6,5	9,9	16,1	23,3		
	2005	6,3	6,1	7,8	7,6		
	2006	13,8	20,8	29,2	58,8		
	2007	4,0	6,1	12,0	15,0		
Mean		7,6	10,7	16,4	21,6	15,1	100
%		100	141	214	328	13,7	100

CONCLUSIONS

The analysis of the behaviour of the flower buds during the low temperature winter periods shows that, taking into account the 3 varieties, a better resistance is recorded by Redhaven, which showed 13% frozen buds in 2007 spring compared to Spingold, which had a percentage of 88% of destroyed buds.

The data concerning the growing and ripening of the trees depending on the variety and planting distance allow us to draw the following conclusions: referring to the vigour of the varieties studied, it can be seen that this is different, Redhaven proving less vigorous whereas Autumn Gorgeous and Springold showed more vigour. This way, we can afford to say that Redhaven is better-suited to be introduced in the super-intensive culture, comparing to the other 2 varieties which were analysed.

The planting distances strongly influence the growth in thickness of the tree, because it reduces as the planting distance of the tree, it turns, reduces from 3 m to 2 m, 1 m and 0,5 m. The decreasing of the vigour of the trees as planting distance in turns decreases to 34%, proves to be an encouragement which comes to promote the super – intensive growing system for the peach – tree, too.

Fruit production is influenced by varieties and planting distances. The three varieties which were analysed register, depending on the fruit – ripening period, a smaller production at Springold with early ripening, and a richer one at Redhaven and Autumn Gorgeous.

The planting distance positively influence the production obtained on each hectare as the trees are planted thickly, obtaining a more numerous number of trees per hectare and a richer production, succeeding in obtainig a doubled or even a tripled production.

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THE BEHAVIOUR OF SOME VARIETIES OF BEANS GROWN IN THE CLIMATIC CIRCUMSTANCES OF ORADEA REGION

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KEY WORDS: variety, beans, climatic circumstances, area, productivity

SUMMARY

The research paper studied the behaviour of certain varieties of beans under the climatic circumstances specific to Oradea region. The varieties if beans tested in Oradea in 2006 are characterized by a great biological and productive potential. The experiment with the varieties of beans emphasizes their behaviour from the angle of the measurements obtained which are related to the production. The productive capacity of the species is closely related to the appearing of the climatic elements which influences it. In spite of this, there are certain species which respond better or less better to those specific circumstances, being pointed out from the others through the production differences. Choosing the best – adapted variety for the climatic conditions of specific geographical area proves to be mostly influential upon the economical efficiency of that variety, besides the other technological elements which should be regarded for.

INTRODUCTION

The bean seeds are used as basic food for people; statistics made by FAO show that more than 500 million people usually eat bean products. For a long time, bean has been called "poop people's meat" because of its high content of quality proteins; rich in essential aminoacids (lizine, arginine, triptofan) and more accessible with the price compared to the proteins of animal origin. The energetic value of the bean seed is very high, of course; reaching about 335 calories given by 100 grams of dried seeds. Food products obtained from, dried beans are very tasty indeed; we can't underrate their dietetical characteristics, and that is the reason they should be part of the diet recommended for the treatment of certain diseases, among them being the liver diseases. Bean seeds flour can be used mixed with the wheat flour, in a percentage of 5% - 10%, in order to obtain tasty and nutritions bread. Green pods are very appreciated as vegetables, whereas Chinese and japonese cuisine use young beans offshoot prepared as salad. The beanstalks (proteinic substances 8,1% of s.n.; glucid – 3,1% of s.n.; cellulose – 3,6% of s.n.) and bean pods constitute valuable fodder, especially for sheep and cows. Bean pods are used in medical field, prepared as tea for the treatments of diabetes. The bean is harvested in early summer (July - August) leaving the land treated with nitrogen, without seeds or plant remains, the tilling of the ground is made in good conditions, so it can be considered as a good forerunner for other cereal crops and especially for the autumn wheat.

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MATERIAL AND METHOD

The biological resources which were experimented upon considered in 6 varieties of beans: Avans, Ardeleana, Star, Ami, Diva, Emiliana. Technical data regarding the technical conditions in wich the experiment took place:

- Experimenting place: Research and Development Agricultural Station in Oradea
- Type of soil: brown
- Forerunner peant: wheat
- Maintenance work: 2 weedings
- Supervision work: 2 sinoratox!2,0 treatment against beans weevil
- Fertilization was made using autumn before ploughing
- Sowing was performed by hand
- During vegetation period observation and measuring were carried
- Harvesting was done by hand and weighing were carried
- Explanation and analysis of results
- The method of setting the experiment was in the form of randon blocks of 6 variants arranged in 3 repetitons
- The harvesting area of a plot was 20 square meters, and the plants were sowed at the distance of 50 cm between the rows
- Thickness was of about 50 germinative beans on a square meter for all the 6 varieties
- The distance between the repetition blocks was of 1 meter (paths) and for each margin of the block there was placed one protection part as large as a common variant
- The scheme of the experiment field and of the randomizing way of the variants for the 3 blocks can be noticed in diagram No.1

OBSERVATIONS AND MEASUREMENTS

During the vegetation period of the tested beans varieties on the experimental field and, when harvesting, the following biometrical measurements were obtained:

a) Observations:

- blossoming (starting point and number of days)
- maturation (starting point and number of days)
- resistance against diseases and pest, by giving grades from 1 to 5 (1 for very resistance; 2 – resistant; 3 – average resistant; 4 – poor resistant; 5 – non-resistant)
- plants density per square meter at harvesting

b) Biometrical measurements

- total height of plants
- insertion height of the bottom pods
- number of pods/ plants
- number of bean seeds/ pod
- average weight of the bean seeds/ plant
- MMB and MHL

The observations and measurements noticed above were produced during the analyses of 10 plants from each variety and counting the average. Production fixing was obtained by weighing the bean seeds from each lot and each repetition and relating that to each hectare. The biometric observations and measurements, together with the production results offer a better appreciation of the behaviour of the beans varieties in the climatic circumstances specific for the Oradea region.

RESULTS AND DISCUSSIONS

The bean is a cultures plant with higher requirements regarding the pedoclimatic conditions. The year 2006 was a favourable one for all the cultured plants, including the bean, because of all climate conditions which were most favourable. During the vegetation period, for the varieties of bean experiment, a certain series blossoming were made, regarding the disease, and pest, plant density at harvesting (table no. 1). According to the description in Table no.1, the starting point of plants blossoming was 20th of June for Star and Diva varieties, while Emiliana and Ardeleana varieties followed 2 days later. For the Ami variety, blossoming began on the 26th of June, and for Avans variety, on the 1st of July.

Table 1

Observations made during the vegetation period of the beans variety experiment, Oradea, 2006

Nr.	Variety	Blossoming		Maturation		Grade for the resistance against diseases and pest	Density at harvesting/m^2
		Starting day	Duration	Starting day	Duration		
1.	Avans	1.07	22	27.07	12	2	41
2.	Ardeleana	28.06	22	27.07	10	2	46
3.	Star	26.06	21	19.07	11	2	36
4.	Ami	29.06	18	18.07	12	2	50
5.	Diva	26.06	21	19.07	13	2	38
6.	Emiliana	28.06	20	19.07	10	2	37

Duration of blossoming was about 18 days (Ami) and 22 days (Avans and Ardeleana). Maturation of the bean pods in the year 2006 conditions began on the 18yh of July (Ami). Star, Diva and Emiliana varieties fallowed on the next day. About a week later (27th of July) the other 2 varieties, Avans and Ardeleana followed. Duration of maturation extended from 10 days (Ardeleana and Emiliana) to 13 days (Diva). Density of the harvesting plants was about 37 – 38 plants/m^2 for Emiliana and Diva varieties and up to 50 plants/ m^2 for the Ami variety. In the conditions of 2006 there were no signification signs of diseases or pest at the varieties of bean experimented in Oradea. Alongside the observations about vegetables presented above, before and after harvesting, measurements. (table no.2)

The total height of the plants is an average of 50,2 cm at the Ami variety, 55,8 cm at Star variety, 58 cm at Diva and Ardeleana varieties and about 65 cm at Emiliana and Avans varieties. The insertion height of the bottom pods stretches between 9 cm (Ardeleana) and 11,4 cm at Diva. The average number of pods per plant was 8,8 for Ami, 9,9 for Ardeleana and not more than 11,2 for Emiliana. In these conditions, the average number of bean seeds per plant was 35,5 for Ami, 36,5 for Star and maximum of 49,2 for Ardeleana. The average weight of the bean seeds on a plant was of 7,9 g at Ami, 9,7 at Avans, 10,9 at Ardeleana and up to 12,7 g at Star variety. The highest MMB was 250 g at Avans variety, followed by 269 g at Ami. The best amount was of 300 g, and 350 g for the Emiliana and Star varieties. The productions obtained during the experiment on beans in 2006 are good enough for the Western part of the country, almost of about 16,0 q/h in some cases (16,4 q/ hectare at diva variety in repetition III, the table). The most productive variety is Ami, but the difference, compared to Diva and Emiliana is very little. Compared to Avans – witness-variety, the “variation analysis” established the significance degree for the difference of the table. Compared to Avans witness – variety, with an average production of 11,7 q/hectare.

The Ardeleana and Star varieties showed differences of –0,1 and +0,4 q/hectare, proving insignificant in both cases.

Table 2

Biometrical measurements at the variety of beans experimented, Oradea, 2006

Nr.	Variety	Height (cm)		Nr. of pods/plant	Nr. of bean seeds/pod	Weight been seeds/plant	MMB (g)	MHL (kg)
		Total	Insertion					
1.	Avans	64,4	10,0	11,0	44,2	9,7	250	78,8
2.	Ardeleana	58,3	9,0	9,9	49,2	10,9	280	77,2
3.	Star	55,8	9,5	10,2	36,5	12,7	350	72,0
4.	Ami	50,2	11,0	8,8	35,4	7,9	260	78,2
5.	Diva	58,1	11,4	10,8	43,3	11,4	290	74,0
6.	Emiliana	64,9	10,8	11,2	45,0	12,2	300	77,2

Table 3

Synthesis of production results obtained at the bean experiment Oradea, 2006

Nr.	Variety	Productions from repetitions			Average production q/ha	Relative production %	Difference q/hectare	Significance of differences
		I	II	III				
1.	Avans	8,3	11,4	15,4	11,7	100	-	-
2.	Ardeleana	8,9	12,0	13,9	11,6	99	- 0,1	-
3.	Star	10,9	12,8	12,6	12,1	103	+ 0,4	-
4.	Ami	15,4	14,6	15,0	15,0	128	+3,3	*
5.	Diva	13,2	14,2	16,4	14,6	125	+ 2,9	*
6.	Emiliana	13,7	14,5	16,2	14,8	126	+3,1	*

DL 5% = 2,47 q/ha DL 1% = 3,51q/ha DL 0,1% = 5,09 q/ha

CONCLUSIONS

The experiment regarding the behaviour of beans varieties in Oradea, took place in favourable climate conditions. These conditions caused a different response of the varieties from the point of view of observation and measurements which took place, and also of the productions obtained. Analyses of the data obtained in 2006 show a good bahaviour of all the varieties, but Ami, Diva and Emiliana varieties were distinguished from the rest, obtaining significant differences of production of +3,3 q/hectare, compared to Avans, the witness – variety, with the production of 11,7 q/hectare. In order to cultivate beans in Oradea region, following the experiment presented in this work, there can be recommended all 6 varieties of beans, but the most productive are: Ami, Emiliana and Diva.

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THE MAIN BIOLOGICAL AND AGRICULTURAL-PRODUCTIVE CHARACTERISTICS OF SOME NUT-TREE HYBRIDS FROM OLTENIA'S SUB-CARPATHIAN AREA

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KEY WORDS: Juglans regia, Juglans nigra, nut tree, germoplasma

ABSTRACT

In Romania, the establishment of nut tree plantations is continuously expanding, yet the seeding material production has never raised up to the level of cultivators requirements.

In our country, although the mother plants are confirmed as Targu Jiu 1, Secular and recently Portval, because of lack of seed tree materials, at present, most of the varieties are being grafted on saplings proceeded from a mixture of genotypes belonging to the species of Juglans regia.

By studying the rich stock of germoplasma, present in the district of Gorj, 20 hybrids, that have appropriate features to their formation as mother plants have been collected, so that they might improve the existing variety.

INTRODUCTION

The development of modern fruit growing cannot be understood without a hard study of mother plants, because they greatly influence the degree of productivity of the varieties the constant of fruit bearing, which is a quality of fruit, the longevity of trees as well as their relationship the environment they live in.

The majority of nut tree cultivating countries have reached to the conclusion that multiplying the nut tree by intensive plantations for this species. The improvement of nut tree grafting technique has raised the problem of using genuine mother trees.

Although research regarding this very subject is rather recent and continuously developing, in no country have they precisely established the best mother tree for each variety nor did they establish the most favorable areas for each mother tree.

MATERIALS AND METHODS

Research was carried out during the period 2003-2007 under the pedoclimatic conditions of the subcarpatian area of Oltenia, in the nearby of Targu Jiu, and the material used in the selection papers was proceeded from both the spontaneous and cultivated flora.

The selection phases hint to identify the initial material both the individual and mass selection as well as the study on saplings and mother trees schools.

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Via individual selection, have they collected 20 natural hybrids belonging to the speciens of *Juglans regia* and *Juglans nigra,* appropriate to the study conditions.

The biotypes have been codified under the short name the EL (the hybrid), followed by a number of order and the street short name or the location where they have been identified.

Observations and measurements were carried out over these selections, concerning: the main phenological phases of both generative and vegetative organs; observations over the mother plant size, consisting in the surface of the trunk selection, the diameter of the wreath; calculations over the physical and technological features over the fruit and the agro productive features (weight, color, shape index, carpelar welding, % of the core).

RESULTS AND DISCUSSIONS

Since of hybrids under study are different in age or growing conditions , the analysis of the obtained results is going to aim at pointing out to the main features and characters concerning the biotypes.

The referential stages from phenological point of view for the selected hybrids, are spreading in vegetation, blooming and harvesting maturity**.**

The burgeoning has been observed as occurring in the second part of March, this being the earliest time, on the 21.03 at EL-8-TJ and on the latest time on 06.04 for EL-15-TJ. The earliest date of the blossom of the female flowers occurred on 14.04 at EL-2-PT, and the end of the blossom on 10.05 (EL-7-TJ, EL-16-TJ and EL-20-JN).The blossom period of the male flowers takes place between 16.03 at EL- 12.05. Dichogamy is a usual phenomenon that often appears as well as on the nut tree and on the studied selections and the report between the protogine plants and the protender ones is almost equal. At all the selected elites the fructification type is terminal, more than half of them, having the protogine type of blossom. (Table. No. 1)

The resistance of the trees at frost can be appreciated according to the presence or the absence of the wounds on the trunks and branches or by the absence or presence of dry young branches. From the 20 selections, half of them present resistance at frost during winter, among them is also mentioned the *Juglans nigra* elite, six of them have medium resistance, (EL-6-TJ, EL-13-TJ) that is they are weakly benumbed on the top of the branches that are one year old, and only four of them are sensitive (EL-8-TJ, EL-9-TJ, EL-12-TJ and EL-18-TJ), being affected the wood one year old and only a little the one of 2-3 years old.

The manifestation intensity of the diseases is in a close connection with the climatic conditions of the respective year, thus in the case of anthracnose, its manifestation is sporadic, but in case of bacteriosis the development of this disease was permitted due to climatic conditions at 50% from the studied trees. The fruits size is a determinative element for the mother plant. Having been realized through the calculation of the size index, the fruits size represented values extended from 20.7 mm (EL-12-TJ) to 31.9 mm (EL-9-TJ).All the selections have an equatorial diameter that doesn't outrun 29 mm; eight of the elites have fruits with a diameter that outruns 26 mm, thus they can be put in the class of nuts for consumption, if by any chance their final assessment doesn't allow their use as seed trees for mother plant.

More than half of the selections present an unitary form of the fruits, namely spheroidal one (round), this resulting from the index value , such as (I_F), extended from 98 mm to 107 mm.

Table 1

The Main Phenological Phase of the Vegetative and Generative Organs

No	Selection (hybrid)	Burge oning	Date of blossoming				Dicho gamy
			Male Flowers		Female Flowers		
			The beginning of the blossoming	The fall of the amentum	The appeara nce of stigmas	The end of blossoming	
1	EL-1-PT	28.03	24.04	08.05	16.04	26.04	Protogine
2	EL-2PT	26.03	20.04	03.05	14.04	23.04	Protogine
3	EL-3-TJ	28.03	16.04	01.05	18.04	05.05	Protender
4	EL-4-TJ	01.04	19.04	28.04	26.04	08.05	Protender
5	EL-5-TJ	01.04	28.04	12.05	30.04	08.05	Protender
6	EL-6-TJ	28.03	19.04	28.04	21.04	03.05	Protender
7	EL-7-TJ	23.03	28.04	12.05	23.04	10.05	Protogine
8	EL-8-TJ	21.03	23.04	08.05	19.04	03.05	Protogine
9	EL-9-TJ	23.03	19.04	03.05	19.04	29.04	Protender
10	EL-10-TJ	27.03	16.04	30.04	21.04	03.05	Protender
11	EL-11-TJ	02.04	24.04	08.05	19.04	05.05	Protogine
12	EL-12-TJ	30.03	28.04	10.05	21.04	03.05	Protogine
13	EL-13-TJ	28.03	28.04	12.05	23.04	06.05	Protogine
14	EL-14-PT	30.03	24.04	07.05	19.04	03.05	Protender
15	EL-15-TJ	06.04	19.04	03.05	26.04	08.04	Protender
16	EL-16-TJ	03.04	21.04	05.05	28.04	10.05	Protender
17	EL-17-TJ	25.03	19.04	03.05	21.04	03.05	Protogine
18	EL-18-TJ	30.03	24.04	08.05	23.04	03.05	Protogine
19	EL-19-TJ	02.04	19.04	04.05	19.04	30.04	Protogine
20	EL-20-JN	30.03	19.04	12.05	22.04	10.05	Protogine

The *Juglans nigra* fruits are ellipsoidal and ovoid, a little flattened and rather broad than long with the index value of 127.9 mm.

Concerning the medium weight of the fruits, it has been obtained a variability large enough from 4.4 gr at EL-12-TJ and 10,8 gr at EL-14-TJ, still six of the selections have the weight under 6 gr, for example EL-7-TJ (5.7 gr), EL-8-TJ (4.8 gr), the rest have values from 6-10 gr. The *Juglans nigra* fruits have a medium weight of 14 grams.

The variation coefficient (s%) was also different. The selections EL-4-TJ (7.1 gr) and EL-11-TJ (6.2 gr) present the variation coefficient of the weight of fruits , the smaller one of 4,6 %, respectively 5,6 %.(Table No. 2).

None of the selections present high values of the variation coefficient, that means nuts are more or less uniform having a small or a middle variation coefficient.

The content of the fruits in the kernel is a characteristic of great importance for the fruits quality but also for the profitableness of a nut tree plantation.

Table 2

The Main Physical Features of the Fruits on the Selected Elites

No	Selection (hybrid)	Fruits size		Index of shape If (mm)	Fruits Shape	Fruits weight		
		Size Index Im (mm)	Equatorial diameter (mm)			Med. weight (g)	Standard exception (s)	Var. coeff. (s%)
1	EL-1-PT	28.1	28.4	104.3	Spheroidal	8.1	1.70	21,3
2	EL-2PT	24.6	24.7	98.	Spheroidal	8.5	1.15	13,4
3	EL-3-TJ	26.8	26.9	104.1	Spheroidal	6.3	0.64	10,2
4	EL-4-TJ	27.4	25.7	119.0	Ovoid long	7.1	0.41	5,9
5	EL-5-TJ	27.2	24.9	116.2	Ovoid	7.6	0.57	7,6
6	EL-6-TJ	27.6	25.3	107.0	Spheroidal	6.8	0.94	13,8
7	EL-7-TJ	25.5	24.1	111.6	Ovoid	5.7	0.54	9,1
8	EL-8-TJ	24.6	23.3	111.8	Ellipsoidal	4.8	0.55	11,7
9	EL-9-TJ	31.6	28.1	121.8	Ovoid-long	8.1	0.63	7,7
10	EL-10-TJ	26.3	26.0	111.7	Ovoid	6.1	0.56	9,1
11	EL-11-TJ	27.0	26.2	110.0	Ovoid	6.2	0.29	4,6
12	EL-12-TJ	20.7	20.9	98.1	Spheroidal	4.4	0.68	18,0
13	EL-13-TJ	28.8	25.5	115.2	Ovoid	5.3	2.5	17,8
14	EL-14PT	28.7	28.6	106.3	Spheroidal	10.8	1.78	16,9
15	EL-15-TJ	27.6	26.3	106.0	Spheroidal	6.5	0.58	9,0
16	EL-16-TJ	26.9	24.9	102.3	Spheroidal	8.8	0.76	9,0
17	EL-17-TJ	25.3	25.3	103.2	Spheroidal	5.6	0.55	9,9
18	EL-18-TJ	23.2	23.0	98.5	Spheroidal	4.6	0.60	14,3
19	EL-19-TJ	28.7	27.2	105.2	Spheroidal	8.2	0.51	6,2
20	EL-20-JN	28.8	25.5	127.9	Ellipsoidal	14.0	2.2	17,8

For the studied plants we can not speak about a comparative characterization of the main features of growth and increase, as they are different from the point of view of age, place and growing up conditions

The strength of the mother plant may influence the productivity and the longevity of the trees; it has a dominant character and is learned at the plants with a mother role, given with precision by the surface of the trunk section, the crown size and the height of the trees.The surface of the trunk section (the same crop conditions and the same age) oscillates from 876.7 cm^2 at EL-7-TJ and 240 cm^2 to EL-18-TJ. The volume of the crown is extended from 742.3 m^3 at EL-7-TJ and 131.1 m^3 at EL-12-TJ. (Table No. 3)

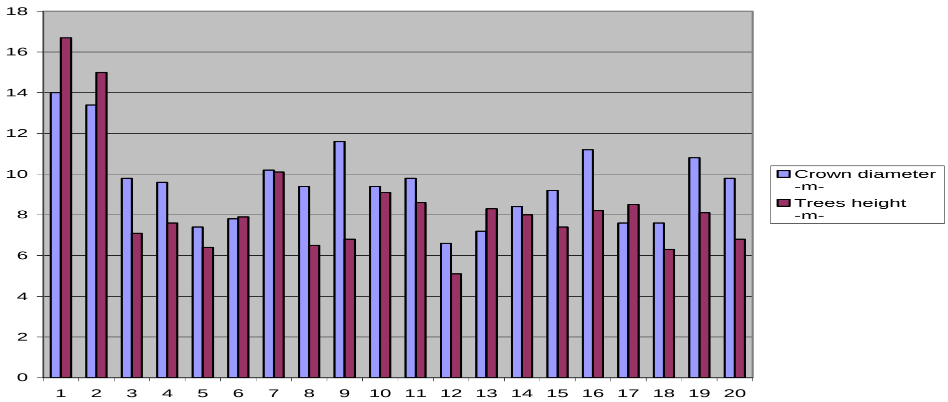
The two 40 year's old selections present differences between the two characters, such as: EL-1-PT has the surface of the trunk section of 2289.0 cm^3 and the volume of the crown of 2065.4 m^3.

The height of the trees has values from 5.1 m at EL-12-TJ and 16.7m EL-1-PT. At the studied plants the growing-up strength was determined by taking into consideration the above mentioned characters and differs in high strength EL-1-PT, EL-2-PT, EL-7-TJ, middle strength, EL-11-TJ, EL-3-TJ, and low strength EL-5-TJ, EL-12-TJ.

Table 3

The Main Growing –Up Characteristics of the Selected Nut Elites

No	Selection (hybrid)	Age (years)	Surface of the trunk section (SST)-cm^2	Diam. of the wreath -m-	Trees height -m-	The vol. of the wreath -m^{3}-	Strength	Conduct
1	EL-1-PT	40	2568,3	14,0	16,7	2920,2	Big	Semi-erect
2	EL-2PT	40	2289,0	13,4	15,0	2065,4	Big	Semi-erect
3	EL-3-TJ	26	471,9	9,8	7,1	385,8	Middle	Erect
4	EL-4-TJ	26	435,7	9,6	7,6	376,3	Middle	Spread
5	EL-5-TJ	26	389,7	7,4	6,4	222,3	Small	Spread
6	EL-6-TJ	26	508,8	7,8	7,9	317,3	Middle	Spread Etalat
7	EL-7-TJ	26	876,7	10,2	10,1	742,3	Big	Spread
8	EL-8-TJ	26	315,8	9,4	6,5	292,8	Small	Semi-erect
9	EL-9-TJ	26	586,7	11,6	6,8	394,8	Middle	Spread
10	EL-10-TJ	26	378,5	9,4	9,1	269,7	Small	Spread
11	EL-11-TJ	26	412,4	9,8	8,6	552,6	Middle	Semi-erect
12	EL-12-TJ	26	240,4	6,6	5,1	131,1	Small	Erect
13	EL-13-TJ	26	336,3	7,2	8,3	391,1	Middle	Semi-erect
14	EL-14-PT	14	267,5	8,4	8,0	342,9	Middle	Erect
15	EL-15-TJ	26	471,9	9,2	7,4	356,7	Middle	Spread
16	EL-16-TJ	26	644,8	11,2	8,2	586,0	Big	Spread
17	EL-17-TJ	26	534,7	7,6	8,5	374,4	Big	Erect
18	EL-18-TJ	26	240,0	7,6	6,3	187,6	Small	Spread
19	EL-19-TJ	26	319,0	10,8	8,1	486,6	Middle	Erect
20	EL-20-JN	26	326,0	9,8	6,8	285,1	Small	Spread



(Gr.1) – Characteristics of the growth of the selected nut hybrids

CONCLUSIONS

In the environment fruit-growing area of Gorj County, there are lots of biotypes that may represent a special agro biological significance, adequate to the demands of becoming a good mother-plant.

For the selected hybrids, the referential stages from the phonological point of view are: the increase of vegetation, the blossom and the harvest maturity.

The burgeoning has been observed as occurring in the second part of March, this being the earliest time, on the 21.03 at EL-8-TJ and on the latest time on 06.04 at EL-15-TJ. The dichogamy phenomenon occurs, half of the selections are protogines, and the fructification type is terminal for all the selections.

There is a good behavior to diseases in the case of anthracnose, its manifestation is sporadic on the elites EL-5-TJ, EL-6-TJ, EL-9-TJ, EL-18-TJ, in case of bacteriosis the development of this disease was permitted due to climatic conditions at 50% from the studied trees.

The index size of the fruits presents values from 20,7 mm at EL-12-TJ and 31.9 mm at EL-9-TJ, more than half of the fruits have a more or less unitary shape, round with an index such as 98 mm at EL-2-PT and 107 mm at EL-6-TJ. The growth of the fruits varies from 4.4 gr at EL-2-tg and 10.8 gr at EL-14-TJ, and the kernel percentage is close or outruns the value of 50%, for example EL-11-TJ, EL-1-PT.

The studied selections are classified, concerning the strength of the trees, into three different groups: high strength EL-1-PT, EL-2-PT, EL-7-TJ, EL-17-TJ middle strength, EL-11-TJ, EL-3-TJ, and small strength EL-5-TJ, EL-12-TJ, EL-18-TJ.

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PARTIAL RESULTS REGARDING THE SELECTION OF SOME NUT TREE HYBRIDS IN ORDER TO OBTAIN GENERATIVE MOTHER PLANTS

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KEY WORDS: Juglans regia, Juglans nigra, nut tree, grafting

ABSTRACT

The majority of countries cultivating the nut tree has reached to the conclusion that multiplying the nut tree by using vegetative methods is the right way to produce intensive plantations for these kind of species.

The improvement of nut tree grafting technique has raised the problem of using genuine mother trees.

Although the research regarding this very subject is rather recent and continuously developing, no country has managed so far to define the most favorable methodes for the developing of the nut tree and of its rootstock.

INTRODUCTION

The seeding material represents the most important element which contributes to the expansion of the plant growing in the modern fruit growing exploitations.

The multiplication of the nut tree has raised a series of technical and economic problems which have led until now to obtaining insufficient quantities of qualitative seeding material.

The multiplication through vegetative methods is the only way to transmit the initial genetical characteristics of the sorts, with a result of homogenous and qualitative material.

In Romania, the poor grafted seeding material causes a lack of the profitable spreading of the nut tree plantations.

MATERIALS AND METHODS

Using the individual selection on the existing biotypes in the County of Gorj, 20 biotypes, (*Juglans regia, Juglans nigra)* with adequate features have been chosen to be studied.

The biotypes have been encoded with the abbreviation EL (elite), followed by a serial number and the abbreviation of the street and the place where they had been identified.

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Beside the research on the phenological, biological and agro - productive features, the selection have been studied also for its ”behaviour” in the fields of formation of the sapling nursery.

The sapling nursery was set in autumn with 100 pieces of nut seeds for each selection at a 90 cm distance between each row and 10-12 cm between each nut tree, placed in rather deep ditches, in the Fruit-Growing Research Station of Rîmnicu -Valcea.

These distances were chosen in order to perform mechanized maintenance activities.

In order to graft the nut tree in protected areas, the gathering of the grafting cuttings was done between January and March when the temperatures fell under 0 degrees during 48 hours.

These grafting cuttings have been deposited in a vertical, upside down position (at a temperature between -1°C and +4°C), in polietyne sacks, well closed in order to avoid dehydration. The *Jupîneşti* sort was used as biological material.

Before begining the proper graftin, the healthy, well developed mother plants between 1 and 2 years old, with an unharmed radicular system and a thickness at the grafting point of 8-20 mm, have been exposed to a process of preforcing for 10-15 days.

At the same time, the healthy one year old grafting cuttings, with 50-80 cm length branches, with short (5-6 cm) internodes, round as section and with reduced marrow, underwent the same process of preforcing for only 3-4 days.

The preforcing was performed in a room covered with sawdust, at a temperature of 26-28 °C, with a relative moisture content of the air of 80-90% and aimed at reactivating the linking tissues. As grafting method, it was chosen the ”chip building” method and the grafting process was performed manually.

The grafted material was bedded in boxes filled with sawdust and it was mantained at a temeprature of 26-28°C for 10-15 days until the grafting point transformed into a callus. The stimulation of the callus-development was done by means of heat – only at the grafting point : hot callusing- using a special instalation.

Subsequent to the forcing period, the grafted and callused material was kept in cool rooms, at the temeperature of 1-4°C until the risk of late white-frost passed and one could plant in Field I (C I) of the nursery.

RESULTS AND DISCUSSIONS

In the sapling nursery, based on a 3 years average and according to the results presented in Table no.1, the medium springing percentage of the nut trees includes 19.6 % at EL-18-TJ and 65.6 % at EL-5-TJ.

By comparing the medium calculated data, we notice the highest amount of nut tree sapling at elites EL-2-PT, EL-5-TJ in the first and the second year and the lowest amount at elites EL-8-TJ, EL-12-TJ, EL-14-PT, in the first and the third year. The elite EL-4-TJ distinguishes itself for its constancy of the springing percentag, ie between 60 and 70 % each year.

The biometrical measurements showed, at the end of the first year of vegetation, the medium diameter of the saplings (measured above the collet: 3-5 cm) and more than 8 mm for all selections (Table no. 2). In this situation the elites EL-3-TJ and EL-9-TJ distinguish themselves with a diameter of 11,9 mm, respectively 10,8 mm.

The height of the saplings also registered at the end of the vegetation period, which is an element studied in the sapling nursery, oscillates between 20 cm at EL-20- JN and 10 at EL-5-TJ.

Table 1

The behaviour of certain nut tree elites selected as mother plants in the nut tree nursery
(taken in 3 years time)

No	Selection (hybrid)	The number of sprung saplings			Average	The springing percentage (%)			Average
		1st year	2nd year	3rd year		1st year	2nd year	3rd year	
1	EL-1-PT	58	26	25	36.3	58	32.5	25	38.5
2	EL-2-PT	67	47	40	51.3	67	47	40	42.4
3	EL-3-TJ	37	77	53	55.6	17	77	53	49
4	EL-4-TJ	61	64	60	61.6	61	71.1	60	64
5	EL-5-TJ	53	83	61	65.6	53	83	61	65.6
6	EL-6-TJ	46	78	56	60	46	78	56	60
7	EL-7-TJ	53	67	71	63.6	53	67	71	63.6
8	EL-8-TJ	13	15	20	16	13	50	20	27.6
9	EL-9-TJ	48	45	41	44.6	48	64.3	41	51.1
10	EL-10-TJ	63	82	74	73	63	82	74	73
11	EL-11-TJ	20	53	43	38.6	20	73	43	45.3
12	EL-12-TJ	28	19	33	26.6	28	30	33	30.3
13	EL-13-TJ	35	27	38	33.3	35	54	38	42.3
14	EL-14-PT	19	49	22	30	19	49	22	30
15	EL-15-TJ	29	59	49	45.6	29	59	49	45.6
16	EL-16-TJ	32	40	44	53.6	32	66.7	44	47.5
17	EL-17-TJ	35	75	54	54.6	35	75	54	54.6
18	EL-18-TJ	16	42	27	28.3	16	16	27	19.6
19	EL-19-TJ	52	55	60	55.6	52	61.1	60	57.7
20	EL-20-JN	49	48	43	46.6	49	48	43	46.6

At the end of the second year of vegetation, by analysing the behaviour in the sapling nursery, we could register small coefficients of variation concerning the diameter of the plants (all over 20 mm) and the height varies from 70 cm EL-1-PT and 112 cm EL-7-TJ.

By analysing the data in Table no.3, the percentage of STAS saplings registers wide variations: EL-6-TJ, EL-14-TJ, EL-17-TJ distinguish temselves with 78%, 68% respectively 62%, while for the elites EL-15-TJ and EL-18-TJ it is under 40%

The percentage concerning the grafting is only 55 % for elite EL-9-TG, for others it is more than 80 %, the highest is to be registered for EL-5-TJ, EL-14-PT, EL-11-TJ, etc.

After planing the saplings in the Field I of the nursery, due to the damages caused by the handling of the material in the planting time, the percentage of grafted plants able to vegetate on the field reduced.

As a result of analysing the information registered in Table no. 2, at the end of the vegetation period in Field I, we observe that the sapling dimensions are above the minimal limits of the STAS (ie 8 mm in diameter and 10 cm high) for elites EL-17-TJ, EL-4-TJ, etc, also smaller sizes of the grafting branches for elites EL-11-TJ and EL-14-PT (under 6,0 mm and 10 cm high) but showing burgeons and rather maturated wood especially towards the lower part of the grafting (a quality that will grant their vegetation cycle the next year in the Field II).

Table 2

The growing features in thickness and length of the selected nut tree elites in the nursery, and in Field I of the nut tree nursery

No	Selection (hybrid)	The collets diameter (mm)		The height of the saplings(cm)		The medium diameter of the grafting branch at the end of vegetation in field I(mm)	The medium length of the grafting branch at the end ot vegetation in field I(cm)
		1st year	2nd year	1st year	2nd year		
1	EL-1-PT	8.7	20..4	14	70	7.1	14.3
2	EL-2PT	10.5	20.6	14	101	8.2	10.8
3	EL-3-TJ	11.9	28.6	13	109	9.4	14.6
4	EL-4-TJ	8.7	21.9	15	91	11.5	14.7
5	EL-5-TJ	8.2	20.1	10	90	10.3	11.3
6	EL-6-TJ	9.0	24.1	14	104	9.5	12.5
7	EL-7-TJ	9.5	24.0	14	112	10.4	10.9
8	EL-8-TJ	10.4	23.4	18	86	9.2	11.1
9	EL-9-TJ	9.0	23.2	14	92	8.4	14.6
10	EL-10-TJ	8.1	21.7	12	92	10.6	12.5
11	EL-11-TJ	10.8	20.7	16	86	6.0	8.0
12	EL-12-TJ	10.6	23.0	14	93	8.8	9.5
13	EL-13-TJ	9.7	20.7	14	80	9.8	12.4
14	EL-14-PT	9.7	20.3	13	84	5.6	7.3
15	EL-15-TJ	9.6	22.4	12	98	.9.7	12.5
16	EL-16-TJ	8.7	21.5	13	95	9.1	11.4
17	EL-17-TJ	11.8	21.2	15	85	11.3	16.8
18	EL-18-TJ	11.5	23.5	18	82	11.9	13.7
19	EL-19-TJ	8.8	19.1	13	77	10.0	10.3
20	EL-20-JN	8.4	23.8	20	94	12.3	12.8

In other respects, the damages caused by the low temperatures in the winter time from the end of the vegetation untill its taking again were insignificant and appeared in the apical part of the grafting, its lower part remaining unaffected on a lenght of 10-12 cm.

The *Jupâneşti* sort used for the grafting produced its first fruit (1-2 fruit / tree) right in Field II of the nursery.

Table 3

The behaviour of the selected elites in the grafting process

No	Selection (hybrid)	Number of saplings	Number of STAS saplings for the grafting process	STAS sapling percentage (%)	Number of thriven sapling after the ingraftment	Percentage (%) of thriving in the grafting process
1	EL-1-PT	58	32	55	25	78
2	EL-2-PT	67	29	43	22	76
3	EL-3-TJ	37	14	37	10	71
4	EL-4-TJ	61	36	59	24	67
5	EL-5-TJ	53	34	64	30	88
6	EL-6-TJ	46	36	78	33	92
7	EL-7-TJ	53	28	48	24	86
8	EL-8-TJ	13	10	76	9	90
9	EL-9-TJ	48	33	68	18	55
10	EL-10-TJ	63	32	50	26	81
11	EL-11-TJ	20	12	60	18	90
12	EL-12-TJ	28	14	50	13	93
13	EL-13-TJ	35	12	34	8	67
14	EL-14-PT	19	13	68	11	84
15	EL-15-TJ	29	5	17	4	80
16	EL-16-TJ	32	26	74	24	85
17	EL-17-TJ	35	22	62	20	90
18	EL-18-TJ	16	5	31	4	80
19	EL-19-TJ	52	25	48	20	80
20	EL-20-JN	49	29	59	17	96

CONCLUSIONS

1. The different behaviours of the selected elites in the nursery prove the special heterogenity of this sort. Only a few selections are to be considered important from the point of view of the studied characteristics.

2. In the sapling nursery – the selections- the mother plants EL-5-TJ, EL-7-TJ note high percentages of replanting the nut trees (more than 60 %) and EL-4-TJ distingush itself for the constancy of the percentage of springing in all the 3 studied years (60-70%).

3. High percentage in obtaining STAS saplings: over 60 % of all the sprung saplings belong to the elites EL-5-TJ, EL-8-TJ, EL-9-TJ, EL-14-TJ.

4. The elites EL-17-TJ, EL-4-TJ had a good behaviour in the nursery- field I: they developed, at the end of the vegetation period, nut trees with the highest values and high quality

5. As a result of analysing all the given data at the end of the vegetation in Field I (nursery), the elites EL-17-TJ El-5-TJ and EL-4-TJ could be promoted as mother plants thanks to the high quality of the nut tree, its fruits and the good behavior in the nursery and the formation fields of the nursery.

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RESEARCH ON THE GENETIC VARIABILITY OF WALNUT INTERNET THE NORTH OF OLTENIA

Iuliana Svetlana Flondor[1]

KEY WORDS: Juglans regia, walnut, populations, variability, biotypes

ABSTRACT

During 2006-2008 period observation have been carried in the walnut populations from the Northern area of Oltenia. This area of Oltenia contains 3 counties: Valcea, Gorj and Mehedinti; there walnut trees are wide spread (over 240 thousands plants). The highest number of walnut trees is found in Gorj county (94503 trees), followed by Mehedinti (74913 trees) and Valcea counties (72570 trees). The walnut populations are from genetic point of view natural hybrids, growing on their own roots. The growth vigor of the walnut trees is large or very large in all the populations studied. Low vigorous walnut trees were not found in the area. The walnut populations are easily differentiated in accordance with the main characteristics of the fruits. The variability is very large regarding the size of fruits (25 mm - 39.6 mm), the fruit weight (6 g - 15.3 g), the kernel weight (2 g - 6.6 g), the kernel percentage 33.3 – 47.1%), etc.

The trees from the walnut populations have terminal bearing and different degrees of resistance at Xanthomonas campestris pv. juglandis (bacteriosis). The general characteristic of the walnut tree from this area is given by the element that refers to the type of shell closure. Over 70 - 75% from the total number of the walnut trees analyzed have easy cracking fruits and easy removal kernel; the rest of 25 - 30% of the walnuts trees have hard shell and difficult to use kernels.

MATERIALS AND METHOD

The investigation was done during a five years period (2003-2008) from the North area of Oltenia in different localities from following counties: Gorj, Valcea and Mehedinti.

The measurements, observation and determination were referring to the bearing characteristics (type of bearing yield, fruit characteristics), growth (habitus), and low temperatures during winter and behavior to diseases.

The marked genotypes have determined the following observations:

- the height of the tree;
- the circumference of the trunk;
- the diameter of the tree crown;
- the flowering age;
- the type of dichogamy;
- fruits maturation;
- efficiency.

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The following characteristics of the fruits have also been revealed:

- fruit weight;
- bark thickness;
- fruits size;
- kernel weight;
- fruits color;
- fruits weight;
- kernel color;
- the easiness of kernel extraction.

The climatic conditions of the area are generally favorable to the growth and bearing of walnut average annual temperature :10,2ºC- 10.4ºC; lowest temperature was -30ºC, but normally the temperature drop to -20ºC;-22ºC; the average sum of rainfall 700-750 mm; the relative humidity 64-85% and the duration of sunshine is 1900 hours per year.

RESULTS AND DISCUSSIONS

Studies have revealed that the *Juglans regia* species in this area has great genetic variability, more distinct populations and biotypes in accordance with the biological characteristics and localities where they were indentified.

The trees used in the research are obtained generatively and planted in familial gardens and orchards, near footways (road plantations) and isolated.

The studied biological material is made of over 300 representative individuals selected from over 31 localities from the North of Oltenia.

A strict genetic evidentiation and delimitation with the maintaining of integrity between some limits of entire population is difficult.

The population is formed by various biotypes with heterozygote individuals.

The first characteristic of this population is represented by the large variability of the growth characteristics, disease tolerance or resistance, resistance to low temperatures, which are present at the individuals that compose the population.

The second characteristic consists into the impossibility of a strict delimitation of the component biotypes after the habitat occupied and even after phenotype.

The *Juglans regia* population from North Oltenia has a great importance, not only for its biotypes, each with a certain phonological expression, but mostly by its genetic structure which owns a gene complex which is responsible for a large variability of the traits.(Cociu, and colab)

The component biotypes of the population are formed from different individuals as number and randomly spread in the entire ecosystem.

The component individuals of one biotype are recognizable after one or two of dominant traits.

The variability of the traits is very large, this conferring to the population an aspect of accentuated heterogeneity.

Growth vigor of the walnut trees is large or very large in all the populations studied, low vigorous were not found in area.

Limits of the tree height are: 10.6-13.0 m; the limits diameter trunk: 1.20-1.50 m and limits crown diameter: 8.5- 10.9 m (Table 1).

The crown shape is globular, semi-erect and spread habitus.

The flowering period of the walnut trees in the North of Oltenia takes place in a short period of time (around 30-35 days). The beginning of the flowering starts in the first 405 days of April and flowering period ends on 7th -10th of May. The individuals with early flowering (10%), medium flowering (80%) are the majority in the population and late flowering (10%). More than 75% of the walnut trees are protandrous and 25% are protogynous.

Table 1

The characteristics of *Juglans regia* trees studied in North Oltenia

County	Height limits of trees (m)	Trunk diameter limits (m)	Crown diameter limits (m)
Gorj	10.8-13.0	1.25- 1.50	8.5- 10.9
Valcea	10.7- 12.8	1. 23- 1.45	8.8-10.9
Mehedinti	10.6-12.5	1.20-1.42	8.6-10.7

The *Juglans regia* population is strictly divided into two groups:

- with fruits are easy to remove kernel (70-75%);
- with fruits have difficult to extract kernel (the kernel is "locked") (25-30%)

The shell thickness is variable into the population. Generally, the majority of the walnut population has fruits with thin < 1.5 mm (15%), medium 1.5-2.5 mm (55%) and thick > 2.5mm (30%) shell.

The variability is very large regarding the size of fruits: 25-39.6mm; the fruit weight: 6-15.3 g; the kernel weight: 2-6.6 g. (Table 2). The color of the kernel tegument is 99% yellow.

Table 2

The characteristics of the walnut fruits from North Oltenia

County	Fruit size (mm)	Fruit weight (g)	Kernel weight (g)	Kernel efficiency (%)
Gorj	25.3-39.6	6.0-15.3	2.0-6.0	33.3-43.1
Valcea	25.2-39.6	6.0-14.4	2.0-6.0	33.3-45.8
Mehedinti	25-39.3	6.0-14.0	2.0-6.6	33.3-47.1

The fruit ripening is a trait with low limits of variability between September 1st-October 5th. Most of the population components are ripening their fruits between September 10th-20th (80%), the rest of them are either early ripening (10%) and late (10%).

The area is favorable to the presence and attack caused by *Xanthomonas campestris* pv. *juglandis*.75% of the walnut is sensitive to bacteriosis.

CONCLUSIONS

The whole population has individuals (natural hybrids) which are characterized by a large genetic variability; this fact has great importance in the breeding programs.

Some traits have large limits of variability:

- vigor;
- fruits size;
- bark thickness;
- the flowering age;
- fruit maturation;
- disease tolerance;
- resistance to low temperatures;
- efficiency.

The North of Oltenia has favorable climatic condition and permitted the forming and evolution, in time, of a natural population of *Juglans regia* (more than 240.000 plants).

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THE INFLUENCE OF CELULLOSIC NUTRITIVE MIX WITH PAPER SUPLIMENT OVER THE BIOLOGICAL POTENTIAL OF THE PLEUROTUS HK-35 MUSHROOM

Chilom Pelaghia, Navolan Calin, Bica Alin, Ratoi R.[1]

KEY WORDS: Pleurotus mushrooms, nutritive mix,biological potential

ABSTRACT

Within the researches carried regarding the realisation of the biological potential of Pleurotus HK-35 correlated with the nutritive celullosic mix consisting of sawdust, barley straws and paper, in different proportions, some aspects were observed such as incubation and fructification by harvest waves, high differences being noticed,the best results coming from the combination of: sawdust 50% , barley straws 25% and paper 25%. A high productive potential was achieved surpasing the wittness (sawdust 50% and straws 50%) with up to 47,2%. The biological production per 100 kg of celullosic material was of 28,3-36,0%.

INTRODUCTION

Inside the „Laboratory for mushroom production" of University of Craiova – Faculty of Horticulture, researches were carried on Pleurotus ssp. with the purpose of utilising different reuseble materials and obtaining ecological products with the help of an own cultural technology, adapted to a new type of space – restructured and modified wine cellar. The laboratory has didactical, research and production purpose, under the guidance of an higher education institution

MATERIAL AND METHODS

Researches were carried in specific conditions of wine cellarde adapted for the culture of Pleurotus sp mushroom, with three research cycles, in plastic bags with holes and positioned on metal spears (fig 1). The celullosic nutritive substrate has as a base barley straws and paper in different proportions, coresponding with the specific variants in table 1.

Table 1

Influence of celulosic nutritive substrate with paper plus over the biologic potential of Pleurotus HK 35

Variant	Materials %			Abreviations
	Sawdust	Barley straws	Paper	
V1(Mt)	50	50	-	R50P50
V2	33	33	33	R33 P33 H33
V3	50	25	25	R50 P25H25
V4	25	25	50	R25 P25 H50
V5	50	-	50	R50 H50

[1] University of Craiova

Fig. 1. Position of the culture plastic bags

RESULTS AND DISCUSSIONS

Elements were followed connected with the intensity of the innoculation process, depending on the specific of the celullosic substrate, as well as the dynamic of fructification per harvesting waves and total production aspect.

Table 2

Medium total production for a production cycle for Pleurotus HK 35 mushrooms

Variant	Specific	Production		±difference to the wittnes Kg/var	Signif.	Biological prod. % of 100Kg celullosic material
		Kg/var.	%			
V1(Mt)	R50P50	9,7	100,0	Mt.	-	32,3
V2	R33 P33 H33	9,3	95,9	- 0,4	-	31,0
V3	R50 P25H25	10,8	111,3	+ 1,1	XX	36,0
V4	R25 P25 H50	9,4	96,9	- 0,3	-	31,3
V5	R50 H50	8,5	87,6	- 0,8	0	28,3

DL 5% = 0,669kg; DL 1% = 0,974kg; DL01% = 1,462kg

The data of table 2 shows the values of productions per harvesting waves and total aspect , taking notice of differences between variants and the superiority of V3- with a total production of 10,8 kg and with the highest values per harvesting waves. Biological percentage production per waves out of the total production per variant is highlighted in the datas from table 3.

Table 3

Biological production per variants and harvest wave correlated with total harvest

Variant	Specific	Harvest wave			Total %	Total prod./var. (30 kg of substrate)
		1	2	3		
V1(Mt)	R50P50	40,2	33,0	26,8	100,0	9,700
V2	R33 P33 H33	39,8	39,8	20,4	100,0	9,300
V3	R50 P25H25	47,2	28,7	24,1	100,0	10,800
V4	R25 P25 H50	41,5	31,9	26,6	100,0	9,400
V5	R50 H50	35,3	35,3	29,4	100,0	8,500

Absolute differences between variants per harvest waves are well highlighted in figure 2, and the ones achieved from total harvest in figure 3.

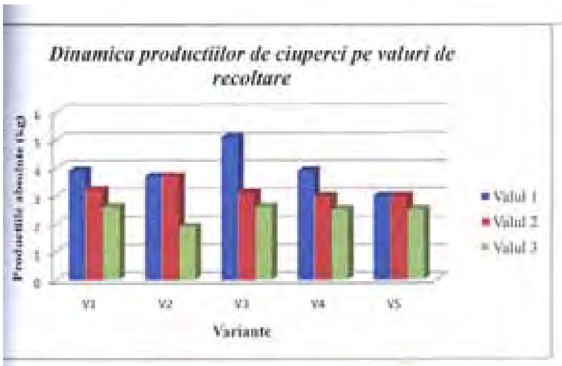

Fig. 2. Dynamic of mushroom harvest per waves

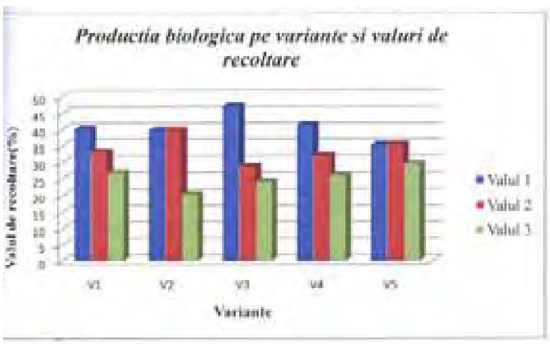

Fig. 3. Biological production per variants and harvest waves

The substrate that was used a suffered weight losses, during the cultural cycles, and the data in table 4 show the fact that there is a direct correlation between the obtained production and „substrate losses” meaning that for a higher production, the consumption was larger.

Table 4

The loss of celullosic material in the technological process of mushroom culture

Variant	Specific	Kg SMC/variant		Difference/variant		Total prod. Kg/varianta
		Initial	Final	Kg	%	
V1(Mt)	R50P50	30,0	17,82	12,18	40,60	9,700
V2	R33 P33 H33	30,0	19,50	11,50	38,33	9,300
V3	R50 P25H25	30,0	18,00	12,00	40,00	10,800
V4	R25 P25 H50	30,0	21,00	9,00	30,00	9,400
V5	R50 H50	30,0	22,50	8,50	28,33	8,500

CONCLUSIONS

- As a general aspect the medium production of the cycles was 8,5-10,8 kg/ variant (30 kg celullosic materials) ;
- The best production value obtained for V3 (R50 P25 H25) with a total total per variant of 10,8 kg and with a distinct significant difference to the wittnes (R50 P50) probably because of a better balance between elements;
- Other variants also behaved well, which had balanced proportions of celullosic materials(V2 and V4)
- At V5, where the straws were missing, the combination was made with sawdust and paper (R50 and H50) and recorded the lowest productions, because of the very compact substrate;
- The loses of celullosic materials during the technological process is correlated with the obtained productions.

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MODIFICATIONS ON THE LEVEL OF GROWTH AND FRUITING ELEMENTS FOR CUCUMBERS CULTIVATED IN NURSERIES – IN CORRELATION WITH ORGANIC MATERIALS USED FOR FERTILIZATION

Palaghia Chilom, Nicolae Raducanu[1]

KEY WORDS: cucumbersi, nurseriesi, organic materials, growth, fructification

ABSTRACT

By using five types of organic materials for cornichon cucumbers, Capricorn hybrid, culture, in nurseries, some aspects were followed regarding the influence of these materials over the growth and fruiting rates.

Increased values were recorded conceirning the height of the plants - 22,13%, diameter - 23,4% and number of leafs - 25,22% .

The medium number of fruits and their weight presented variations depending on variants, and the production gains are up to 44,68% - for earlyness and 20,5% - for total production per I-st cycle of 2008.

The best results were obtained for the variants that contained garden and leaf mould.

INTRODUCTION

In today's context of the agriculture, the vegetables culture as a basic branch, together with the experts, is trying to limit the consumption of pesticides as much as possible, but it is also necessary in order to produce high quality ecological products.

Within the undertaken researches, the start began with the use of organic materials delivered by the agricultural subsidiaries, applied single or associated, for soil fertilization, thus reducing the use of chemically obtained fertilizers.

For start, the results are good, and helpfull in achieving the proposed objectives.

MATERIAL AND METHODS

The researches were carried under the pedo-climatic conditions met at the vegetables culture sector of S.D. Banu Maracine.

Six experimental variants were established , five of which representing combinations of organic materials, coresponding with the specific of the variants in table 1.

[1] Universitatea din Craiova

Table 1

Specific of variants

Variant	Specific	Abreviations
V1	Wittness – unfertlized	Wtt
V2	Supplimentary fertilized with leaf mould	Lm
V3	Supplimentary fertilized with garden mould	Gm
V4	Supplimentary fertilized with pomace	P
V5	Supplimentary fertilized with leaf mould + pomace (1:1)	Lm + P
V6	Supplimentary fertilized with leaf mould + garden mould (1:1)	Lm + Gm

Fertilization was applied on the soil of the nursery , the culture taking place during first cycle of 2008, planting being done on 4-th of april – for the new type of nursery that has been built.

The surface of a variant – repetition was $10m^2$, while the surface of the whole experience was $180m^2$, for six variants and three repetitions.

The planting was made in rows with a distance of 90cm in between and 30cm between plants on the row, the irrigation being done with the help of drippers.

A common fertilization substrate was assured, and, depending on the variant, the organic materials were dosed , prepared as required.

During the culture, aspects regarding the growth and fruiting elements were observed, and some phisyological and biochemical modifications as well.

RESULTS AND DISSCUTIONS

In dynamic some aspects were observed and recorded, regarding elements of growth and fructification per variants and repetitions, and based on arithmetical and statistical calculations the datas are presented in tables 2 – 5 si graphic 1.

Tables 2 and 3 present values of growth elements during two moments, at the begining of harvesting (table 2), and at the moment of the plants reaching the sustaining system (table 3).

Table 2

Elements of growth for cucumber plants depending on the specific of variants in the begining of harvesting (C-I 2008)

Var.	H		100%	Diameter		100%	No. leafs		100%
	cm	±d(cm)		mm	±d(mm)		No.	±d(nr)	
V1 – Wtt	80,90	Wtt	100,0	8,53	Wtt	100,0	11,70	Wtt	100,00
V2 – Lm	85,54	4,64	105,73	9,34	0,81	109,49	12,00	0,30	102,56
V3 – Gm	94,77	13,84	117,14	9,63	1,10	112,89	12,90	1,20	110,26
V4 – P	85,77	4,87	106,02	9,09	0,56	106,56	12,20	0,50	104,27
V5 – LM+P	95,70	10,16	118,29	9,41	0,68	110,32	12,90	1,20	110,26
V6 – Lm+Gm	98,80	17,19	122,13	9,80	1,27	114,89	13,13	1,40	112,22

Table 3

Elements of growth for cucumbers at the moment of plants reaching the sustaining system (C I - 2008)

Var.	H		100%	Diameter		100%	No. leafs		100%
	cm	±d(cm)		mm	±d(mm)		No	±d(nr)	
V1 – Wtt	250	Wtt	100,0	12,8	Wtt	100,0	22,2	Wtt	100,00
V2 – Lm	262	12	104,80	14,3	1,5	111,72	27,2	5,0	122,52
V3 – Gm	272	22	108,80	14,6	1,8	114,06	27,8	5,6	125,22
V4 – P	258	8	103,2	13,6	0,8	106,25	25,9	3,7	116,67
V5 – LM+P	270	20	108,0	14,2	1,4	110,94	26,8	4,6	120,72
V6 –Lm+Gm	284	34	113,6	15,8	3,0	123,44	27,6	5,4	124,32

Differences between variants are obvious from the presented data, and the best results were recorded at V6 (Lm+Gm), followed by V3 si V5. It can be concluded that the garden mould obtained by composting organic materials (manure), single or mixed, had the best influence, the growth increases in II-nd stage being of up to 22,13% regarding the height, up to 23,44% regarding the diameter and of 24,32% for the medium leaf number per plant. The fructification elements per stages are presented in tables 4 and 5.

Table 4

Production of cucumbers per harvesting stages correlated with the specific of variants (C I - 2008)

Var	Early production*		%	Signif	Total production**		%	Signif
	Kg/m^2	±d			Kg/m^2	±d		
V1 – Wtt	2,82	Wtt	100,0	Wtt	9,22	Wtt	100,0	Wtt
V2 – Lm	3,37	0,55	119,15	X	9,82	0,60	106,51	-
V3 – Gm	3,87	1,05	134,84	XXX	10,87	1,65	117,89	XX
V4 – P	2,96	0,14	104,96	-	9,46	0,24	102,60	-
V5 – LM+P	3,67	0,85	130,14	XX	10,67	1,45	115,73	XX
V6 – Lm+Gm	4,08	1,76	144,68	XXX	11,11	1,89	120,50	XXX

DL 5,0% = 0,479 DL 5,0% = 0,869
DL 1,0% = 0,664 DL 1,0% = 1,204
DL 0,1% = 0,916 DL 0,1% = !,660

* Production per m^2 at the moment of plants reaching the sustaining system
** Total production per plant in C I - 2008

Table 5

Number and medium weight of the fruits in dynamic (C I - 2008)

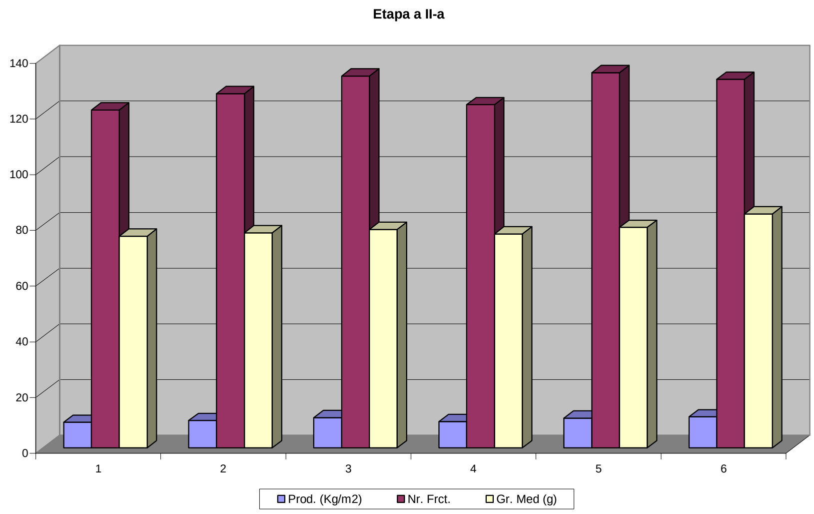
Var.	Stage I			Stage II		
	Prod. Kg/m^2	No. frt.	Medium (g)	Prod. Kg/m^2	No. frt.	Medium(g)
V1 – Wtt	2,82	44,0	64,09	9,22	121,3	76,0
V2 – Lm	3,37	52,0	64,81	9,82	127,2	77,2
V3 – Gm	3,87	52,3	74,00	10,87	133,5	78,4
V4 – P	2,96	43,4	68,20	9,46	123,2	76,8
V5 – LM+P	3,67	51,5	71,26	10,67	134,7	79,2
V6 -Lm+Gm	4,08	50,0	81,60	11,11	132,3	84,0

Early production increases were recorded of 4,96 – 44,68% and total production increases of 2,6 – 20,5%, with significant and very significant differences for V6, V3 and V5.

Production of the cycle was 9,22 – 11,11Kg(m^2) respectively 92,2 – 111,1 t/ha.

High differences were also recorded conceirning the number of harvestewd fruits and their medium weight. (tabelul5).

Graphic 1 ilustrates a correlation between total production, medium fruit weight and their number.



Graphic 1. Number and medium weight of the fruits in dynamic (etapa aII-a)

CONCLUSIONS

- Suplimentary organic fertilization is reccomended, administrated on existing pedological conditions.
- High differences were recorded between variants, and the best results were achieved using garden mould, single, or combined with leaf mould and pomace.
- Increases in growth elements, and especially fruiting elements are considered very good , under the circumstances.

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RESEARCHES REGARDING THE INFLUENCE OF LIGHT ON THE GERMINATION OF SEEDS AT SOME VEGETABLE SPECIES

Gheorghita Hoza[1]

KEY WORDS: germination, light, vegetable species

ABSTRACT

The germination of some vegetable seeds is a process which, regularly, takes place in dark, in soil. Exceptionally, there are some vegetable species which germinate in it conditions of light.

For this research there were used 5 species, respectively: carrot, celery, parsley, salad and radish which were seeded during 3 phases (periods of time), in hot greenhouse, in small boxes. The first period of time was the beginning of December, the second one, mid of March and the last one, the end of March.

The germination process was different at each specie depending on the seeding moment.

In the first stage, the salad and radish seeds germinated after 3 days, having a percentage of 43% and 75%. The other species needed 5 days to germinate in a percentage of 46% at carrot, 1% at celery and 3% at parsley.

In the second and third stage, the percentage of germination was higher due to the softer environmental conditions provided by March.

INTRODUCTION

The germination of seeds is very important for the culture technology of vegetable species. It is a biological process which characterizes each specie and it is influenced by environmental factors (Dumitrescu M. 1998). It is well known that vegetables germinate on dark conditions, but researches proved that they can also germinate on light conditions (Chaux 1994,, Thomas 1996, quoted by Burzo I. 2000). This fact was the start point for the study of reactions of many vegetable species which give the below part of them to be consumed.

MATERIAL AND METHOD

The researches were conducted in hot greenhouse. They consisted in setting the seeds to germinate in three different periods of time and studying their behavior. The seedling was made in small boxes, on rows having 5 cm distance between them, uncovered with soil.

[1] UŞAMV Bucureşti

Wetting was conducted throughout infiltration in order not to disturb the seeds (especially the small ones) from their original places. The times for observations were the 4th of December, the 13th of March and the 26th of March. The experiment was daily observed in order to provide the appropriate level of humidity and to register the percentage of germination. The humidity has a very important part because if it is not maintained in certain values, the production has very much to suffer due to the death of the embryons of plants.

RESULTS AND DISCUSSIONS

The results obtained in the first stage of seedling proved that salad and radish started to rise in a percentage of 4,1% and 75,4% after only 3 days. Carrot, celery and parsley started to rise after 6 days and had big differences between species. Their percentage was registered as it follows: 46,3% at carrot, 9,8% at celery and 3,1% at parsley.

This percentage is due to the characteristics of each species, but also to the unhelpful conditions of environment which provided less light.

It is well known that carrot, celery and parley have a smaller percentage of germination in comparison with salad and radish and need a longer period of time to germinate (table 1).

From the first signs of germination, the percentage increased its values and the process was ended after 14 days at carrot, celery and parsley, 8 days at radish and 9 days at salad.

Table1

The period of time and the percentage of germination of some vegetable seeds, in light conditions, stage I(%)

Specie	Date								
	7.12	8.12	10.12	11.12	12.12	13.12	14.12	17.12	18.12
Carrot	-	-	46,3	53,7	53,7	53,7	54,9	57,3	58,5
Celery	-	-	9,8	12,7	18,6	57,8	63,7	79,4	81,4
Parsley	-	-	3,1	12,5	23,3	50,2	53,3	58,2	60,2
Salad	43,1	51,7	58,6	59,5	60,3	61,2	61,2	61,2	61,2
Radish	65,4	66,9	78,2	79,7	80,0	80,0	80,0	80,0	80,0

In the second stage of seedling, the environmental conditions were more favorable, giving the possibility to seed the studied species in open field (if the soil is in appropriate conditions).

The germination started and ended faster than in the first stage. At radish and salad, the percentage of germination was higher, 72,5% and 61,9% (in a very short time). At carrot, the germination ended after 6 days and gave a percentage of 44,6%. Celery and parsley germinated after 9 days, giving a 40% percentage.

It is remarkable that the process of rising finished after 10 days at carrot and after 13 days at celery and parsley (table 2).

Table 2

The period of time and the percentage of germination of some vegetable seeds, in light conditions, stage II (%)

Specie	Date								
	15.03	18.03	19.03	20.03	21.03	22.03	25.03	26.03	27.03
Carrot	-	44,6	52,7	55,4	60,8	60,8	60,8	60,8	60,8
Celery	-	-	-	42,0	81,1	85,5	87,0	87,0	87,0
Parsley	-	-	21,6	40,0	46,7	55,0	65,0	65,0	65,0
Salad	61,9	66,7	73,0	88,6	92,5	92,5	92,5	92,5	92,5
Radish	72,5	75,0	76,8	76,8	78,1	88,1	88,1	88,1	88,1

The percentage of germination rose in the third stage of experiment and the time for germination decreased due to the favorable environment conditions. After 2 days from seedling, 77-78% of radish and salad rose and after 5 days the process finished with 95,2% salad and 88,4% radish.

28,9 % of carrot germinated after 4 days, which proves its positive react to light. After 7 days, 60% of carrot germinated and after 11 days the percentage was of 85,5%. Celery and parsley had a lower percentage of germination, but the time decreases substantially (table 3).

Table 3

The period of time and the percentage of germination of some vegetable seeds, in light conditions, stage III(%)

Specie	Date								
	28.03	29.03	1.04	2.04	3.04	4.04	5.04	8.04	9.04
Carrot	-	28,9	59,4	76,8	79,7	81,1	85,5	85,5	85,5
Celery	-	-	41,9	60,8	75,7	78,4	78,4	78,4	78,4
Parsley	-	-	41,2	47,6	63,5	63,5	65,1	65,1	65,1
Salad	77,4	91,9	95,2	95,2	95,2	95,2	95,2	95,2	95,2
Radish	78,4	85,6	88,4	88,4	88,4	88,4	88,4	88,4	88,4

CONCLUSIONS

Researches regarding the germination of some vegetable species, in light conditions in covered field, proved that:

- The germination is possible if the humidity conditions are appropriate;
- The time of germination decreased, especially at those species which germinate slower than others (carrot, celery and parsley);
- The percentage of germination was influenced by the environmental conditions and by the characteristics of the studied species.

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RESEARCHES REGARDING THE INFLUENCE OF CULTIVARS ON THE QUANTITY AND QUALITY OF CARROT PRODUCTION

Gheorghita Hoza[1]

KEY WORDS: cultivar, carrot, production

ABSTRACT

The cultivar used to found a culture represents an essential item in the culture technology. In the present experience were used 6 carrot cultivars, with different periods of vegetation as it follows: Nantes, Chantenay redcore, Nantes 3, Toucho, Mohre and Chantenay de Corazon rojo 2.

The culture was founded in the mid of March, throughout direct seedling, on unshaped field, in 4 rows equally distant at 25 cm which formed bands equally distant at 50 cm.

The harvesting of roots was executed in 2 stages: the first one in 100 days after rising and the second one in 120 days after rising.

In the first stage, the production of roots was significant at Chantenay redcore and Nantes 3 while at the other cultivars it was insignificant or weaker than at control. The production of roots was of 43.9 t/ha at Nantes 3 and 39.7 t/ha of Chantenay redcore.

In the second stage of harvesting, the most significant production was registered at Nantes 3 (50.1 t/ha) and Ch. Redcore (49.7 t/ha, followed by Ch rojo2 (45.1 t/ha).

INTRODUCTION

The carrot is a very appreciate vegetable due to its rich content of nutritive elements, vitamins, glucids, dry substance and other (Dumitrescu and a. 1998, Burzo and a. 2005).

Every vegetable grower is interested in obtaining the best production from the quantity and quality point of view (Berar V. 2002) and gives the best attention to selecting the cultivars and the culture field.

The quality of roots represents a vital element in selecting the cultivars and it is influenced by the culture technology (Alda S. and a. 2002)

MATERIAL AND METHOD

The researches took place on the experimental field of Horticulture Faculty from Bucharest, during 2 years, studying 6 cultivars of carrot.

The experimental variants were the following:

V1 – Nantes – mt

V2 – Chantenay redcore

[1] USAMV București

V3 – Nantes 3
V4 – Touchon
V5 –Mohre
V6 - Chantenay de corazon Rojo 2.

The culture was founded in mid March by manual seedling, with 25 cm distance between rows an d 4-5 cm distance between the plants. The harvesting faced 2 stages as it follows: the first one in 100 days from rising of the plants and the second one in 120 days from the same phenomenon. Observations and measurements were made in order to establish the weight of plants, the average weight of roots, the diameter of the central cylinder and the stem the length of roots, the production of roots and their biochemical composition.

RESULTS AND DISCUSSIONS

The data studied on the field (table 1) proved that 100 days after the rising of plants, the total weight of one plant had the highest value at Chantenay redcore with 104.8 g. followed by Chantenay de Corazon rojo with 99.5 g and Nantes with 86.7 g.

The percentage of root from the total weight of plant was higher at Nantes, 87.3%. followed by Mohre, 85.2%, and Touchon, 81.7%.

The diameter of the stem, especially the diameter of the central cylinder, is an important feature in establishing the quality of carrot roots.

The cultivar Chantenay redcore had a stem diameter of 3.5 cm and the central cylinder of 2.2 cm, having the highest values. The smallest central cylinder was registered at Mohre, 1.3 cm.

The length of roots had an important role in harvesting and registered values between 11.4 cm at control and 14.5 cm at Touchon. The shorter the roots are the easier the plants can be harvested resulting less wounds and a longer period of conservation.

Table 1

The features of carrot roots in the first stage of harvesting

Cultivar	Weight (g)		% Root	Stem diameter (cm)	Central cylinder diameter (cm)	No. of leaves	Length of roots (cm)
	total	Root					
Nantes mt	87.7	71.6	81.6	2.5	1.6	9.5	11.4
Chantenay redcore	104.8	79.3	75.7	3.5	2.2	7.9	12.2
Nantes 3	86.7	75.7	87.3	2.9	1.5	8.9	12.3
Touchon	86.3	70.5	81.7	2.6	1.6	9.4	14.5
Mohre	80.2	68.3	85.2	2.2	1.3	8.8	12.1
Chantenay de corazon rojo 2	99.5	73.3	73.7	3.7	1.9	8.3	13.8

The second stage of harvesting gave an increase of roots percentage at the majority of cultivars and an increase of central cylinder (table 2). Also, the length of roots and the number of leaves was superior to the first stage of harvesting.

Table 2

The features of carrot roots in the second stage of harvesting

Cultivar	Weight (g) total	Weight (g) Root	% Root	Stem diameter (cm)	Central cylinder diameter (cm)	No. of leaves	Length of roots (cm)
Nantes mt	97.1	78.1	80.4	2.9	1.3	11.5	15.4
Chantenay redcore	123.7	99.3	80.3	4.4	2.4	12.9	17.2
Nantes 3	115.8	100.3	86.5	3.1	1.8	11.9	15.3
Touchon	85.5	76.3	89.2	2.7	1.6	12.4	18.5
Mohre	80.3	71.2	88.6	2.4	1.3	11.8	15.1
Chantenay de corazon rojo 2	120.4	90.1	74.8	4.4	2.6	11.3	17.8

From biochemical point of view the carrot roots presented appropriate features to be consumed. The content in water and total dry substance registered high values. Also, the NPK content was higher at cultivars with a longer period of vegetation, these elements are metabolized, (table 3).

At the second harvesting was registered a decrease in the N and P content due to a transformation suffered during the metabolization and an increase in content of dry substance, sugar and C vitamin for roots.

Table 3

The biochemical composition of carrot roots in the first stage of harvesting

Cultivar	NPK content (ppm)			Water %	s.u.t. %	sus %	Total sugar %	C vitamin mg/100 g	Acidi-ty %
	$N-NO_3$	$P-PO_4$	K						
Nantes mt	92.3	292	5320	87.2	9.8	8.2	5.2	6.0	0.11
Chantenay redcore	116	539	6040	89.4	9.9	8.4	5.1	5.6	0.10
Nantes 3	92.3	345	5240	88.1	10.1	8.3	5.0	5.5	0.11
Touchon	203	240	5080	87.9	10.0	8.2	4.9	5.8	0.10
Mohre	184.5	232	4960	87.5	10.3	7.9	4.7	6.3	0.11
Chantenay de corazon rojo 2	111	262	5680	87.7	10.2	7.8	4.8	6.2	0.11

Table 4

The biochemical composition of carrot roots in the second stage of harvesting

Cultivarul	NPK content (ppm)			Water %	SUT %	SUS %	Total sugar %	C vitamin mg/ 100 g	Acidi-ty %
	$N-NO_3$	$P-PO_4$	K						
Nantes mt	77	172	5080	85.2	12.8	11.2	5.7	7.2	0.13
Chantenay redcore	83	89	5860	86.4	12.9	11.4	5.9	6.8	0.12
Nantes 3	85	165	5160	86.1	13.1	11.3	5.7	6.9	0.12
Touchon	74	172	4990	85.9	13.0	11.2	5.8	7.1	0.13
Mohre	75	165	4790	85.5	13.3	10.9	5.7	7.3	0.13
Chantenay de corazon rojo 2	56	140	5510	85.7	13.2	11.0	5.9	7.2	0.13

The production of roots was larger at Nantes 3, 43.9 t/ha, with an increase of 22.6% comparatively with control, followed by Chantenay redcore with 39.7 t/ha, with an increase of 10.9%.

The weakest production was registered at Mohre (table 5).

Table 5

The production of carrot in the first stage of harvesting

Cultivar	The average weight of roots (g)	Production			
		t/ha	%	Comparison with control (t)	Significance
Nantes mt	71.6	35.8	100	-	Mt
Chantenay redcore	79.3	39.7	110.9	+3.9	xxx
Nantes 3	87.7	43.9	122.6	+8.1	xxx
Touchon	70.5	35.2	98.3	-0.6	N
Mohre	68.3	34.1	95.2	-1.7	o
Chantenay de corazon rojo 2	73.3	36.7	102.5	+0.9	N

DL 5 % 1.25 t/ha
DL 1 % 1.78 t/ha
DL 0.1 % 2.58 t/ha

In the second period of harvesting, the production registered higher increases at Nantes 3, Chantenay redcore and Chantenay de Corazon rojo 2.

The smallest production was registered at Mohre (table 6).

Table 6

The production of carrot in the second stage of harvesting

Cultivar	Average weight of roots	Production			
		t/ha	%	Comparison with control (t)	Significance
Nantes mt	78.1	39.1	100	-	Mt
Chantenay redcore	99.3	49.7	127.1	+10.6	xxx
Nantes 3	100.3	50.1	128.1	+11	xxx
Touchon	76.3	38.1	97.4	-1	o
Mohre	71.2	35.6	91.0	-3.5	ooo
Chantenay de corazon rojo 2	90.1	45.1	115.4	+6	xxx

DL 5 % 0.81 t/ha
DL 1 % 1.15 t/ha
DL 0.1 % 1.66 t/ha

CONCLUSIONS

From the researches conducted on different cultivars of carrot in Bucharest, resulted the following conclusions:

- The cultivars used behaved differently in the two stages of harvesting;
- The percentage of roots, from the total weight of plant, was higher at cultivar Nantes 3 (87.3%) in the first stage of harvesting and at cultivar Touchon (89.2%) in the second stage of harvesting;
- The content of total dry substance was smaller in the first stage of harvesting, approximatively 10%, but it increased in the second stage, reaching 13%;
- The production of roots was different among varieties and between the two stages of harvesting. In the first stage, the largest production was registered at Nantes 3 with 22.6% more than control. Cultivars Touchon and Mohre had a weaker production than control. In the second stage of harvesting, the largest production was registered at Nantes 3 and Chantenay redcore with 27-28% over control Touchon and Mohre did not succeded control.

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S.C. UNISEM S.A. – ORIGINATOR, MAINTAINER AND CULTIVATOR OF VEGETABLES VARIETIES FOR DURABLE AGRICULTURE

Gheorghe Glăman[1], Zoia Tudor[2]

INTRODUCTION

The durable agricultural is a concept and a target of the present period as the over using of chemicals by unreasonable utilization of chemicals, fertilizers and other stimulus have the unique aim the production and the maximum profitableness.

The cultivator must know and observe these mechanisms, making allies the birds, animals and insects that can help him in using the particular technologies of durable agriculture.

Near the traditional methods pf plants crop: hand hoeing, weeding, organic fertilizers application, treatments with sulphur and copper, juice of nettle or tobacco etc, the vital concerns of the humanity, aiming not to loose the genetic dower, was the rigorous crop rotation, keeping the valuable species and varieties of vegetables, fruits, cereals, forages, ornamentals plants.

In this context, S.C. UNISEM S.A. sets up in 1996 the first private laboratory of research in vegetables viewing to create , to maintain and to cultivate plants for seeds of traditional vegetables varieties. The laboratory accomplishes researches of improvements and specific activities of conservative selection in his branches from the country: Alba, Bihor, Ialomița, Ilfov, Neamț and Sibiu.

OBJECTIVES

During the works of individual, repeated selection , but also of the conservative selection SC UNISEM SA had in view the:

- stabilization of valuable biotypes coming from local population or varieties long time grown in Bărăgan plain and getting of new varieties;
- keeping the authenticity of the new created varieties;
- obtaining seeds of superior biological category;
- utilization of traditional selection methods avoiding the mutant and artificial substances and methods;
- participation near ICDLF Vidra and the other research stations in vegetables field, at competitive grants.

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RESULTS

From the research, selection and improvement activity executed by S.C. UNISEM S.A., we are mentioning in this article, the results of *Ialomița* branch (commune Perieți) only, that registered in 2008 the following five varieties of garden peas – *Ialomița 1* (2000), garden beans – *Scanteia* (2000), carrot – *Mileniu 3* (2003), red beet – *Regat* (2005), red onion – *Rosil* (2008).

Also, Ialomița branch accomplishes the conservative selection at the varieties created by ICDLF Vidra : garden peas- *Cornelia* (1984) and autumn cucumber – *Mondial* (1995).

Excepting the Rosil line, all the others are already known by the cultivators from this area and from the country, the seeds being sold all over the country.

We are presenting a short description of the varieties registered by SA UNISEM SA-Ialomița branch:

● Garden peas variety *Ialomița 1 ,* has been registered in 2000 and it has the following characteristics:
- Semi early variety- 58 days until the technical maturity
- Production potential 7,8 -9,1 t/ha, green pea-shells
- The green grains are consumed fresh , preserved or frozen. The dried peas can be consumed after re-hydration.
- The technological maturity of pea-shells has a simultaneity of 75 %
- The pea-shells have 6 -7 cm length and contain 7 – 8 grains peas. 82,3% from the grain production are from the category “FINE” and “SEMI-FINE”
- The variety can be cultivated on landed property or successive culture

● Garden beans variety – *Scânteia,* has been registered in 2000 and it has the following characteristics :
- The pots color is green
- Semi early variety 45 – 50 days
- Production potential 14 -15 t/ha, green pots
- The production is consumed fresh,, preserved or frozen.
- The pots have the light green color, cylinder shape, little curved, without threads, with grains gently evident
- Pots length 12- 14 cm
- Pots width 1,4 -1,5 cm
- The variety is suitable for culture in landed property, intercalated and successive
- In arid zones, the repeated watering are necessary
- Resistant variety at XANTHOMONAS PH., PSEUDOMONAS PH. and COLETHORICHUMLIND

● Carrots variety – *Mileniu 3* has been registered in 2003 and it has the following characteristics:
- Semi early variety 90 – 110 days;
- Production potential 50 – 60 t/ha;
- High efficiency at conditioning
- Diameter 2 -5 cm at the leafs bottom and L 20 – 24 cm;

- Superior biochemical and tasty quality : sweet, succulent, color deep orange, specific fragrance;
- Recommendations : crop of summer-autumn on condition of organic fertilizing of the precursory plant with repeated watering or rich pluviometric conditions

● Red beet variety *Regat* has been registered in 2005 and it has the following characteristics:
- Early variety 70 – 80 days;
- Production potential 20 – 30 t/ha;
- Root tube-round , sphere shape with skin dark red, of 250 -350 g. The inside color is
dark red, uniform with concentric rings lighter in zone of wooden vessels, these one being more evident when the vegetation status is very advanced;
- The pulp is soft, succulent, sweet. It is suitable for consuming fresh or preserved;
- It can be preserved during the winter in special appropriate space;
- The cultivation is simple on condition that observe the technology and favorable period of harvesting;
- For storage during the winter it is sowing on June-July, in irrigation conditions, in sandy soils so to avoid the roots deformation.

● Red onion variety *Rosil-L007,* it is going to be registred within this year, it is recommended for the following characteristics :
- Line proposed for registration (2008) under name *Rosil;*
- Semi late;
- Production potential 20 – 25 t/ha
- Bulbs uniform sized, they have pressed tunics, bright red color and sphere shape, little flat. The inside color is white-violaceous.
- The taste is hot piquant, specific of specie
- The variety is proposed for direct onin sowing – conditioned of irrigation with small and repeated norms
- The plants are resistant at: BOTRYTIS ALLII, ERWINIA CAROTOVORA, ALTERNARIA PORRI, SCLEROTINIUM CEPIVORUM and tolerance at PERENOSPORA destructor.

CONCLUSIONS

All the above varieties are suitable for the conditions of durable agriculture because they are: rustic; resistant in a natural manner at the attack of pathogen agents, adapted at the climate conditions of Bărăgan plain and other similar zones, they have the capability of adaptation to different conditions then those where they have been created (being tested by I.S.T.I.S.) with very good results, in centers from other zones, also) and they have a good efficiency in the normal conditions of : water, natural fertilizers, treatments with simple mineral substances (copper, sulphur) etc.

The cultivators have a lot of methods for vegetables growing in the condition of durable agriculture , but they have to carefully observe and know all the phenomena took place in their garden. The mixing of the traditional gardening methods with the technologies of the durable agriculture means : work, self-denial, knowledge and there is totally excluded the superficiality, unconcern, using of methods to get instant profit.

The majority of us is conscious that the last 40-50 years of super chemification and mechanization can destroy the dower bequeathed from our grandsires.

Under the pretext that “the people have to be nourished“ the essential food sources were destroyed : EARTH, WATER, AIR. We consider that the people working in research and education have important responsibilities to alarm the agricultural farmers, the political and administrative organisms that the huge peril is nearer then we should want to accept.

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RESEARCHES CONCERNING EXTRACTION AND DOSAGE TECHNOLOGY OF HYDROSOLUBLE B COMPLEX VITAMINS BY USING SOME GARDEN AND AGRICULTURAL CROP PLANTS AS RAW MATERIAL

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KEY WORDS: fertilizers with microelements, pea, hidrosoluble vitamins, experimental parcels

ABSTRACT

Vitamins are organic substances which in small or very small quantities are indispensable for normal growth and development of living organisms. The experiments carried out using garden pea, Bördi variety, in order to study influence of physical and chemical factors on hydrosoluble vitamins content had been implemented in Munar locality, Arad County, during 2005-2007 period of time. Fertilization of experimental plots cultivated with pea was realised using two different microelements fertilizers: Universol Blue and Ferticare I, radically applied in the same time with irrigation water (fertirrigation). The use of Universol Blue and Ferticare I complex microelements fertilizers during vegetation period produces an increasing of hydrosoluble vitamins B_1, B_2 and B_6 content in peas. Appliance of Ferticare I fertilizer causes an important increase of vitamin B_6 quantity in green pea.

INTRODUCTION

Together with enzymes and hormones, vitamins belong to catalyses' category, substances which participate to regulation and stimulation of metabolically processes (2). Among vegetables cultivated for green beans excels pea (fam. Papilionaceae). World-level, total surface pea cultivated has varied in the last years, between 857.000 ha (1989 - 1991 average) and 821.000 ha in 1999. Restricting to Romania, can be observed a drastic reduction of cultivated surfaces with garden pea, from 23.000 ha (1989 – 1991) to 6.000 ha, in present (1).

Experimental researches had been carried out during 2005-2007 period in Munar locality, Arad County, a favorable area for pea cultivation from pedoclimatical viewpoint. Experiments aimed the following scientifically objectives: pea crop's foundation Bördi variety, appliance of some complex chemical fertilizers with microelements during vegetation period, in order to stimulate and increase content of hydrosoluble vitamins B_1, B_2 and B_6 from peas, extraction, identification and dosing hydrosoluble vitamins B_1, B_2 and B_6 from peas through physico-chemical methods (3).

MATERIAL AND METHODS

The experimentation we had used the Bördi peas variety which is a semi-early maturing variety with wrinkled beans. Physical factors had been had in view and entered as part of an experiment which included 18 plots - 6 variants and 3 repetitions. All these experiments are characterized by the fact that, together with *fertilization* factor it had been

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also had in view the usage of fixed nitrogen from atmosphere by means of nitrogen fixing bacterium (*bacterization)*.Used bacterial product for seeds treatment was Biotrofin biofertilizer (10 l/ha). The surface of experimental field (115 m^2) was reckoned by taking into consideration the producer's specifications (3).

For identification and dosing hydrosoluble vitamins B_1, B_2 and B_6, by means of physical analysis methods, was used High Performance Liquid Chromatography coupled with Mass Spectrometry (HPLC-MS).Mass spectrometry was realized on a High Capacity Ion Trap Ultra (HCT Ultra, PTM discovery) mass spectrometer, Bruker Daltonics source, Bremen, Germany. HCT-MS is coupled to a PC, Compass 1,2 software, which comprised Hystar 3.2.37 package and Esquire 6.1.512 modulus for instrument control and acquisition of chromatograms/MS spectrums, as well as Data Analysis 3.4.179 portal for stocking, analyzing ionic chromatograms and proceeding MS spectrums.

RESULTS AND DISCUSSIONS

As a conclusion for determinations that were effectuated on experimental field, cultivated with Bördi variety pea during 2005-2007, from pedoclimatical viewpoint, 2007 was the most favourable year because of the registered soil's temperatures and pH at experimental plots' foundation moment.

Experimental results for quantitative determination of vitamins B_1, B_2 and B_6 from raw peas (Bördi variety), by means of chemical methods, are showed in Table 1 and Table 2.

Table 1

Content of vitamins B_1 from peas (Bördi variety) obtained as part of fertilized experimental plots (2005-2007)

Experimental plot (variant)	Thiamin hydrochlorate mg/100 g.r.s. (method 1)			Thiamin hydrochlorate mg/100 g r.s. (method 2)		
	2005	2006	2007	2005	2006	2007
1 - Witness	0,46	0,47	0,45	0,33	0,32	0,30
2 – Universol	0,63	0,60	0,62	0,48	0,41	0,44
3 – Universol	0,59	0,62	0,57	0,51	0,54	0,52
4 – Universol	0,54	0,55	0,53	0,42	0,43	0,42
5 – Ferticare	0,54	0,59	0,61	0,45	0,49	0,48
6 – Ferticare	0,65	0,65	0,64	0,57	0,58	0,59

Table 2

Content of vitamins B_2 and B_6 from peas (Bördi variety) obtained as part of fertilized experimental plots (2005-2007)

Experimental plot (variant)	Riboflavin phosphate mg/100 g r.s.			Pyridoxine hydrochlorate mg/100 g r.s.		
	2005	2006	2007	2005	2006	2007
1 - Witness	0,12	0,12	0,09	0,15	0,14	0,15
2 – Universol	0,16	0,16	0,14	0,24	0,27	0,26
3 – Universol	0,15	0,17	0,15	0,42	0,42	0,41
4 – Universol	0,14	0,15	0,16	0,30	0,34	0,32
5 – Ferticare	0,18	0,16	0,18	0,39	0,38	0,41
6 – Ferticare	0,19	0,18	0,19	0,51	0,53	0,54

In accordance with data from Table 1 and 2, values of vitamins' concentrations established for witness plots in 2005 show minor variations related to vitamins' concentrations established for witness plots in 2006 (ex. 0,14 mg pyridoxine hydrochlorate/100 g r.s. for 2006 related to 0,15 mg pyridoxine hydrochlorate/100 g r.s. for 2005). On the other hand, for fertilized plots there are registered significant differences (ex. 0,48 mg thiamin hydrochlorate/100 g r.s. in 2005 comparative with 0,41 mg thiamin hydrochlorate/100 g r.s. in 2006).

Referring to witness variants (unfertilized plots), it can be observed that the concentrations of hydrosoluble vitamins B_1, B_2 and B_6 for 2007 show insignificant differences comparative to the values registered in 2005 and 2006 (ex. the quantities of vitamin B_1 of peas proceeded from witness plots are: 0,33, 0,32 and 0,30 mg thiamin hydrochlorate/100 g r.s.– Method 2).

Relying on the 6 obtained chromatograms, there were acquired 42 mass spectrums, adequated for analyzed samples. The comparative analysis for the presence of vitamins B_1, B_2 and B_6 and their adequate signal intensities was realised relatively to a-chlorophyll (internal standard). Taking into account experimental conditions already described, it can be noticed that for peas samples obtained as part of fertilized plots, even the concentration of a-chlorophyll presents a minor increase relatively to peas obtained as part of witness plots. Thus, in sample 6 (Ferticare I 180kg/ha), the registered concentration of a-chlorophyll is 0,46% and signal intensity 1019, comparatively to 0,30% concentration and 515 signal intensity for witness sample.

CONCLUSIONS

Performed researches demonstrate that the best results when microelements chemical fertilizers were used at pea, were obtained when Universol Blue is given with a dose of 15 g/m^2 cultivated surface and when Ferticare I is given with a dose of 16 g/m^2 cultivated surface.

Concerning 2005, the highest quantities of thiamin, riboflavin and pyridoxine were registered at samples of peas proceeded from plots number 6, fertilized with Ferticare I in doses of 180 kg/ha for 3 times. Significant increases were obtained for both years 2006 and 2007. For the example,experimental results of the year 2005 by means of chemical methods are showed in figure 1, and 2.

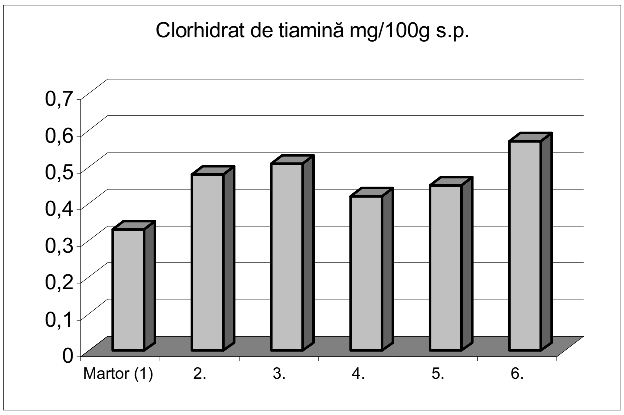

Figure 1 - Concentration values of B_1 vitamin in green pea beans obtained on the experimental plots (year 2005)

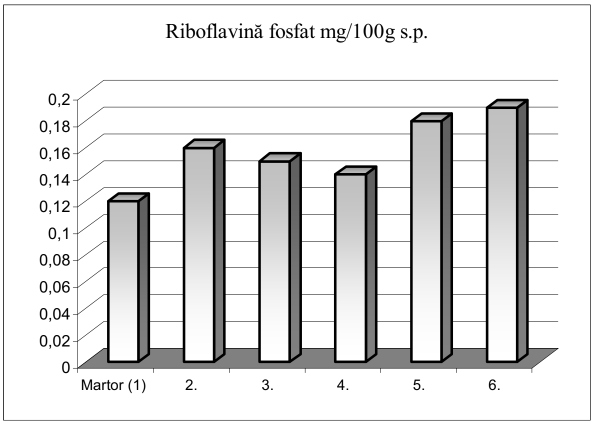

Figure 2 - Concentration values of B_2 vitamin in green pea beans obtained on the experimental plots (year 2005)

For 2006, by applying Ferticare I fertilizer, in peas can be observed an increasing of thiamin quantity for 1,2-1,5 times, riboflavin quantity for 1,3-1,5 times and pyridoxine quantity for 2,5-3,5 times.

In 2007, by using Ferticare I fertilizer with a dose of 180 kg/ha in three different moments, can be noticed a significant increase of vitamin B_6 quantity in peas, for 3,6 times higher than the witness.

Analyzing mass spectrums adequate for analyzed samples can be noticed an increase of signal intensity for vitamin B_1 presence. Thus, the signal intensity is $1,1x10^3$ for witness sample, $3,7 \ x10^3$ for plot's 2 sample (Universol Blue 100 kg/ha) and 1x104 for plot's 6 sample (Ferticare 180 kg/ha). For vitamins B_2 and B_6, by analyzing mass spectrums can be observed that from quantitative viewpoint it doesn't exist a significant increase relatively to a-chlorophyll, even if there are differences regarding signal intensity.

Pea's crops bacterization, seeds-level, by using Biotrofin biofertilizer assures getting distinctly significant yields, productivity differences being included in 1,002-1,121 t/ha.

The use of Universol Blue and Ferticare I complex microelements fertilizers during vegetation period produces an increasing of hydrosoluble vitamins B_1, B_2 and B_6 content in peas. Also, appliance of Ferticare I fertilizer causes an important increase of vitamin B_6 quantity, comparative with vitamins B_1 and B_2.

Results obtained by HPLC-MS analysis, as a semiquantitative method, gives eloquent and valuable information about the presence and the concentration of some biological active compounds in peas, such as hydrosoluble vitamins B_1, B_2 and B_6.

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Vol. XIII (XLIX) -

MORPHOLOGICAL AND PRODUCTIVE MODIFICATIONS FOR FIELD CULTIVATED TOMATOES UNDER THE INFLUENCE OF CROPMAX AND VITAFLORA STIMULENT PRODUCTS

Maria Dinu, Savescu P., Raducanu N.[1]

KEY WORDS: Cropmax, Vitaflora, treatements, tomatoes, ecological

ABSTRACT

By using Cropmax and Vitaflora stimulent products it has been tested the possibility of increasing the productive potential of tomatoes. The purpose for using these products was not only to increase the productiviness but also to protect the environment and of the soil in particular because it is well known that in the vegetables culture, the soil is very stressed due to the intensive character of the cultures.The Cropmax product is 100 % natural, being reccomended to be used into the ecological vegetables culture.

In this paper preliminary results are presented, while the final results are to be communicated as soon as possible .Two cultivars of tomatoes were taken into study, Ioana and Rada that behaved very well in field culture conditions.

Significant differences were recorded regarding the characteristics of the plants as well as regarding the number of flowers and fruits per plant, compared with the untreated wittnes.

INTRODUCTION

Vegetables culture is the most intensive sector of Horticulture, which at this time goes through a series of changes worldwide and as a result we must align ourselves to this trends and orientations.

The rational use of pesticides,chemical fertlizers and other chemical products was a priority for the vegetables growers for sometime, but at present became a major preocupation due to climatic changes that appeared and in vast majority is our fault.

MATERIAL AND METHODS

The experiment was carried between 2006 - 2007, inside S. D. Banu Mărăcine. Two cultivars of tomatoes were taken into study, Ioana and Rada which are well suited for field culture. The plants were treated during the vegetation period with Cropmax 0,2% and Vitaflora 0,2%, three treatments in an interval of two weeks.

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RESULTS AND DISCUSSIONS

After applying each treatment observations and determinations were made regarding the height of the plant, the diameter and the number of leafs for plants of three variants for each cultivar.

As it can be noticed in Table 1 the height of the tomatoes plants of Ioana hybrid, for both treated variants recorded differences compared to the untreated wittnes, differences that are more significant in the case of plants treated with Vitaflora compared to those treated with Cropmax.

Table 1

Morphological determinations for tomatoes cultivars treated with stimulent products (medium values)

Treat-ment	Culti-var	Variant	Type	Height		Base Diametre		Leafs	
				cm.	%	mm.	%	No.	%
I	Ioana	V1 (Ref)	Untreated	69,0	**100,0**	7,7	**100,0**	9,6	**100,0**
		V2	Cropmax0,2%	73,0	105,7	8,6	111,6	10,6	110,4
		V3	Vitaflora 0,2%	74,0	108,1	8,6	111,6	10,6	110,4
	Rada	V1 (Ref)	Untreated	63,0	**100,0**	7,6	**100,0**	8,6	**100,0**
		V2	Cropmax0,2%	66,4	105,3	9,2	121,0	10,2	118,6
		V3	Vitaflora 0,2%	66,2	105,0	9,2	121,0	10,0	116,2
II	Ioana	V1 (Ref)	Untreated	109,3	**100,0**	13,3	**100,0**	16,0	**100,0**
		V2	Cropmax0,2%	111,6	102,1	14,1	106,0	14,3	89,3
		V3	Vitaflora 0,2%	113,3	103,6	13,7	103,0	18,3	114,3
	Rada	V1 (Ref)	Untreated	118,3	**100,0**	11,0	**100,0**	18,0	**100,0**
		V2	Cropmax0,2%	108,3	91,5	14,6	132,7	14,6	81,1
		V3	Vitaflora 0,2%	119,0	100,5	11,0	100,0	15,0	83,0
III	Ioana	V1 (Ref)	Untreated	120,0	**100,0**	13,9	**100,0**	17,5	**100,0**
		V2	Cropmax0,2%	138,3	115,2	14,8	106,4	17,7	101,1
		V3	Vitaflora 0,2%	145,0	120,8	14,0	100,7	23,4	133,7
	Rada	V1 (Ref)	Untreated	159,6	**100,0**	14,2	**100,0**	24,0	**100,0**
		V2	Cropmax0,2%	142,3	89,1	14,9	104,9	19,1	79,0
		V3	Vitaflora 0,2%	153,3	96,0	13,4	94,3	19,3	80,4

Regarding the diameter of the plant, there were recorded differencess compared to the wittnes, differences that remain obvious in the case of leaf number also.

These aspects are very important for vegetables growing.

At Rada cultivar, after the first treatment, the treated variants recorded higher values for all the three elements taken into study compared to the wittnes. After the second treatment, Cropmaxul determined a thickness of the plat's stem and a stronger vigour also reflected by the strong colour of the leafs.

At the third treatment it was still obvious that the treated variants record higher values than the wittnes: higher stems, more vigour, and appearing a correlation between number of leafs, height of the plant and the diameter.

Regarding the number of flowers per plant and the number of fruits, the differences are highlighted in table 2.

Table 2

The influence of stimulent treatments over the fructification elements of tomatoes (medium values)

Cultivar	Variant	Type	Flowers		Fruits	
			no.	%	no.	%
Ioana	V1 (Ref)	Untreated	44,9	100,0	21,7	100,0
	V2	Cropmax 0,2%	42,3	94,2	25,7	118,4
	V3	Vitaflora 0,2%	41,8	98,8	27,4	126,2
Rada	V1 (Ref)	Untreated	21,9	100,0	17,4	100,0
	V2	Cropmax 0,2%	26,1	119,1	17,7	101,7
	V3	Vitaflora 0,2%	27,9	127,3	16,1	92,5

For Ioana cultivar, the Cropmax and Vitaflora treated variants recorded lower values of flower numbers compared to the wittnesVery significant differences are recorded in fruit numbers per, where it is obvious that the fecundation percentage is higher for the variants treated with Cropmax and Vitaflora, differences being of 18,4% for V2 and 26,2% for V3.

In the case of Rada cultivar, this produced a larger number of flowers for treated variants compared to the untreated wittnes, but unfortunately this raport does not appear in the number of fruits, which is larger for the untreated witness .

CONCLUSIONS

Treatments with Cropmax and Vitaflora determined a vigour for tomatoe plants, improved the drought ressistance of these plants as well as wealthy foliage for a good photosynthesis, adequate to the productivity of this specie.

The biostimulent Cropmax favors fructification, while Vitaflora has a good effect on flowering. Also the cultivars reacted differently, Ioana reacted favorably regarding the number of fruits per plant, Rada, the number of flowers. The results obtained for the year's research are encouraging and justifies the continuation of testing these products in culture, recording biochemical and productivity tests.

In 2006 the vast majority of the production was lost due to very bad weather.

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THE RESEARCH CONCERNING THE PHYSIOLOGICAL BEHAVIOUR OF YELLOW MELON CULTIVARS IN UNHEATED GREENHOUSE

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KEY WORDS: Yellow melon, foliar surface, photosynthetic radiation

ABSTRACT

The dynamical process of agricultural enhancement, corroborates with human society developments implies the augmentation of importance of new sorts and hybrids with high productive potential and nutritional role comparative with old species because of high efficiency in transformation of energy in fruitful mass.

The enhancement of yellow melon sort cultivated in open field and in greenhouse is the constant preoccupation of many researchers, but is necessary to test this new sots and hybrids in specific conditions of our country.

METHODS

The research was performed in unheated greenhouse conditions at "Întreprinderea de sere Işalniţa" for establish of the behaviour, morphological, physiological and crop characteristics of some yellow melon cultivars for use in culture. In this study we analyze 14 cultivars concerning physiological characteristics and perform multiple correlation between measured parameters. The physiological measurement was performed at 50 day after plantation with "Leaf Chamber" device and after this we made the necessary correlation with computer program Statistica.

RESULTS AND DISCUSSIONS

We perform correlations between foliar surface and photosynthesis intensity (see Figure 1) and we observe the optimum foliar surface at 90 dm^2 when photosynthesis intensity is 8.64 mg organic C /g.s.p. The cultivars with optimum of foliar surface are Delada 92.76 dm^2 and Amarillo Canaria 95.90 dm^2 (see Figure 2) but from photosynthesis point of view the Amarillo Canaria cultivars is the best 8.64 mg organic C /g.s.p.(see Figure 2). The correlation between active photosynthetic radiation and transpiration rate (see Figure 3b and c) in comparison with average values from Figure 3a achieve maximum value; corresponding at 5 mmols/m^2/s for active photosynthetic radiation and 0.325 mmols/m^2/s for transpiration rate. In this stage we found Maestro cultivar for active photosynthetic radiation (5.5 mmols/m^2/s) and Amarillo Canaria 0.325 mmols/m^2/s for transpiration rate. The correlation between active photosynthetic radiation and photosynthesis rate (see Figure 4a and b) is a increasing curve from 0.345 mmols/m^2/s to maximum value of 0.84 mmols/m^2/s. The Polidor cultivar achieve the optimum for photosynthesis rate (0.84 mmols/m^2/s).

[1] University of Craiova, Horticultural Department

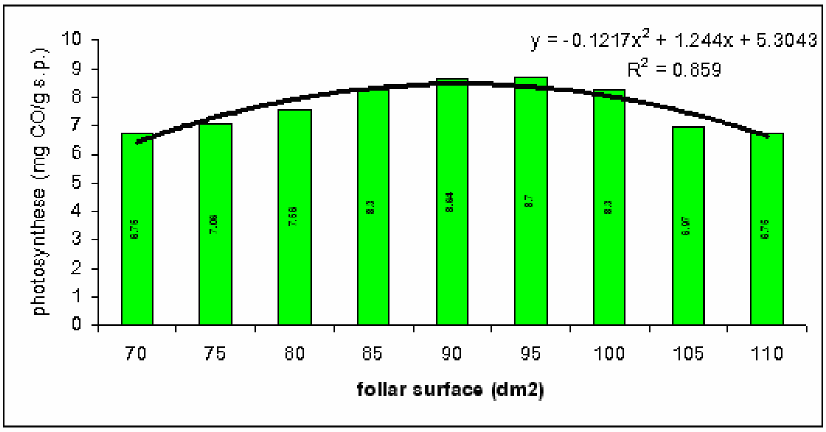

Figure 1.

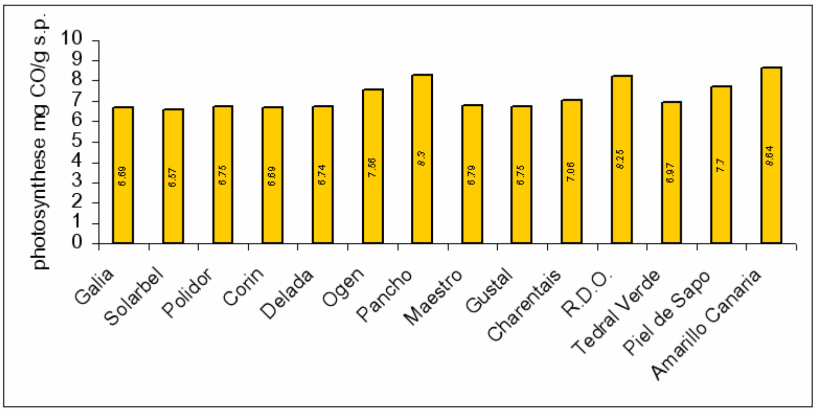

Figure 2.

The correlation between active photosynthetic radiation and vapor water pressure into measurement chamber is a decreasing regression (see Figure 5a) from 21.65 mbar to 18.25 mbar. In the Figure 5b we present eight cultivars with maximum value of water vapor pressure into stomatal chamber.

The correlation between active photosynthetic radiation and substomatal CO_2 concentration (see Figure 6a and b) have decreasing behavior, with maximum value of 446.0 ppm CO_2 (Piel de Sapo cultivar) followed by the Amarillo Canaria, Tedral Verde, Solarbel and Pancho cultivars.

The leaf temperature of yellow melon was between 27.2°C for Tedral Verde and 28.0 °C for Ogen, the differences being insignificant.

CONCLUSIONS

The first conclusion is that from many correlations between physiological parameters for 14 cultivars of yellow melon , not all cultivars are proper for culture in the unheated greenhouse conditions.

In comparison with Galia control cultivar we can distinguish the Delada, Amarillo Canaria, Pancho, Charantais, R.D.O , Corin and Maestro cultivars.

We need the more measurements for diversification of sorts and good adaptation to the specific condition of culture.

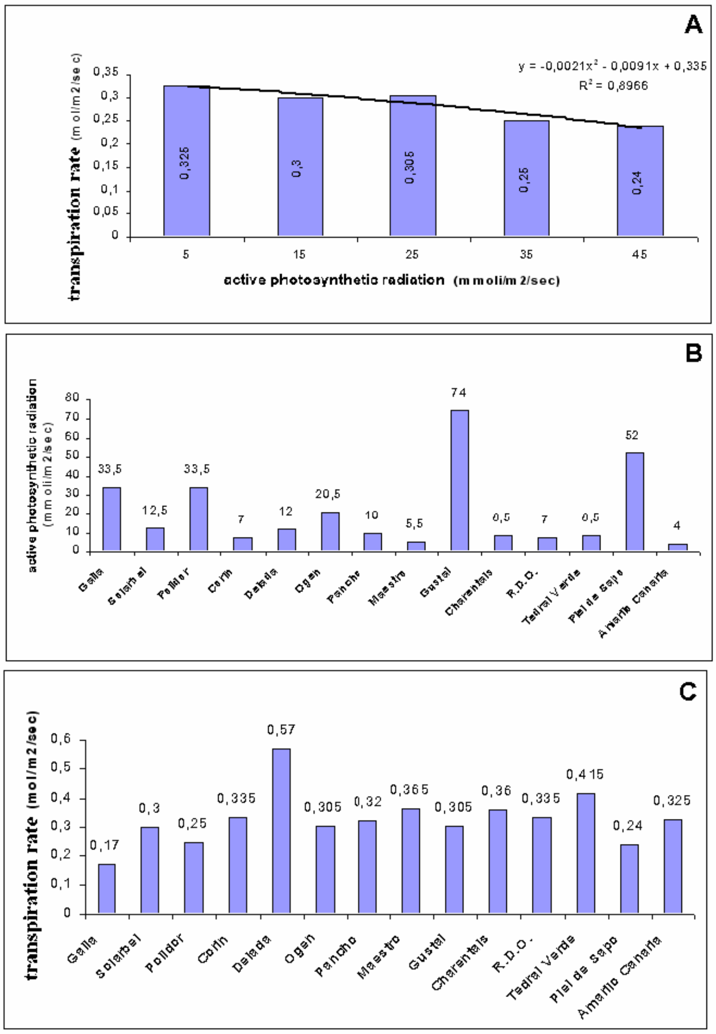

Figure 3.

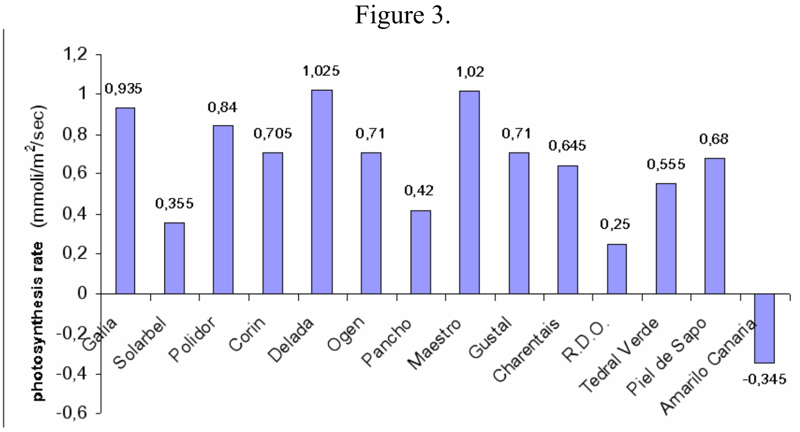

Figure 4.

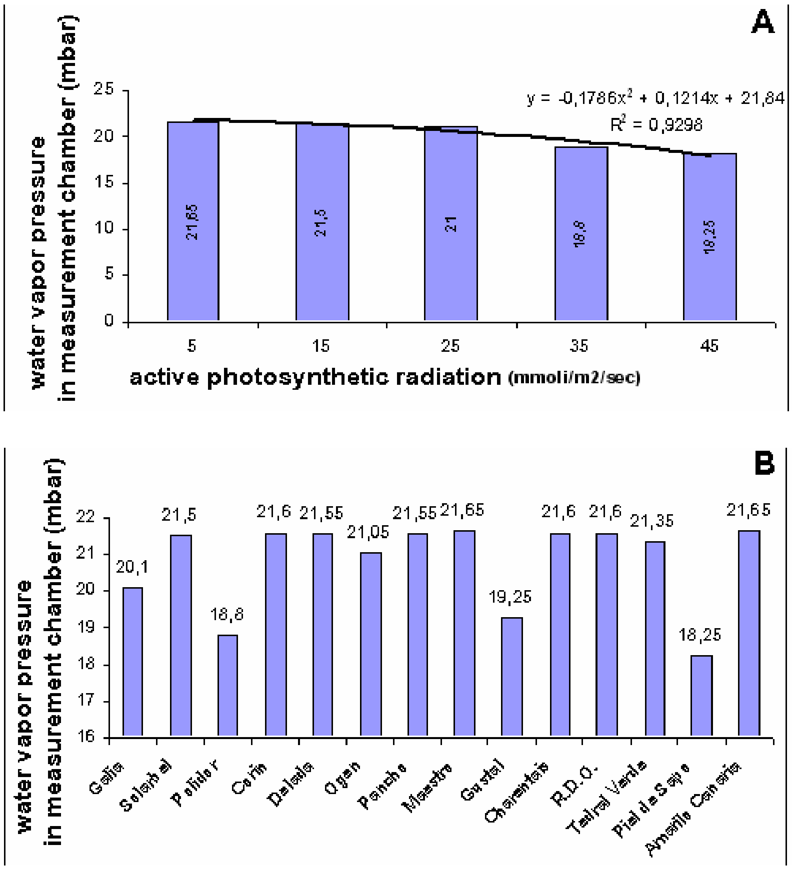

Figure 5.

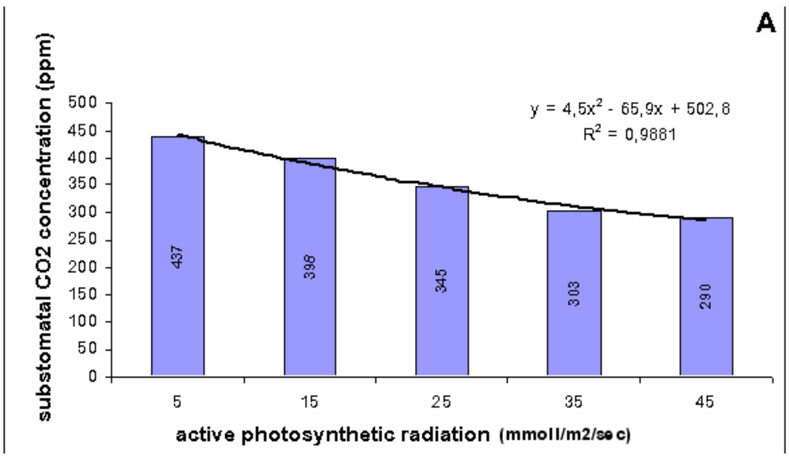

Figure 6a.

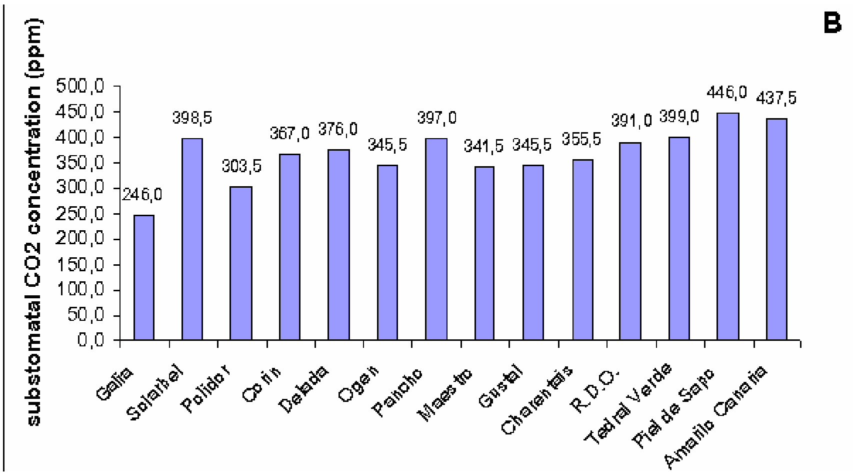

Figure 6b.

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STUDIES REGARDING THE INFLUENCE OF THE FOLIAR FERTILIZATIONS WITH ORGANIC COMPOUNDS OF THE BORINE UPON SOME MORPHOLOGICAL AND PRODUCTION ELEMENTS FOR THE GARDEN BEAN

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KEY WORDS: foliar fertilizers, boron, garden bean, quality, production

SUMMARY

The boron is an essential micronutrient for the growing of the plants. Following the experiments made regarding the foliar fertilizations with organic compounds of the boron, it has been noticed that the average height of the plants showed a significant grow for the treated variants, the values being between 15-45%. The average number of ramifications on the plant was higher for the variants to which there have been applied stimulators for fertilization comparing to the mark. The average length of the pods as element of production and quality presented a slight decrease in absolute values by administrating foliar fertilizers. The average number of pods on the plant, the main production elements, has increased with 18-45% for the variants foliar fertilized comparing to the mark.

INTRODUCTION

The boron is declared and acknowledged as an essential micro-nutrient for the plants, having a role in growth and development. The boron participates to the oxidation-reduction processes from the plants. It influences the formation process of the chlorophyll along with other micro-elements (Mn, Cu, Zn).

The boron takes part to the metabolism of the carbohydrates and to their formation process, encouraging the respiration process. Recent studies demonstrate that the plants need boron in order to stimulate the ascorbic metabolism.

The boron influences the formation process of the breeding organs, reduces the toxicity of other elements (Cu), stimulates the activity of the different enzymes: saccharose (from the sugar beet), tyrosinase (from the potato), pectinase (from the fruits, leaves, and so on)

The boron deficit of the plants leads to the appearance of the mortification and degradation of the meristematic tissues from the apical crest or from the fructification organs.

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The garden bean is an annual plant having a tradition in the agriculture of our country due to the multiple improvements both in the alimentation in the shape of hulls at the technological maturity, green and dried beans, bean flour, and for the animals' feeding by the secondary production.

The chemical composition of the hulls varies a lot depending on their development status. The hulls'quality depends on the physical and chemical factors, especially the fertilizers with a decisive role in achieving high and qualitative productions.

Their application upon certain criteria (the soil's deficit, the plant's necessary, ensuring the functioning within the normal limits of the azote fixing bacterias) constitutes a basic element in this regard.

MATERIALS AND METHODS

For the year 2007, the experiments were performed in vegetation jars emplaced in the Botanical Garden of the University of Craiova, in four rehearsals, having the following experimental variants:

V1 = mark sprayed with water
V2 = Folibor with fructose
V3 = Folibor with sorbitol
V4 = Cupribor with fructose
V5 = Cupribor with sorbitol
V6 = Borcomplex

It was administrated a quantity of commercial product calculated at surface unit of 5 l/ha, the concentration of the solution for each applied foliar fertilizer being of 1%.

For each variant by itself it was applied a number of two treatments, these being performed during the vegetation period as it follows:

- the first treatment when the plants of garden beans had formed 6-8 leaves normally developed;
- the second treatment – after 15 days from the first application

As a biological material it was used the breed of groundling garden beans and with the green hull Işalniţa 43.

Within the experiment there were performed morphological determinations and measurements (the average height of the plant, the average number of branches on the plant, the length of the hull) and of production (the average number of hulls on the plant).

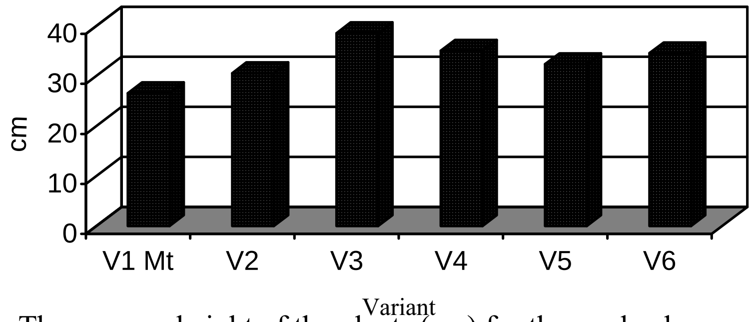
RESULTS AND DISCUTIONS

This experience had as a purpose the achievement of some estimative data regarding the effect of the Folibor and Cupribor products by the modification of the ligands, but also the action of the Borcomplex at the garden bean.

Regarding the average height of the plant, the achieved results show that in the year 2007 the highest value was of 38,5cm obtained by applying the Folibor with sorbitol (V_3), this exceeding with 45,3% the value of this character at the mark variant (V_1 – 26,5 cm).

Also, for the other experienced variants for which there were applied treatments with foliar fertilizers, the average height of the plant was higher comparing to the mark, with absolute values comprised between 6 cm (Folibor with fructose – V_2) and 8,5 cm (Cupribor with fructose – V_4) and relative values of 15,1%, respectively 32,1% (diagram 1.1).

Diagram 1.1



The average height of the plants (cm) for the garden bean

This experiment performed at the Botanical Garden of Craiova had as a purpose the achievement of some estimative data regarding both the effect of the products (Folibor and Cupribor by the modification of the ligands (fructose with sorbitol), and the action of a new product (Salicilate with boron).

Therefore, the average height of the plants presented a significant growth, from 15 to 45% comparing to the mark for all the experienced variants. Regarding the effect due to the change of the fructose with the sorbitol, the biggest difference was registered at Folibor (approximately 30%) and the smallest at Cupribor (approximately 10%) (diagram 1.2).

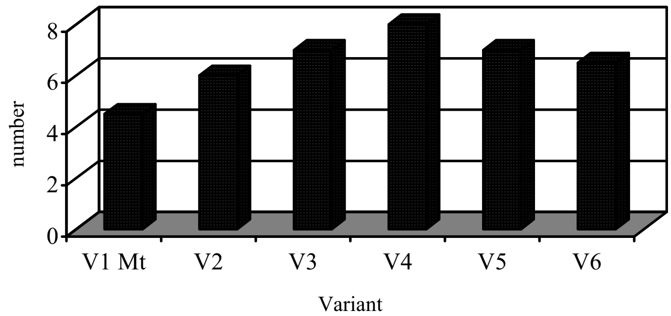
The average number of branches on the plant presented a growth by applying the fertilizer stimulants, comparing to the mark variant, due to the better development of the plants, not being significant differences neither between the products nor the ligands.

The average number of hulls on the plant, the main production element, presented raises between 18 and 45%, the best results being registered at the variant for which it was applied salycilate of boron (V6), followed by Cupribor (V4) and Folibor (V2) with fructose, its replacement with sorbitol determining a raise of only 18% for both products. The average length of the hull, as a production and quality element, presented an easy drop (of up to 1 cm) by applying the fertilizer stimulants.

Regarding the percentage of hulls until the first harvest, reached at the technical maturity, it is ascertained that only by applying the Cupribor with sorbitol and the Salycilate with boron, this was over that of the boron, but there can not be made references upon the earliness or tardiness due to the application of the fertilizer stimulants with boron.

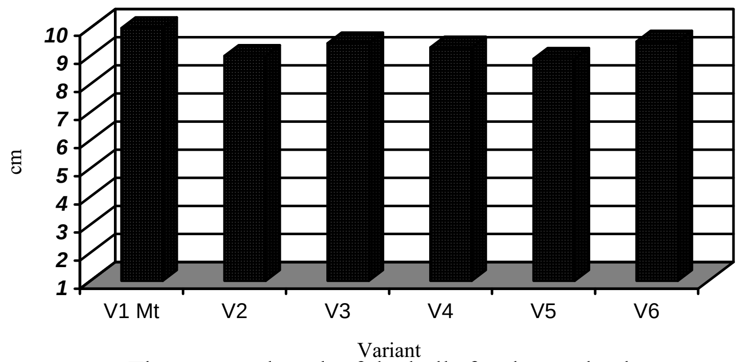
These guiding data must be checked by achieving in the field an experiment in accordance with the experimental technique, which would allow us to determine the effect of these products, but we may say, without establishing the probability level of repeatability, that the noticed modifications are determined by the applied products.

Diagram 1.2



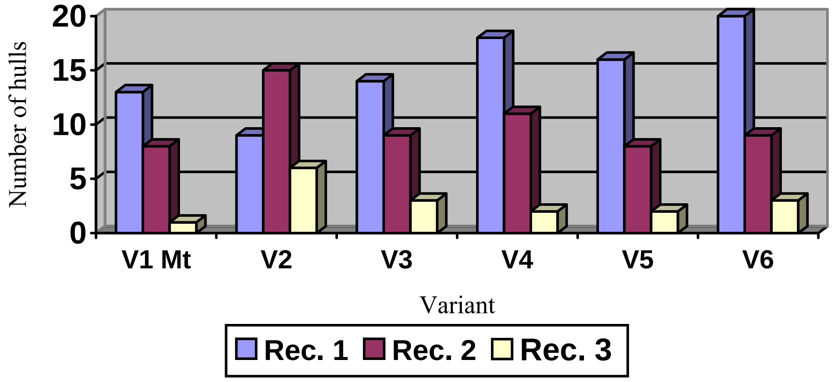
The average number of branches on the plant for the garden bean

Diagram 1.3



The average length of the hulls for the garden bean

Diagram 1.4



The average number of hulls/harvest for the garden bean

CONCLUSIONS

• The average height of the plants registered a significant raise for the variants treated with foliar fertilizers based on organic compounds of the boron, comparing with the mark, the values being comprised between 15-45%.

• The average number of branches on the plant was higher for the variants for which there were applied fertilizer stimulants comparing with the mark, due to a better development of the plants.

• The average length of the hulls, as a production and qualitative element presented an easy drop in absolute values by administrating foliar fertilizers.

• The average number of hulls on the plant, the main production element, presented raises comprised between 18-45% for the variants foliar fertilized, comparing with the mark.

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CONSIDERATIONS REGARDING THE WATERING NORMS AND IRRIGATIONS NORM ON THE VEGETATION PERIOD OF THREE TOMATOES HYBRIDS CULTIVATED IN SOLARIUM AREA AND DRIPPING IRRIGATED, IN EXPERIMENTAL YEAR 2006

Hoban Adriana[1]

KEY Words: irrigation, tomato, irrigation norm

SUMMARY

The paper represents the results of the watering norms and the irrigation norm, at three tomatoes hybrids cultivated in solarium area and dripping irrigated. The researches started in the experimental year 2006 further on three years until, this year, 2008. The experimental hybrids take-in studies are Astona hybrid (H_1), Falcato hybrid (H_2) and Sprinte hybrid (H_3); hybrid it was the first factor of the experiences. The second factor was irrigation with three graduations: irrigation on minimum humidity level of 50 %(I_1), 70% (I_2), and 90 % (I_3) from the active humidity interval (A.H.I.).

INTRODUCTION

The experimental results present in this paper are the results of the researches about the watering norms and the irrigation norm of the tomatoes culture, cultivated in solarium area and dripping irrigated.

The experimental field was in Someşeni neighborhood, Cluj-Napoca city, in 2006. The researches follow the behavior of three tomatoes hybrids: Astona, Falcato, Sprinter, irrigated with three different irrigations levels: 50 %, 70 % and 90 % from A.H.I..

MATERIAL AND METHOD

To determinate the dripping irrigation norm, is necessarily to determinate the classic irrigation norm (on furrow) using the well-known mathematic formula below:

$$m = 100 \text{ x } D \text{ x } AD \text{ x } (FC - P)$$

where:

D – the deep that the soil is humid (m);
DA – the apparent soil density (g /cm^3);
FC – field capacity of soil for water (% from the dried soil mass);
P – momentary water provision from soil (% from the dried soil mass).

The right applying classical watering norms, for the tomatoes culture, are known after the formula is applied.

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To arrive at the best results regarding the watering norm, we calculate and determinate the deep that the soil is humid at 0,6 m, the apparent soil density as 1,32 g /cm^3, the field capacity of soil for water as 27,13 %, momentary water provision from soil is different for all three irrigation levels.

Irrigation norm represent the water quantity that is give at one watering (watering norm) multiply with the watering numbers. The irrigation norm is determinate after it makes the watering chart.

RESULTS AND DISCUSSIONS

The obtain results regarding the classical watering norm, in solarium area, for those three hybrids dripping irrigated with three irrigation levels, are in the next table:

Table 1

Classical watering norms at tomatoes culture dripping irrigated (Cluj-Napoca, Someşeni, 2006)

Variant	D (m)	AD (g /cm^3)	FC (%)	P (%)	m (m^3/ha)
50 % A.H.I	0,6	1,32	27,13	25,5	129,10
70 % A.H.I				22,3	382,54
90 % A.H.I				18,9	651,82

In a publication, the author Grumeza N. and his collaborators, in 1983, consider that at gross watering norm is necessary to add 10 % – 15 %, because the water lost on evaporation and percolation. The soil from the experimental solar is clayey and we consider that is enough to supply the gross watering norm only with 5 % from it initial value.

We determinate all the watering norms needed: the net one, gross one, on the variants and on the repetitions. These values are in the next table.

Table 2

Watering norms on variants and repetitions at tomatoes culture dripping irrigated (Cluj-Napoca, Someşeni, 2006)

Variant	m_{net} (m^3/ha)	m_{gross} (m^3/ha)	v_{ariant} (m^3/ha)	$r_{epetition}$ (m^3/ha)
50 % A.H.I	64,6	67,8	0,149	0,050
70 % A.H.I	191,3	200,8	0,442	0,147
90 % A.H.I	325,9	342,2	0,753	0,251

Before the irrigation norm determination, we make the watering chart. Immediately after the planting, it was used low watering norms, because the plants root system is weak.

On first two weeks, it was watering with watering norms calculated for 30 cm deep, and in the next two weeks, it was watering a layer of 60 cm deep, using the correspondent norm. After a month from the planting, when the plants are able to deep-in the roots, was apply the calculated watering norm for 1 m deep.

The watering chart, for the experimental year 2006, is present in the table below.

Table 3

Watering chart on monthly decades at tomatoes culture in solarium
(Cluj-Napoca, Someşeni, 2006)

Var.	April				May				June				July				August				Total
	I	II	III	T	I	II	III	T	I	II	III	T	I	II	III	T	I	II	III	T	
50% AHI	1	1	1	3	1	1	1	3	1	1	2	4	2	2	1	5	1	1	1	3	*18*
70% AHI	1	1	2	4	2	1	2	5	2	2	2	6	2	3	2	7	2	1	1	4	*26*
90% AHI	4	5	6	15	5	5	6	16	5	6	7	18	6	6	7	19	6	5	5	16	*84*

Watering chart on monthly decades at tomatoes culture in solarium, for experimental year 2006, is graphic draw in next figure.

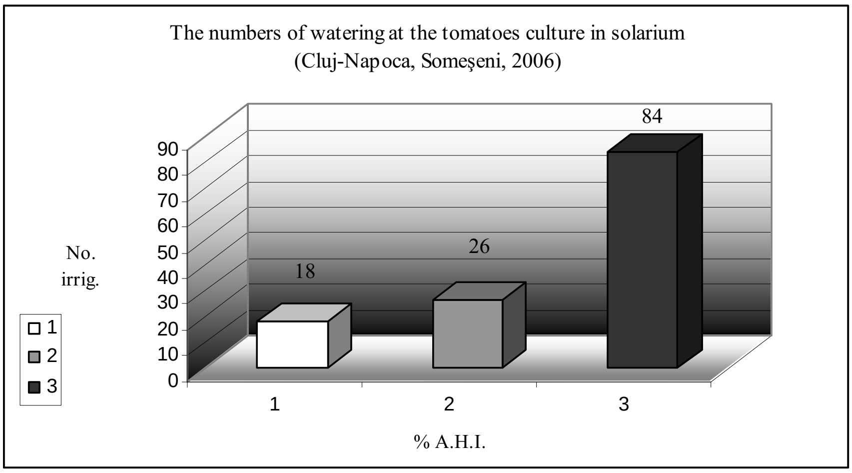

Fig. 1. The numbers of watering at the tomatoes culture in solarium
(Cluj-Napoca, Someşeni, 2006)

Irrigation norm on the vegetation period represents the quantity of water that is give at one watering multiply with the number of the watering

Next table present the irrigation norm values on the experimental year 2006.

Table 4

Irrigation norm at tomatoes culture in solarium
(Cluj-Napoca, Someşeni, 2006)

Variant	Irrigation norms (m^3/ha)					
	April	May	June	July	August	2006
50% AHI	868,8	1768,8	1826,6	1828,8	1803,2	*8096,2*
70% AHI	857,0	1750,4	2184,8	2288,2	1804,8	*8885,2*
90% AHI	913,8	2254,0	2279,8	2404,7	2026,6	*9878,9*

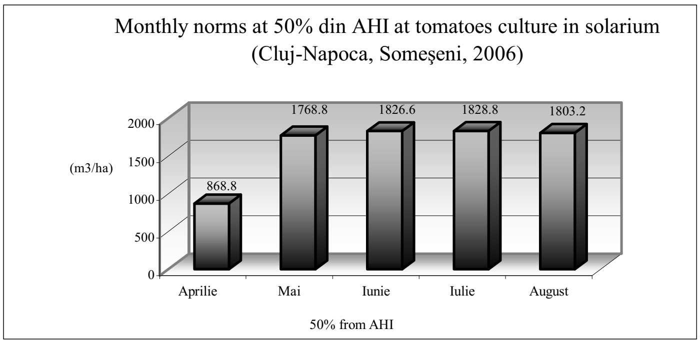

Fig. 2. Monthly norms at 50 % from AIH at tomatoes culture in solarium (Cluj-Napoca, Someşeni, 2006)

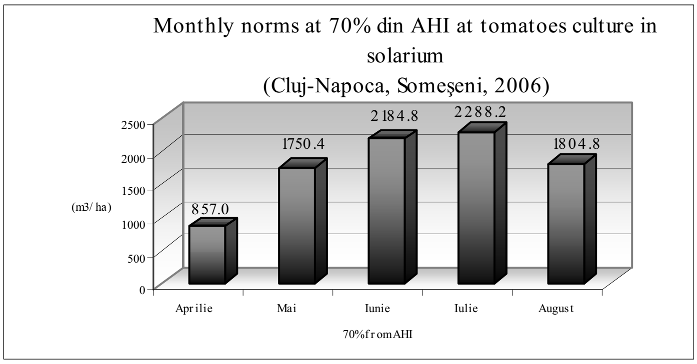

Fig. 3. Monthly norms at 70 % from AIH at tomatoes culture in solarium (Cluj-Napoca, Someşeni, 2006)

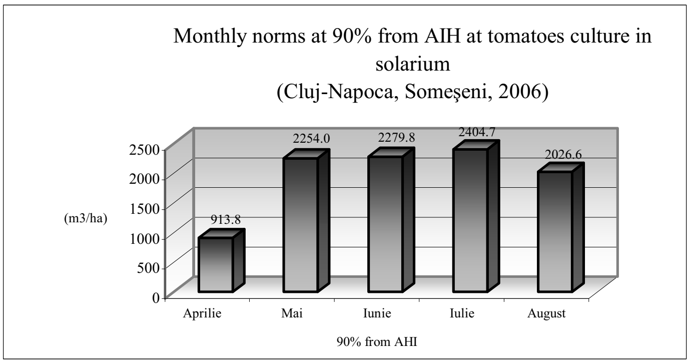

Fig. 4. Monthly norms at 90 % from AIH at tomatoes culture in solarium (Cluj-Napoca, Someşeni, 2006)

Next figure present all monthly norms on every 50%, 70% and 90% levels from A.H.I..

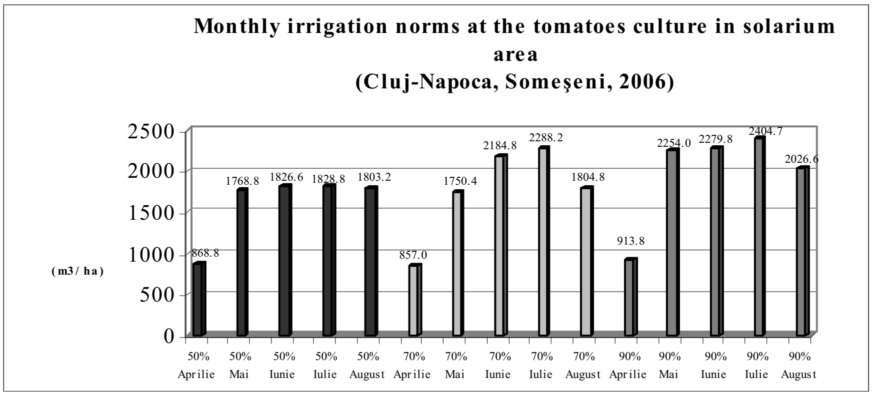

Fig. 5. Monthly irrigation norms at tomatoes culture in solarium
(Cluj-Napoca, Someşeni, 2006)

The figure below shows the total irrigation norms on 2006, for all three irrigation levels.

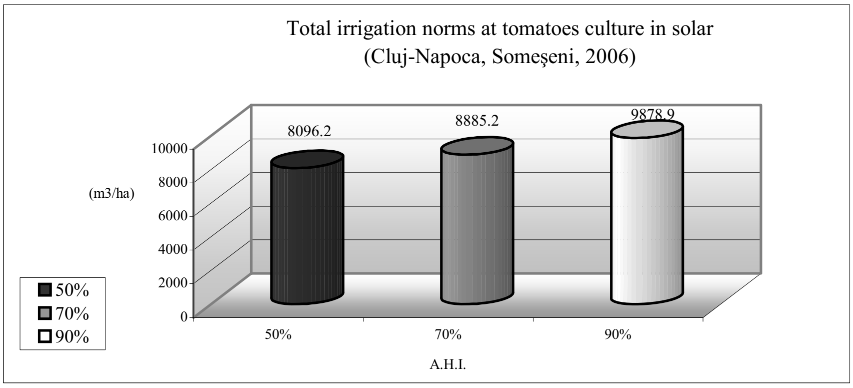

Fig. 6. Total irrigation norms at tomatoes in solarium
(Cluj-Napoca, Someşeni, 2006)

CONCLUSIONS

The conclusions are:

1. Classic watering norm obtain values between 129 m^3/ha and 651 m^3/ha. The lowest value is recorded at the minimum irrigation level of 50 % from AHI – 129,10 m^3/ha, this norm is wanted in production.
2. Watering norm on variant and repetitions present the lowest values at the same minimum irrigation level of 50% – 129,10 m^3/ha, this level is considerate of the science authors, the best level of all,

3. Watering chart present big differences between the variants of 50% and 90%: 18 watering for the 50% level and 94 watering for 90% level.
4. Monthly irrigation, its values are growing from lowest irrigation in April 868,8 m^3/ha – 857,0 m^3/ha – 913,8 m^3/ha – for all thee irrigation plafonds of 50 %, 70 % and 90 % from A.H.I.. It can be saw that the differences between these values are not so big. The months May and June are higher than last month, arrive at a maximum level in July, this was the hot month of the year 2006. August is the month when we apply the last irrigation norms and they are less that in July.

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✓ Horticultură
✓ Tehnologia prelucrării produselor agricole
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RESEARCHES REGARDING THE WATER CONSUPTION OF THREE TOMATOES HYBRIDS CULTIVATED IN SOLARIUM AND DRIPPING IRRIGATED, ON THREE IRRIGATION LEVELS, IN THE EXPERIMENTAL YEAR 2006

Hoban Adriana[1]

KEY WORDS: irrigation, tomato, irrigation norm

SUMMARY

The results of the water consumption of three tomatoes hybrids cultivated in solarium area and dripping irrigated, at the different irrigation levels. The researches started in experimental year 2006 during three years of study until current year, 2008. The experimental hybrids are: Astona (H_1), Falcato (H_2) and Sprinter (H_3); and the experimental irrigation levels: 50 % from AHI (I_1), 70 % (I_2) and 90 % (I_3) from AHI. These are the information dates base of the experiences that was make to arrive at the results of the water consumption, for every each of the irrigation levels.

INTRODUCTION

The experimental field was located in Someşeni neighborhood, in the East side of city Cluj-Napoca, on the right side of the Someşul Mic River, at approximately 200 m of it, during three experimental years, 2006 – 2008. The geographical forms, that delimitate this experimental zone, determinate a specific microclimate for horticulture cultures.

The researches regarding the water consumption, in 2006, of three tomatoes hybrids cultivated in solarium area and dripping irrigated at three different irrigation levels, was calculate using specific methods and formulas, for arriving at relevant results for the culture.

MATERIALS AND METHOD

Experimental material take in study is representing of two experimental factors with solarium conditions of vegetation and dripping irrigation.

The water consumption is determinates with water balance in soil, in close circuit.

Water balance from the soil represent the relation between water quantities that deep-in soil and the lost water quantity, on short terms the quantity expression of hydrologic regime of the soil.

To do the water balance from the soil it masts apply the condition, that:

"in" = „out"

"In" represents all the water source contributions of the soil:

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- Water reservation from the soil at the start vegetation;
- The sum precipitations from vegetation period of the plant (in protected area cases is "zero");
- Water quantity apply on irrigation, represented irrigation norm;

"Out" represented all the water consumptions from the soil:
- Total water consumption of the culture;
- Water reserve remains in the soil in harvest moment.

Making the water balance between „in" and „out" it was obtains the formula:

$$Ri + Pv + \Sigma m = Rf + ETR$$

where:
Ri – water initial reserve from the soil (at the start vegetation period) (m^3/ha);
Pv – the precipitations from the vegetation period (in protected area, Pv = 0);
Σm – irrigation norm (m^3/ha);
Rf – final water reserve from the soil (at the end vegetation period) (m^3/ha);
ETR– water consumption (m^3/ha).

Initial water reserve from soil (Ri), represent the water quantity from soil, in m^3/ha, that it can be found in spring, before that culture is started, on conventional deep take as 1 m. The determination method of water initial reserve from soil it was gravimetric method, using drying stove.

Irrigation norm (∑m) represent the water quantity that was apply in vegetation period, did not take in calculus the provision drench.

Final water reserve (Rf) from soil represent the water quantity that remain in soil after the harvest, at the end of the vegetation period.).

The determination method is gravimetrical method.

From the experimental field, we take soil stamps, at 20 cm, 40 cm, 60 cm, 80 cm and 100 cm, deep levels. At these soil stamps, we apply all the methods that assumed perfect results, using breathalyzers, drying stove.

For humidity calculus, we apply the formula:

$$U\% = \frac{\text{apa pierduta}}{\text{masa soluui uscat}} \cdot 100 \qquad \text{or} \qquad U\% = \frac{C_1 - C_2}{C_2 - T}$$

where:
U – soil humidity (%);
C_1 – breathalyzer tare + humid soil mass (g);
C_2 – breathalyzer tare + dried soil mass (g);

It was used both formulas to obtain the best results.

Soil humidity is determinate making the arithmetic media between those three experimental repetitions, accepting, between those three repetitions, maximum deviation of 2%. If, just one time the repetition was aberrant, it was eliminate from calculus, the media was obtain using the other two repetitions. It the differences, between those three repetitions, was over 2%, the determination was make again.

The obtain dates for the water consumption, at three tomatoes hybrids cultivated in solarium and dripping irrigated on three irrigation plafonds, are presented in Table 4.

Using the same deep plafonds: 20 cm, 40 cm, 60 cm, 80 cm and 100 cm, it was determinate the active humidity interval of soil.

The active humidity interval of soil, useful for plants, is necessary for determinate the correct application of the irrigation regime and the water proportion accessible for plants from the field capacity.

Calculus formula for active humidity interval, to obtain useful results for the experiences, is this:

$$A.H.I. = FC - DC$$

where:
A.H.I. – active humidity interval;
FC – field capacity;
DC – drooping coefficient.

Apply the formula, obtain results for every deep level take in study, are in the next table.

Capacity field and drooping coefficient, was calculate before for the same five deep levels.

Table 1

Active humidity interval for soil
(Cluj-Napoca, Someşeni, 2006)

Deep level (cm)	AD (t/m^3)	FC (%)	DC (%)	AHI (%)
0 – 20	1,14	27,4	11,60	15,8
20 – 40	1,25	27,2	12,20	15,0
40 – 60	1,58	26,8	12,70	14,1
60 – 80	1,75	26,6	13,30	13,3
80 – 100	1,94	26,9	13,70	13,2

Another helpful parameter for the experiences is the active humidity coefficient. This coefficient gives dates about accessible water proportion for plants from the field capacity. These dates are determinate for the same deep levels (20 cm, 40 cm, 60 cm, 80 cm and 100 cm).

Active humidity coefficient:

$$AHC = \frac{FC - DC}{FC} * 100$$

where:
AHC – active humidity coefficient;
FC – field capacity;
DC – drooping coefficient.

In table below is calculates the active humidity coefficient for all five deep levels (0-100 cm), using field capacity, the drooping coefficient and the active humidity interval values.

Table 2

Active humidity coefficient
(Cluj-Napoca, Someşeni, 2006)

Deep level (cm)	AD (t/m^3)	FC (%)	DC (%)	AHI (%)	AHC (%)
0 – 20	1,14	27,4	11,60	15,8	57,7
20 – 40	1,25	27,2	12,20	15,0	55,1
40 – 60	1,58	26,8	12,70	14,1	52,6
60 – 80	1,75	26,6	13,30	13,3	50,0
80 – 100	1,94	26,9	13,70	13,2	49,1

Minimum Humidity level is an indicator that his value presents special interest, because presents the minimum humidity interval until drooping coefficient value, where the plants are dieing, and the biological activity is stops.

According this, is calculate the minimum humidity plafond using the formula below:

$$P.min = WC + \frac{1}{2} (FC-WC)$$

where:
FC – field capacity;
DC – drooping coefficient;
AHI – active humidity interval.

The results are in the table below:

Table 3

Minimum humidity plafond
(Cluj-Napoca, Someşeni, 2006)

Deep level (cm)	FC (%)	DC (%)	AHI (%)	AHC (%)	P.min (%)
0 – 20	27,4	11,60	15,8	57,7	19,5
20 – 40	27,2	12,20	15,0	55,1	19,7
40 – 60	26,8	12,70	14,1	52,6	19,8
60 – 80	26,6	13,30	13,3	50,0	20,0
80 – 100	26,9	13,70	13,2	49,1	20,3

RESULTS AND DISCUSSIONS

Water consumption of those three hybrids, cultivates in solarium area and dripping irrigated with three different irrigation plafonds, at Cluj-Napoca city in experimental year 2006, was determinate and calculate, and the obtain results are notate in Table 4.

Table 4

Water consumption at tomatoes culture in solarium, with three irrigation levels (Cluj-Napoca, Someşeni, 2006)

Variant	DA (g/cm^3)	IN			OUT	
		Ri (m^3/ha)	Σm (m^3/ha)	Total (m^3/ha)	Rf (m^3/ha)	ETR (m^3/ha)
50%AHI	1,32	2185,1	8075,2	10260,3	2206,9	8053,4
70%AHI		2185,1	9017,4	11202,5	2196,2	9006,3
90%AHI		2185,1	10098,7	12283,8	2255,6	10028,2

Water consumption in experimental year 2006, is graphical represented in next.

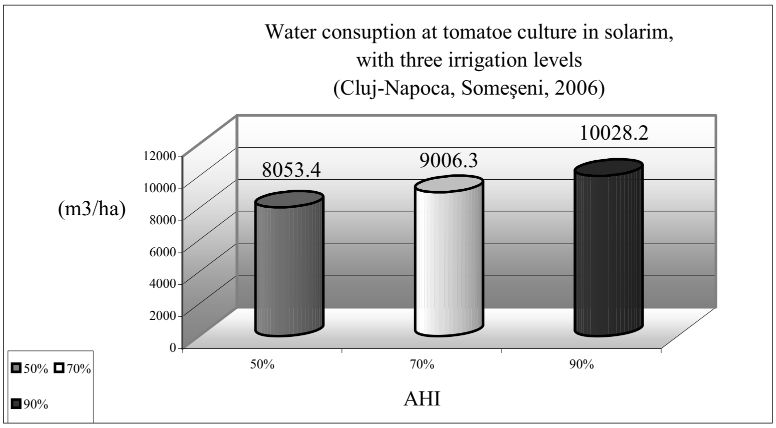

Fig.1. Water consumption at tomatoes culture in solarium, with three irrigation levels (Cluj-Napoca, Someşeni, 2006)

CONCLUSIONS

The experiences make in experimental year 2006, in Cluj-Napoca city, regarding water consumption of three tomatoes hybrids: Astona, Falcato and Sprinter, cultivated in solarium area and dripping irrigated with three different irrigation levels from active humidity interval.

Water consumption is record minimum values at the minimum irrigation level 50 % from AHI, of 8053,4 m^3/ha, what demonstrate the theory sustain of Scientifics: Budiu V. in 2003; Grumeza N. and O. Drăgănescu in 1983; Vermeiren I. and Jobling J. A. in 1980.

These Scientifics proof that irrigation on minimum level of 50 % from the total irrigated surface is enough to obtain best production results and lowest water consumptions.

Water consumption at irrigated variant of the minimum plafond of 70 % from AHI, record a high water consumption approximately 1000 m^3/ha, recording a value of 9006,3 m^3/ha.

Irrigated variant of minimum irrigation level of 90 % from AHI record the biggest values, comparing with the other two variants. This variant has bigger values comparing with the variant of irrigated at the minimum irrigation level of 70 % from AHI, with approximately 1000 m^3/ha, and approximately bigger with 2000 m^3/ha that first variant, irritation of 50 % from AHI. Water consumption at this last variant is 10028,2 m^3/ha, record a very big water consumption unjustified in production.

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THE INFLUENCE POT TYPE ON THE BIOLOGICAL ACTIVITY OF THE SUBSTRATE AND THE SEEDLINGS GROWTH

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KEY WORDS: cabbage, salad, respiration, transplants, root

ABSTRACT

Numerous researches doing in those domains accentuating that actually in Romania is more used at transplant production, nutritive pot, realized through pressing from different earth mixtures like plastic material rigid or bendable flowerpot, but not degradable. Recently it has expanding alveolus blade using by different dimensions. Like comparison in countries great producer of vegetables it has used other types of pots, especially biodegradable materials that present advantage of the unpolluted soils, create optimum conditions for growing of the transplants, facile planting and transplanting success percent growing as result of transplanting stress elimination. Very good results are signalized in case of Jiffy stripe pots type uses.

INTRODUCTION

Alongside nutritive substrates, pot types can influence microbiological activities at root sphere level, and as result plant nutrition through solubilizations of low accessible minerals, grow and transplants quality .

The purpose of the research was determining of the Jiffy type plastic material pots and nutritive pot (control variant) concerning biological activities at pricking-out substrates and implications of this modifications concerning cabbage and salad transplants growing and qualities.

MATERIALS AND METHODS

The experiences was organized in warm glasshouse at Vegetable Department from USAMV Bucharest, after linear blocks design with four repetitions, used like biological materials Mona salad cultivars and Moucheter cabbage hybrid.

Total plant number from experience was 480, pair 80 plant per variant for each species in part, that means 20 plants per repetition.

Breeding material production it has effected in period February-march 2007, through sowing in small wood boxes filling with nutritive mixture (40 % manure, 30 % nutritive earth, 20 % divot and 10 % sand).

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For pricking-out it has used: plastic material pot with different dimensions (5,5/4,5cm at salad and 7/8 cm at cabbage); Jiffy stripe five at salad and Jiffy stripe seven at cabbage; nutritive pot with flank by 3 cm at salad and 5 cm at cabbage.

Nutritive mixture used for nutritive pot filling and for making of nutritive pot was realized from: 40 % manure, 40 % divot, 10 % nutritive earth, 10 % sand.

Experimental cultures setting up it has doing in moment of pricking-out (6 march for cabbage and 13 march for salad).

For each observed species was result the next experimental variants(fig. 1.):

V1 –plastic pot, V2 – Jiffy pot V3 – nutritive pot (control variant)

V1 V2 V3

Salad

V1 V2 V3

Cabbage

Fig. 1. – Experimental variants

In vegetation period it has applied specific agrotechnics transplants producing: daily aeration, irrigations, one chemical fertilization with NPK solution in concentration by 0, 5 %, treatments with specific substances for diseases and pests controlling and weeds clearing.

Maintenance working was uniform applied to all studied variants.

It has effectuated observations and determinations concerning different pot types on:

- biological activities at substrates: respiration of the nutritive substrates from plant root sphere, heterotroph micro-flora from plant root sphere through dilutions method (10-5), used Topping medium.

- transplant growing-plant length and total mass, at vegetative aerial apparatus and roots.

These parameters were determined before planting (19 April at cabbage and 23 April at salads), and obtained dates has calculated like average at measurement effectuated at 10 plants for repetitions.

Statistical analyses at registered dates it has doing with JMP 6.0. Program. For statistical interpretation at the results it has used: variances analyze (ANOVA), Tukey-Kramer tests (multiple comparisons) and Dunnet (comparisons with control variant).

RESULTS AND DISCSSIONS

Results concerning pot type influences on nutritive substrates respiration from transplants root sphere are presented in table 1. For appreciating of pot type influences interactions, substrates and plant it has effectuated determinations on initial substrates used, uncultivated (considered control variant).

Table 1

Nutritive substrates respiration from cabbage and salad transplants roots sphere

Species	Variant	Specifications	Repetitions ($mgCO_2$/100g sol S.U.)			Average
			R1	R2	R3	
Control – uncultivated substrates			18.81	18,81	16,59	18,07
Cabbage	V1	plastic pot	22,19	26,63	25,52	24,78
	V2	Jiffy pot	143,68	116.31	109,47	123,15
	V3	Nutritive pot	19,31	19,31	19,31	19,31
Salad	V1	plastic pot	20,94	21,99	24.09	22,34
	V2	Jiffy pot	120,20	127,27	123,73	123,73
	V3	Nutritive pot	24,82	25,95	23,69	24,82

In comparison with control variant without plant it has ascertained respiration growing of the all-nutritive substrates in all-experimental variants.

At Jiffy pot variants it has remarked a growing by seven time approximately at respiration intensities at both examined species in time of the other pot types, differences are very small.

Pot type influences on heterotroph micro-flora from roots sphere are presented in table 2 and figure 2.

Table 2

Heterotroph micro-flora from cabbage and salad roots sphere

Species	Variant	Specification	Nr. heterotroph bacteria (mil/gr soil S.U.)			Average
			R1	R2	R3	
Control – uncultivated substrates			12,95	13,65	14,33	13,62
Cabbage	V1	Plastic pot	13,69	15,05	14,37	14,37
	V2	Jiffy pot	354,48	196,23	253,20	267,97
	V3	Nutritive cube	25,39	31,97	18,81	25,39
Salad	V1	Plastic pot	21,96	27,77	24,86	24,86
	V2	Jiffy pot	156,99	154,81	231,31	181,70
	V3	Nutritive cube	44,54	17,40	17,40	26,44

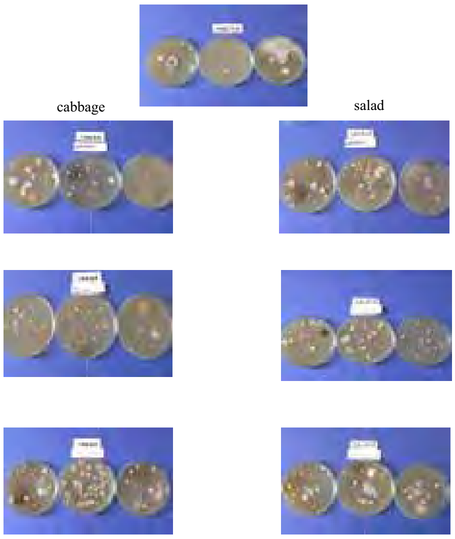


Fig. 2. Heterotroph micro-flora from nutritive substrates

The great number of bacteria colonies it has evidenced in case of Jiffy pot (267,97 mil/gr soil S.U at cabbage and 181,70 mil/gr soil S.U at salad) with remarkable differences both toward control substrates and other pot types.

In case of the plastic pot pricking-out variant it has remarked a less heterotroph bacteria number, close like value to control unplanted variant at cabbage (14.37 mil/gr. soil S.U.) and by 1,8 times bigger at salad (24,86 mil/gr soil S.U.).

Nutritive pot has determined growing of the heterotroph bacteria number by two time approximating in comparison with control substrates.

Result concerning pot type influence on the transplants growing is presented in table 3.

Table 3

Growing indicators at cabbage and salad transplants in planting time

Species	Variant	Specification	Aerial part height (cm)	Roots length (cm)	Total mass (g)
Cabbage	V1	plastic pot	14,07	19,21	8,15
	V2	Jiffy pot	15,37	9,84	7.38
	V3	Nutritive pot	14,83	8.92	7.62
Salad	V1	plastic pot	6,65	15,34	2,07
	V2	Jiffy pot	8,24	10,44	2,11
	V3	Nutritive pot	6,93	6,91	1,68

Aerial parts height (figures 3 and 5) has remarked Jiffy pots who obtained results was superior the other variants. Roots length (figures 3 and 5), pricking-out in plastic pot variant was bigger by 2,5 times at salad transplant and 2,15 times at cabbage transplant comparatively with V3 variant.

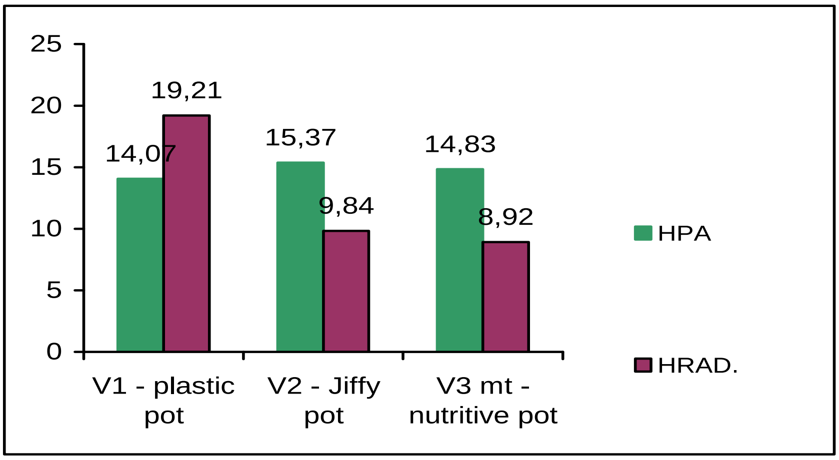


Fig. 3. Pot influence on the growing indicators at cabbage transplants.

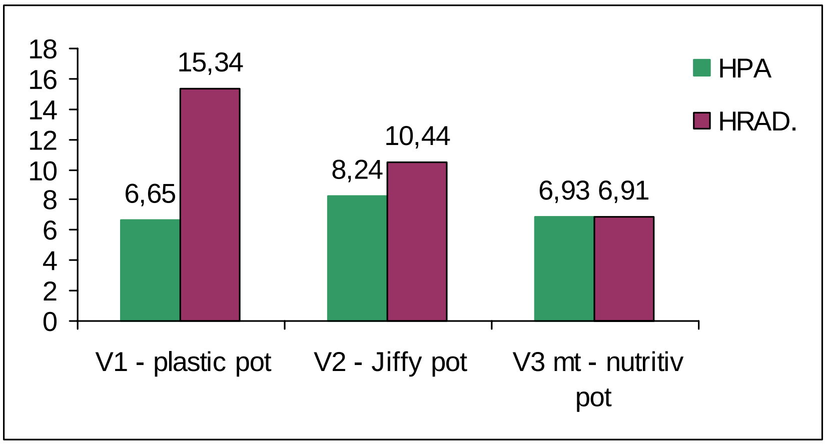
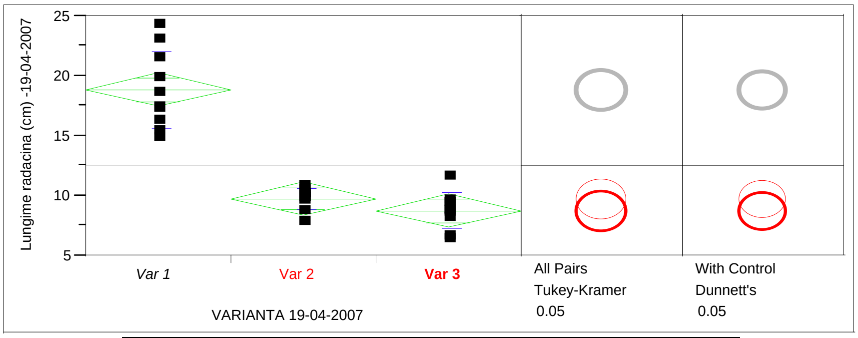


Fig. 5. Pot influences on the salad transplant growing indicators

Statistical interpretation at result (figures 4 and 6) denotes very significant differences between plastic pots and the other pot types. Between Jiffy types and nutritive pot it has registered significant differences at salad transplant and insignificant differences at cabbage transplant.

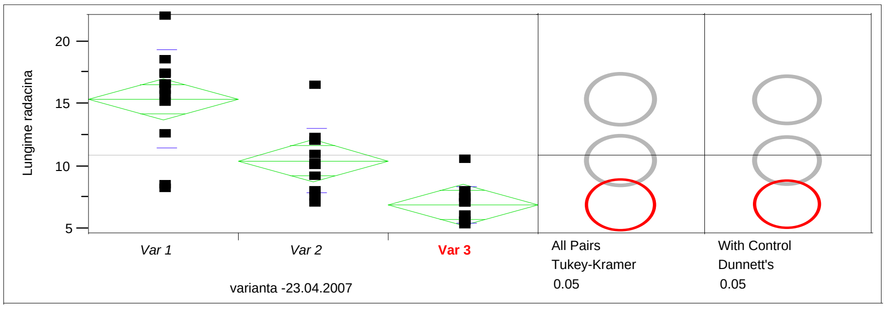


Summary of Fit	
Rsquare	0.835172
Adj Rsquare	0.822963
Root Mean Square Error	2.129424
Mean of Response	12.44667
Observations(or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Varianta 19-04-2007	2	620.34467	310.172	68.4036	<.0001
Error	27	122.43000	4.534		
C. Total	29	742.77467			

Fig. 4. The influence of pots type on root length (cm) at cabbage (Statistical analyses – Anova with a single factor)



Summary of Fit	
Rsquare	0.835172
Adj Rsquare	0.822963
Root Mean Square Error	2.129424
Mean of Response	12.44667
Observations(or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
varianta -23.04.2007	2	429.66500	214.833	26.5171	<.0001
Error	33	267.35500	8.102		
C. Total	35	697.02000			

Fig. 6. The influence of pots type on root length(cm)at salad (Statistical analyses – Anova with a singe factor)

Results concerning pot influences on transplants mass (figure 7) has evidenced that optimum variants, plastic pot in case of the cabbage, and Jiffy pots at salad, that has leaded at totally mass growing by 1.2 times comparing with pricking-out in nutritive pot transplants (control variant).

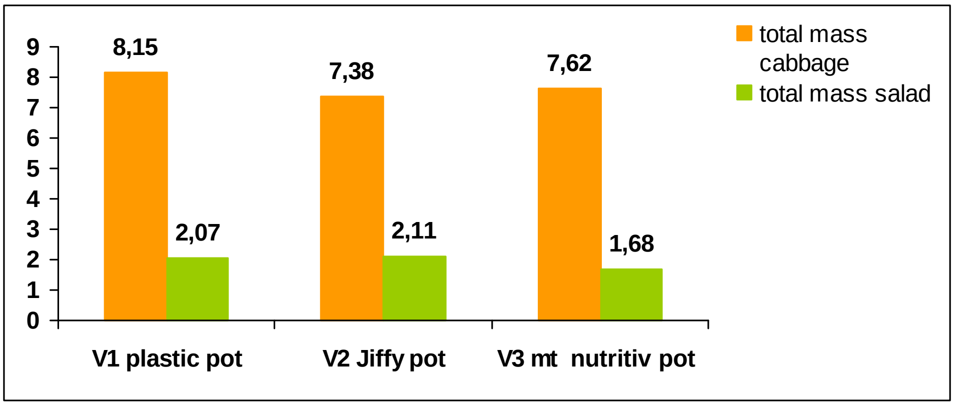


Fig. 7. Pot influence on the total mass (g) of the cabbage and salad transplant

CONCLUSIONS

Different pot types used at cabbage and salad transplants production influenced in different modes both substrates biological activity and transplants growing parameters.

At nutritive substrates level, toward control variant without plant it has ascertained growing of the respiration in all experimental variants. At Jiffy pot variant, these been approximate seven time bigger, while other pot types, differences are very small.

The great number of heterotroph bacteria it has evidenced in case of Jiffy pots, both at cabbage and salad, with remarkable differences toward control substrates and other pot types.

Aerial transplants part height, at both studied species is not major influenced by pot type used at pricking-out. Under this aspect, the great result it has obtained at Jiffy pot.

Pot type has strong influenced transplants root system growing, with significant differences between plastic pot that has obtained the great results and other pot types.

Between Jiffy pots and nutritive pot it has registered significant differences at salad transplants and insignificant at those of cabbage; obtained results denoted a strong influences at pot type concerning transplant salad root growing, toward cabbage transplants root.

Transplant total mass, pricking-out in plastic pot at cabbage and Jiffy pot at salad, grows approximating 1.2 times toward transplants form nutritive pot.

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THE INFLUENCE OF SELECTIVE PHOTO FOILS ON PATHOGENIC AGENTS *ALTERNARIA SOLANI* AND *FULVIA FULVA* IN PROTECTED PRODUCTION OF TOMATOES

Mali Sanda Manole, Ruxandra Ciofu[1]

KEY WORDS: tomatoes, selective photo foils, pathogenic agents, early crops, cultivars

ABSTRACT

Tomatoes crops, especially in the early growth stage are confronted with a complex of diseases, which produce considerable losses, especially in greenhouse conditions. Therefore an important condition for preventing the emergence of these diseases consists in providing the necessary measures to reduce the number of treatments to obtain higher quality yields.

This research presents results obtained in the University of Agricultural Sciences and Veterinary Medicine – Bucharest greenhouse, Department of Vegetable Crops. We studied the influence of PVC photo selective sheets on the emergence and the incidence of early blight (Alternaria solani) and leaf mold (Fulvia fulva) on two different varieties of tomatoes.

INTRODUCTION

In modern agriculture, plant protection is an important element in a healthy fresh produce market, obtained with minimum inputs and friendly to environment. The rate of diseases is variable from year to year, basicly from one production cycle to another within the same year. It is well known that diseases are influenced by a range of interacting responses to UV light, including altered plant growth, canopy microclimate, altered host plant resistance and changes in the survival of fungal pathogens (Paul et al., 2005). This research underlined the influence of photo selective films on the incidence of early blight (*Alternaria solani*) and tomato leaf mold (*Fulvia fulva*) on two different varieties of tomatoes. Early blight (*Alternaria solani*), leaves mold (*Fulvia fulva*) and grey mold (*Botrytis cinerea*) are often considered a major problem in greenhouse production of vegetables, including tomato. *Alternaria solani*, causing early blight has worldwide distribution and may attack tomato at any growth stage. Stems, leaf and fruits can be affected. This disease causes direct losses by the infection of fruits and indirect losses by reducing plant vigor. Fruit from defoliated plants are also subject to sunscald. Leaf mold, caused by the fungus *Fulvia fulva* (synonym *Cladosporium fulvum*), is a common and destructive disease on tomatoes worldwide grown under humid conditions. The disease is most destructive in the greenhouse during the fall, early winter, and spring when the relative humidity is most likely to be high, and air temperatures are such that heating is not

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continuous (Dobrin, 2005). The pathogen mainly affects the leaves of tomato. Infected leaves shrieked and die.

It is known that light provides energy for photosynthesis and also acts as an informational medium for plants such as identifying surrounding environmental conditions. Photoreceptors provide information on subtle changes in light composition in the growing environment, allowing the plant to make physiological and morphological changes.

As light is involved in the pathogenic processes of several foliar diseases, light transmitted through the greenhouse covers is currently the sole controllable factor in the spread of foliar diseases. In fungi, light acts in many cases as a stress inducing agent and results in morphogenetic changes, including spore production and spore germination (Reuveni and Raviv, 1997). The effect of the UV light on pathogens that causes plant diseases are well covered in a recent review by Raviv and Antignus (2004).

MATERIALS AND METHODS

Experiments took place in the greenhouse of the University of Agricultural Sciences and Veterinary Medicine – Bucharest, Department of Vegetable Crops. Two factor were studied: ***Factor* a** - cultivar: $\mathbf{a_1}$ = *Lycopersicum esculentum* var. *esculentum*: **Cindel (F1); $\mathbf{a_2}$**= *Lycopersicum esculentum* var. *cerasiforme*: **Cerise; *Factor* b** – photo selective films: **b1:** red; **b2:** yellow; **b3:** green; **b4:** treated white; **b5**: not treated white (table 1). Sheets were used to cover one greenhouse per sheet, which were arranged in a randomized block design experiment.

Table 1

Tested variants

V1= a_1b_1	V2= a_1b_2	V3= a_1b_3	V4= a_1b_4	V5= a_1b_5
V6= a_2b_1	V7= a_2b_2	V8= a_2b_3	V9= a_2b_4	V10= a_2b_5

Seedlings were produced in heated nurseries, according to known technologies (Ciofu, 2003). Seedlings were planted in photo selective covered greenhouses, as soon as the soil temperature was 10-12^{0}C. The planting scheme followed the pattern of 35/70 cm (fig.1). The incidence of early blight (*Alternaria solani*) and leaves mold (*Fulvia fulva*) has been expressed by frequency (F %), intensity (I %) and rate of attack (G.A. %). Symptom development was rated using a 0 to 4 scale based on the infected area (the percentage of diseases parts of each tested plant), where 0 = no symptoms, 1, 2, 3 and 4 = 25, 50, 75 and 100% infected. Ten plants (cv. Cindel and Cerise) in each variant were marked and used for disease rating (average of ten measurements). The efficacity of photoselective films in reducing the diseases incidence was calculated: E (%) = $GA_{control}$ - $GA_{variant}$) / $GA_{control}$ x 100. Must be mentioned that the infections were naturally installed (from the inoculum reserve of the previous year) and no foliar treatment were applied.

Fig.1. View of experiments

RESULTS AND DISCUSSIONS

Our results showed remarkable differences in using different photo selective foils on the emergence of early blight and tomato leaf mold. Early blight appeared first in red covered film greenhouse at Cindel cultivar; for Cerise cultivar the disease appeared later under the same red cover film. The colour of the foil influenced the size of early blight necrotic spots. Thus, for Cindel cultivar, under red covered foil, the size varied between 1.5-1.8 cm. Under yellow foil the size of spots were smaller (0.5-0.8 cm) almost the same size of spots obtained using green cover film (fig.2).

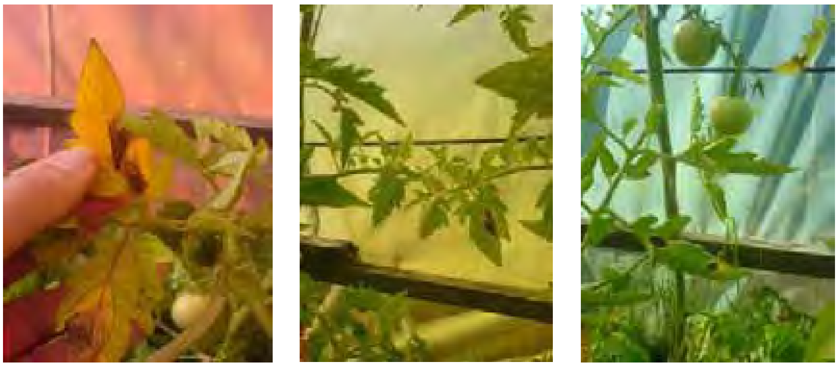

Fig. 2. Spots size of early blight on leaves under red, yellow and green films (Cindel cultivar)

The early blight incidence was 22% for *Lycopersicum esculentum* var. esculentum and 7% for *Lycopersicum esculentum* var. cerasiforme (considered as controls). For both varieties the colored films reduced the incidence of the disease (table 2). The most effective coloured films in limiting the incidence of early blight were the green film (variant 3) and treated white film (variant 4) on Cindel cultivar. On Cerise cultivar the most effective films was treated white foil (variant 9 - when early blight was 100% absent); very effective was red film (variant 6 with 71.42% efficacity) followed by green film: variant 8 – with 57.14% efficacity (table 2).

Table 2

The effect of photo selective sheets on early blight (*Alternaria solani*) development

Cultivar	Variant	Rate of attack (GA.%)	Efficacity (%)
Cindel	V1	18	18,18
	V2	15	31,81
	V3	6	72,72
	V4	5	**77,27**
	V5 - control	22	-
Cerise	V6	2	71,42
	V7	5	28,57
	V8	3	57,14
	V9	0	**100**
	V10 - control	7	-

Tomato leaf mold (*Fulvia fulva*) was vigourously present in all variants no matter the colour of the films (fig. 3). The leaf mold incidence was 28% for *Lycopersicum esculentum* var. *esculentum* and 95% for *Lycopersicum esculentum* var. *cerasiforme* (considered as controls). For both varieties the coloured films reduced the incidence of the disease (table 3). On Cindel cultivar, the most effective coloured films in limiting the incidence of leaves mold were the yellow film (variant 2 – 64.28% efficacity) followed by the red film (variant 1 – 57.14% efficacity). On Cerise cultivar the most effective films were red film (variant 1 – 57.89%) and the yellow one (variant 2 – 52.63% efficacity). The treated white film, very effective in reducing the early blight incidence, was less effective in this case (only 15.78% efficacity, variant 9).

Fig. 3 – Leaves mold attack under yellow and green films (Cerise cultivar)

Table 3

The effect of photo selective sheets on tomato leaf mold attack (*Fulvia fulva*)

Cultivar	Variant	Rate of attack (GA.%)	Efficacity (%)
Cindel	V1	12	57.14
	V2	10	**64.28**
	V3	18	35.00
	V4	21	25.00
	V5- control	28	-
Cerise	V6	40	**57.89**
	V7	45	52.63
	V8	66	30.52
	V9	80	15.78
	V10- control	95	-

CONCLUSIONS

Control of early blight of greenhouse tomato caused by *Alternaria solani* has also been achieved by inhibition of sporulation by means of UV-absorbing vinyl films (Vakalounakis, 1991). *Alternaria*, *Botrytis* and *Stemphyllium* are examples of pathogenic fungi that sporulate only when they receive light in the ultraviolet range (below 360nm). It has been already possible to control diseases on greenhouse vegetables caused by several species of these fungi by covering or constructing the greenhouse with a special UV-absorbing vinyl film that blocks the transmissions of light wavelengths below 390nm (Agrios, 2005).

- Cultivars have a specific reaction, influencing attack level and determining a different frequency of pathogens.
- *Lycopersicum esculentum* var. *cerasiforme* (Cerise) has manifested a great sensibility to *Fulvia fulva* pathogenic agent, mean time the other variety *Lycopersicum esculentum* var. *esculentum*(Cindel) has manifested sensibility to *Alternaria solani*.

- Film type and used cultivar influenced in different way plant resistance to this pathogen.
- It is recommended covering of green house with sensitive photo foils as a measure for limiting the attack of pathogens agents.
- It is indicated proper selection of foil type in function of used cultivar and frequently pathogen agent existing in tomato culture.
- Some photo selective films have the capacity of limiting the early blight and leaves mold incidence and could be an important element in the control of these diseases.

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THE REDUCED SIZE PLANTS – CONCEPT, ASSORTMENT, CULTURAL METHODS

Anton Doina, Nicu Carmen, Manda Manuela[1]

KEY WORDS: reduced size plants, classification, cultural methods, assortment

SUMMARY

The reduced size plants (RSP), frequently called „miniplants", have appeared throughout Europe in the last 20 years. They are used in the floral arrangements (miniature gardens), in flower pots and flower stands, in the indoor, terraces and balconies decoration, for gifts or shopping for oneself.

In this paper are presented: the classification of the reduced size plants, the main plants from our collection (38 species from 21 botanical family) and the systematization of the cultural methods from the speciality literature, which can lead to obtaining of low height plants.

Depending on our classification, this species are divided in: microplants (5-10 cm height), miniplants (10-20 cm) and proper reduced size plants (20-30 cm).

INTRODUCTION

The market of the miniplants is in visible growth, it doubled in the last 5 years, in Europe the production being dominated by Denmark, followed by Holland and Belgium. The reduced size plants (RSP) often called "miniplants" appeared at European level in the last 20 years and they are used in floral compositions in pots and window boxes, in the indoors, terraces and balconies decoration, they are also used as presents or as the so called "shopping for oneself". They are put to sale in small sized pots, of 5 -12 cm, so they have limited spaces and they have different origins: specific, genetic and cultural (Vidalie H., 2004). The reduced size plants of specific origin have slow growth and reduced as volume (*Saintpaulia*); the ones of genetic origin (mini *Chrysanthemum,* mini *Cyclamen,* mini *Rosa*), are the result of the improvement works (hybridizations, mutations); those of cultural origin are obtained through different culture techniques applied to plants in pots: retardants (Anton Doina and collaborators, 2000; 2002), techniques DIF (Morell D., 1999; Hallard N., 1997; Pasian C., 2003), micropropagation (Auger A., 1989), decresing the substratum volume (Manda Manuela, Nicu Carmen, Anton Doina, 2007).

In the present paper we bring in the denomination of the reduced size plants (RSP), which we consider more ample and that includes the miniplants. They are presented according to their specific origin, the main plants from the discipline collection and the systematization cultural methods found in the literature of specialty, which may lead to obtaining reduced size plants.

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MATERIAL AND METHODS

At the Floriculture discipline of the Horticulture Faculty a reduced size plant (RSP) collection was made from 30 botanical families, 130 genera and species.
This collection was classified according to the specific origin and the size of the plants, in the present paper 38 species being presented.

To some genera and species (*Anthurium andreanum, Ficus benjamina, Peperomia caperata rubra, Syngonium podophyllum, Hypoestes sanguinolenta, Spathiphyllum wallisii*) different cultural methods were applied in order to reduce growth, such as: reducing the substratum volume, hydric stress, cuttings, applying of retardant substances and the results were or will be presented in ulterior works.

RESULTS AND DISCUSSIONS

The reduced size plants have the height between 5-30 cm and they are classified as: microplants (5-10 cm); miniplants (10-20 cm) and the proper reduced size plants (20-30 cm).

The microplants have 5-10 cm height (the culture is made in 5 cm diameter pots) in table 1 there are presented 12 species from 7 botanical families, most of them decorative by leaves. The miniplants have 10-20 cm height (the culture is made in 6-9 cm diameter pots). There are presented 13 species from 12 botanical families, at most of them the main decorative element is the leaf, by colour, size, position etc. (table 2)

The proper reduced size plants have 20-30 cm height (the culture is made in 10-12 cm diameter pots). There are presented 13 species of 12 botanical families that have as decorative element the leaves (11 species) or/and the flower (4 species). The last category also contains species that in the first period of their life have a slow growth such as *Punica granatum, Ficus benjamina*, *Hypoestes sanguinolenta,* species that can be maintained in reduced shape by cuts or can be conducted to different supports. (table 3)

The succulent plants make up a large category of reduced size plants, but they are not presented in this paper. Also, from the spontaneous flora they were identified more species that can be put in the RSP category, they are in the acclimation phase in greenhouse conditions, in both situations the results will make the object of ulterior communications.

In the specialty literature we have met many methods applied by different authors, in order to obtain RSP, therefore controlling the height of the plants, to which we propose the following classification: chemical (polluting), physical and cultural (not polutting).

The *chemical* methods imply applying retardants, substances that slow down or stop growth, reduce the foliar surface, determine the compact bushes, with reduce sizes.

The *physical* methods suppose mechanical actions: the shaking of the plants, brushing, air currents that reduce the plant’s growth and the shortening of the internodes.

The *cultural* methods: *hydric stress*, reducing the quantity of water and of the watering frequency, fact that implies the reduced height and diameter of the plants, *nutritional stress* that implies reducing the substratum volume or the limitation of the phosphor content, that determines the extension of the internodes and implicitly of the height of the plants; *heat stress* - DIF techniques – the difference between the day temperature and that of the night; *light filters* - the red light stops the extension of the stalk and determines the ramification by stimulating the lateral growth of the bud; *cuts*, the *micropropagation* determines the effect of branching - the bush aspect of the plant.

CONCLUSIONS

1. The reduced size plants are classified in: microplants (5-10 cm height); mini (10-20 cm) and the proper reduced size plants (20-30 cm).

2. The reduced size plants can be of specific, genetic or cultural origin.

3. The methods applied in order to controlling the height of the plants are: chemical (applying retardants); physical (mechanic action - shaking, brushing, air currents), cultural (hydric stress, nutritional stress, DIF and DIP techniques, absorbent filters)

4. The RSP collection of the floriculture discipline, that containes 130 flower genera and species, was structured in a data base that present informations about the plant's taxonomy, the height, decorative elements, propagation, ecological requests, the image of the plant.

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Table 1

Plants with 5-10 cm height (microplants)

No.	Genus	Species/cultivar	Family	Decorative element	
				Flower/inflorescence	Leaf
1.	Begonia	conchifolia	Begoniaceae	-	Peltate leaves, ovate, glabrous on the upper side and pubescent on the lower side.
2.	Chirita	tamiana	Gesneriaceae	Delicate tubular flowers, axillary, white with two violet stripes.	-
3.	Cryptanthus	acaulis var. *ruber*	Bromeliaceae	-	Lanceolate leaves, wavy, with dentated margins, light green on the upper side, with a pink shade.
4.	Fittonia	argyroneura nana	Acanthaceae	-	Small leaves, of 2,5 cm, simple, oval, smarald green, with white veins.
5.	Fittonia	verschaffeltii	Acanthaceae	-	Obovate-elliptical leaves, 6-10 cm long, olive green, with obvious veins, intense pink or carmine-red.
6.	Peperomia	caperata *Rubra*	Piperaceae	-	Leaves disposed in rosette, cordate, goffered, dark red.
7.	Peperomia	caperata *'Little Fantasy'*	Piperaceae	-	Leaves with red petiole, disposed in rosette, cordate, goffered, with the entire margins slowly sinuate, green on the upper side and greyish-green on the lower side.
8.	Peperomia	fenzlii	Piperaceae	-	Elliptical leaves, and the lower side of the leaves is convex and pink.
9.	Peperomia	rotundifolia	Piperaceae	-	Leaves disposed on the small branches as some buttons, with long petiole, almost round, with whole margins, dark green on the upper side and white on the lower side.
10.	Saintpaulia	ionantha	Gesneriaceae	Single or double flowers, disposed in cymes-panicles, pink, white, blue	-
11.	Selaginella	kraussiana	Selaginellaceae	-	Very small leaves, light green, disposed as some flat scales, on creeping stalks, thin and ramified.
12.	Soleirolia	soleirolii	Urticaceae	-	Small leaves, of 0,5 cm diameter, round, alternate, bright green, that make up a dense carpet.

Table 2

Plants with 10-20 cm height (miniplants)

No.	Genus	Species/cultivar	Family	Decorative element	
				Flower/inflorescence	Leaf
1.	Adiantum	raddianum	Polypodiaceae	-	Leaves with black petioles, the limb of the leaves is 2-3 pinnate-sectate, with broaded fronds, like a fan, irregularly lobate.
2.	Anthurium	andreanum *Silance*	Araceae	The inflorescence is a yellow spadix, surrounded by a small red spathe.	-
3.	Begonia	boweri *Tiger*	Begoniaceae	-	Velveted leaves, dark green, with yellow-green spots.
4.	Callisia	repens	Commelinaceae	-	Thick leaves, ovate, lanceolate or oblong-lanceolate, with a sharp tip, glabrous, bright green.
5.	Ficus	pumila	Moraceae	-	Alternate leaves, short petiolated, with its bases slightly cordate, the margins unequally sinuate and rounded tip, mottled aspect, coloured with green and cream.
6.	Hemigraphis	repanda	Acanthaceae	-	The leaves are lanceolate, narrow, with the margins unequally crenate. The lower side presents violet reflexes, and the upper side is glossy green.
7.	Pellionia	pulchra	Urticaceae	-	Alternate leaves, elliptical, with its bases cordate and asymetrical, the margins slightly sinuate. The lower side is pinky, reddish veined, and the upper one is dark green, along the veins and between them light silvery green.
8.	Pilea	spruceana	Urticaceae	-	The leaves are shortly petiolated, the limb is elliptical, slightly obovate, with the margin crenate-serrate from the middle towards the tip. The lower side is reddish, and the upper one is green.
9.	Plectranthus	coleoides variegatus	Labiatae	-	Simple, opposite, fleshy leaves, persistent, oval-triangular, with crenated margins, green with white.
10.	Sansevieria	trifasciata *Hahnii*	Agavaceae	-	Lanceolate leaves, sharp, making up tight rosettes, disposed as a spiral, dark green with light green transversal ribbed.
11.	Saxifraga	sarmentosa	Saxifragaceae	-	Reniform rounded leaves, crenate, hairy, olive green with silvery veins, reddish pink on the lower side.
12.	Scirpus	cernuus	Cyperaceae	-	Fine leaves, cylindrical, light green.
13.	Tillandsia	schiedeana	Bromeliaceae	Inflorescences with pink bracts and small, yellow flowers.	-

Table 3

The proper reduced size plants - 20-30 cm height

No.	Genus	Species/cultivar	Family	Decorative element	
				Flower/inflorescence	Leaf
1.	Begonia	foliosa	Begoniaceae	-	Small ovate-elliptical leaves, dark green on the upper side and reddish on the lower side, with the margin of the limb crenate-dentate.
2.	Begonia	fuchsioides	Begoniaceae	Pendent flowers, disposed in clusters, orange-red or pink.	-
3.	Campanula	isophylla *'Alba'*	Campanulaceae	Numerous white flowers with a receptacle-shaped corolla.	-
4.	Ceropegia	woodii	Asclepiadaceae	-	Long stalks, pendent and small, opposite leaves, heart-shaped, grey-green on the upper side and purple on the lower side.
5.	Chamaedorea	elegans	Palmae	-	Pinnate leaves, with oblong-lanceolate foliole, 10-20 cm long and 2-3 cm width at the young plants, strongly acuminate.
6.	Ficus	benjamina	Moraceae	-	Persistent leaves, 5-7 cm long, oval, sharp tips, leathery, with waxed aspect, variegated. Curved branches or pendent.
7.	Guzmania	lingulata minor	Bromeliaceae	-	Lanceolate curved leaves, metalic green, that form a 30 cm high rosette. It presents big red bracts, that surround the small white or yellow flowers.
8.	Hypoestes	sanguinolenta	Acanthaceae	-	Simple, whole, opposite, oval-elliptical leaves, dark green with numerous pink, white or red small spots.
9.	Ludisia	discolor var. dawsoniana	Orchidaceae	-	Alternate velvet leaves, dark green with pink veins.
10.	Murraya	paniculata	Rutaceae	Small white cream flowers, perfumed.	7-10 cm long leaves, persistent, composed from numerous oval foliole, dark green, glossy.
11.	Peperomia	orba *Variegata*	Piperaceae	-	Oval small leaves, light green with yellow margin.
12.	Scindapsus	aureus *Marble Queen*	Araceae	-	10-20 cm long leaves, heart-shaped, then lobate, green, intensly mottled with white or sometimes completely white.
13.	Punica	granatum var. *Nana*	Lythraceae	Solitary, tubular flowers, waxed aspect, orange-red	Semipersistent leaves, simple, 5-8 cm long, sharp, glossy, bright green.

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STUDIES REGARDING THE BEHAVOIUR OF *Salvia splendens* IN FOLIAR FERTILIZATIONS CONDITIONS

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KEY WORDS: Salvia splendens, foliar fertilization, Folisof F212

ABSTRACT

Modern durable agriculture have diversified priorities as fertilization and environment protection, the use of bio stimulators and organic-mineral fertilizers foliar applied, keeping the efficiency level of fertility and preventing the residual pollution. There were organized experiments with Salvia splendens to test foliar fertilizers action. Cultures were established with nursery transplants. We used foliar fertilizer Folisof F212, 0.2, 0.4 and 0.6 % concentration. Treatments started two weeks after the cultures were established and were repeated at ten days intervals (4 treatments in total). The determinations and the observations consisted of four biometric measurements and morph-anatomical analysis during plants vegetation period.

INTRODUCTION

Original from Brazil, *Salvia splendens* (*Lamiaceae* fam.) is one of the annual plants with a diverse utilisation in landscape design, being well appreciated, first of all due to the long periods of decoration and also due to its intense red shades colours of the flowers (both corolla and also calix).

In the present paper are presented some aspects regarding the morph-anatomical modifications of *Salvia splendens* plants in the conditions of foliar fertilization application with Folisof F212.

MATERIAL AND METHODS

The experimental crops were settled up in the didactic floral field at University of Agricultural Sciences and Veterinary Medicine Iaşi, România. The four variants, placed in a randomized system, resulted from foliar fertilization with **Folisof F212** in three different concentrations (0.2%; 0.4% and 0.6%) and from one control variant, un-fertilized:

- V1-treated with water (control);
- V2-fertilization with Folisof F212 0.2%;
- V3-fertilization with Folisof F212 0.4%;
- V4-fertilization with Folisof F212 0.6%.

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Complex foliar fertilizer **Folisof F212** is a Romanian product. Contain macro and micro-elements, respectively: N-90 g/litre, K-90 g/litre, P-45 g/litre, Ca-0.4 g/litre, Mg-0.5 g/litre, B-0.2 g/litre, Zn-0.1 g/litre, Fe-0.2 g/litre.

Were applied 4 foliar treatments, at an interval of 10 days. At control variant the foliar fertilizations were replaced with water spraying.

Morph-anatomical studies put in light some modifications at the level of plants' tissues and organs, function of foliar fertilizer concentration. Those dates were completed with the evaluation of plants' grow in height; branch out degree and plants' flowering capacity.

For a better observation of the structural details of the studied material (stem) were made microscopically samples. Biological material was preserved in ethylic alcohol 70% and coloured with green-iodine and carmine-alum. Were made transversal sections through stem with a razor at hand micro-tome.

RESULTS AND DISCUSSIONS

A control (V_1), the contour of the transversal section through offshoot is square, with prominent ribs (photo 2). Epidermis present iso-diametric cells or with a little bit prolonged shape, cover by a thin cuticle (photo 1). From place to place are uni-cellular and plural-cellular tector hair (photo 1), the last ones having uni-cellular or octo-cellular gland. Tector hairs are long, with very thin walls and large lumen. Stomata are placed upon the epidermis level. The bark is split into angular colenchimatic tissue (photo 4), hypodermic which forms lines at ribs level and in rest it is collenchymas. The leading tissues are ring shaped type and the great majority of them are of secondary origin. Free ring is composed by holey tubes, annex cells and parenchyma cells. Wooden ring, much thicker, presents vessels disorderly placed in the fundamental mass. Wooden ring has medullar parenchyma rays, uni-seried and bi-seried (photo 5). At the purlieu of the free ring are numerous thin lines of schlerenchymatic (photo 3). Marrow is parenchyma – cellulose, the cells of the peri-medullar area being real hydro-cites.

Face to control, at variant treated with Folisof 0.2% (V_2) the thick degree of the vessel walls is greater. But the diameter of the transversal section is smaller that at the control (photo 6).

Variant V_3 is not very much different face to V_2 (photo 7), but the periphloemic schlerenchym is better developed, but with the walls with a moderate thick (photo 8).

At V_4 could be observed a visible increase of the division degree of the cells (photo 9), so to the marrow, at wood level, could be observed cellular slits (photo 10 and 11). We consider that this concentration is un-favourable for plants' development. The walls of the cells are moderate thick face to the ones of the other variants (photo 12).

Plants' growth in height was a little bit slow in the first stage, respectively till the last but one treatment, and after that, the differences face to control was much more visible. Treatments with Folisof F212 stimulate the growth in height, overpassing the control with pecpentages which varied between 10.5% (V_4) and 26% (V_3).

At V_4 variant the growth decrease after the application of the last treatment, due to the higher concentration of fertilizer which intensified the cellular division but also connected it with cells' breaking up.

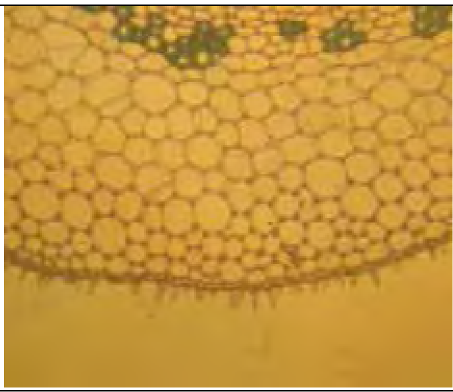


Photo 1. – Transversal section through *Salvia splendens* offshoot (control) – epidermis and collenchymas

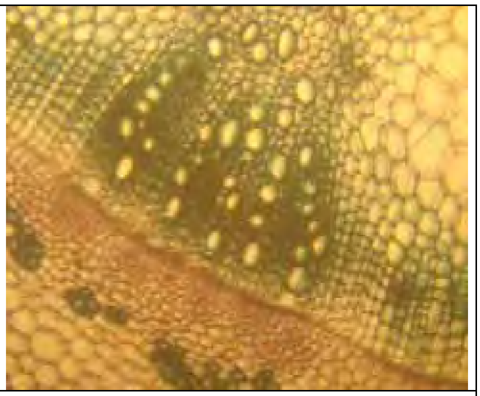


Photo 2. - Transversal section through *Salvia splendens* offshoot (control) – schlerenchym, free and wood

Photo 3. - Transversal section through *Salvia splendens* offshoot (control) – lines of schlerenchymatic fibres

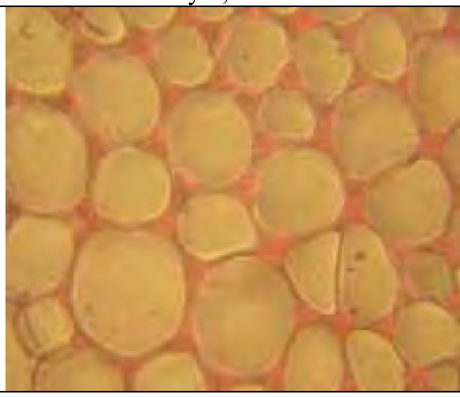


Photo 4. - Transversal section through *Salvia splendens* offshoot (control) – angular collenchymas

Photo 5. - Transversal section through *Salvia splendens* offshoot (control) – wooden vessels

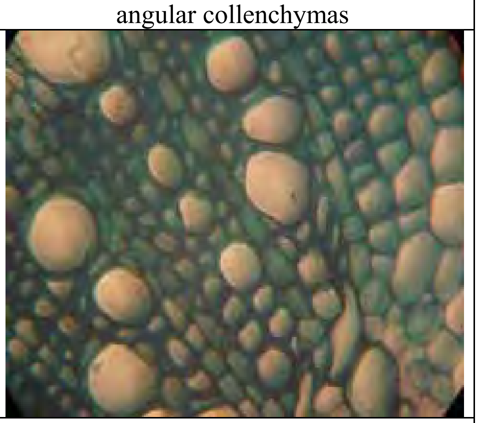


Photo 6. - Transversal section through *Salvia splendens* offshoot (Folisof 0.2%) wooden vessels

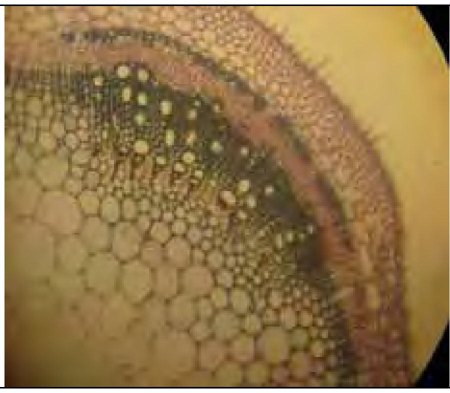


Photo 7. - Transversal section through *Salvia splendens* offshoot (Folisof 0.4%) assembly

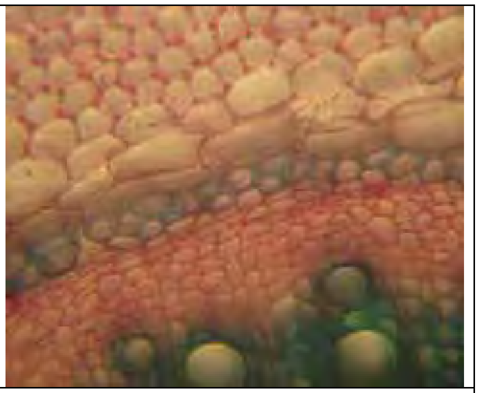


Photo 8. - Transversal section through *Salvia splendens* offshoot (Folisof 0.4%) schlerenchym, free, wood

Photo 9. - Transversal section through *Salvia splendens* offshoot (Folisof 0.6%) wood and marrow

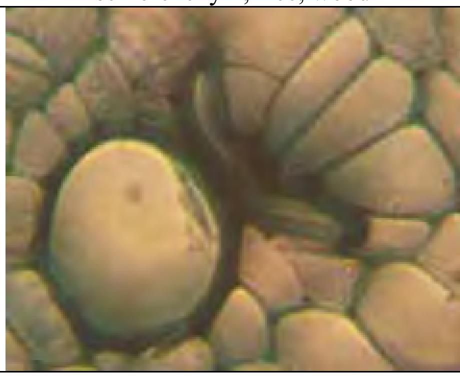


Photo 10. - Transversal section through *Salvia splendens* offshoot (Folisof 0.6%) artefact

Photo 11. - Transversal section through *Salvia splendens* offshoot (Folisof 0.6%) artefact

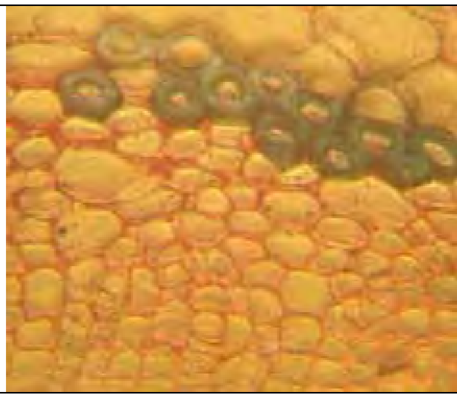
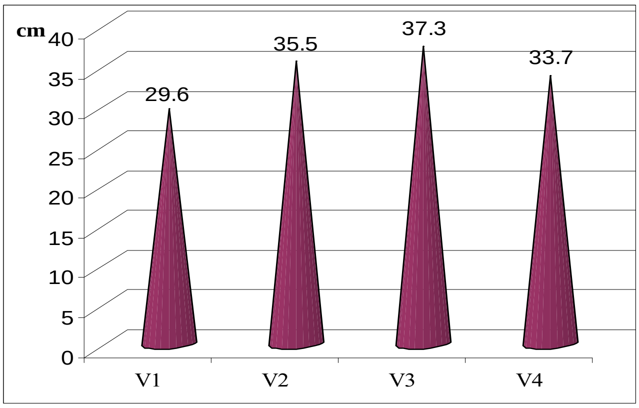


Photo 12. - Transversal section through *Salvia splendens* offshoot (Folisof 0.6%) schlerenchym

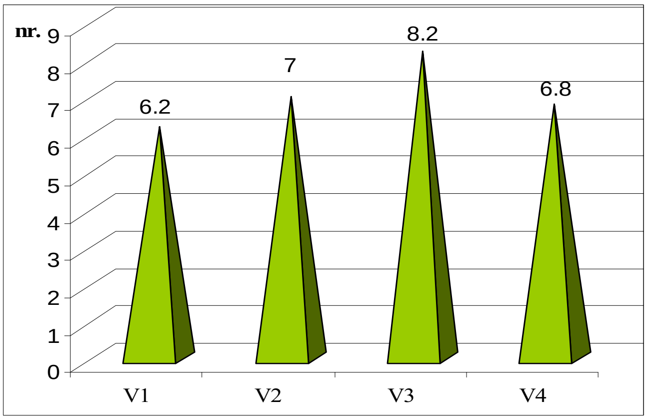
Very significant differences were at variants V_2 and V_3 and distinct significant at V1 (fig. 1).



DL 5%=1.5
DL 1%=2.2
DL 0.1%=3.6

Fig. 1. - Average height of plants

As regarding the branch out degree of the stems, this one was more visible and with very significant diferences face to control at variant V_3. Even if were recorded values of the average numaber of ramifications/plant which overpass control, at variant V_2 diferences were significant and at variant V_4 the diferences were insignificant (fig. 2).



DL 5%=0.7
DL 1%=1.0
DL 0.1%=1.6

Fig. 2. - Average number of ramifications/plant

The average length of the inflorescences was in very close limits between variants, the differences being insignificant (fig. 3).

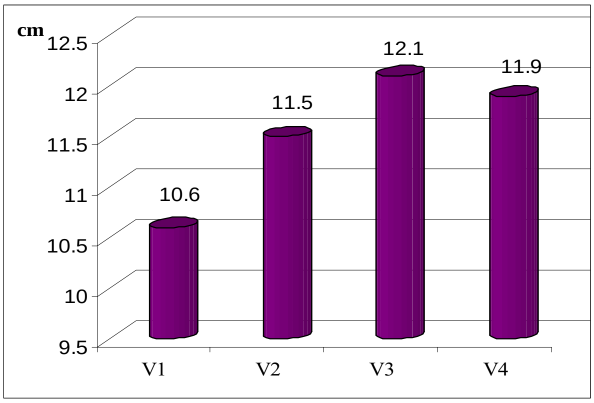


Fig. 3. - Average lenght of the inflorescences

CONCLUSIONS

Foliar fertilization with Folisof F212 stimulated the growth on height and the branch out degree of *Salvia splendens* plants but differently, functions of the used concentration. The best results were obtained at 0.2% and 0.4% concentrations.

The morph-anatomic studies at the stem level show a higher lignifications degree at the fertilized variants.

Higher concentrations of Folisof F212 are favourable to cell division correlated with the appearance of the cell breaking up (artefacts) at the wood level, phenomena less favourable for plants' grow and development.

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THE VALUATION OF SOME TULIP CULTIVARS IN ORDER TO DIVERSIFY THE ASSORTMENT

Carmen Nicu, Manuela Manda, Doina Anton[1]

KEY WORDS: rustic bulbous, morphological characteristics, decorative qualities, landscapes

SUMMARY

The tulips are beside the hyacinth and the narcissus, the principal rustic "bulbous" species, perennial plants which bloom in spring, in March-April and they are used both in the area of the landscapes, in flower beds, groups of plants on the lawn and for cut flowers.

The behaviour of some tulip cultivars in the conditions of the Craiova town, was studied in 2003-2006 period. The biological material came from Holland and it was composed of seven cultivars (*Candela, Golden Apeldoorn, Negrita, Pink Triumph, Red Triumph, Upstar, Red Giant*) *and a „botanical" tulip* (*Tarda*). *The principal phenophases (spring, the appearance of the flower bud, the period of blooming) and the morphological and decorative characteristics of the plants and the flowers of the cultivars introduced into assortment were studied.*

It was established the decorative period and the utilization of the studied cultivars.

INTRODUCTION

The beauty of the landscapes made in parks and in gardens by cultivating tulips, perennial rustic "bulbous" species, that blossom in spring, are very appreciated and well known. The tulips contribute to some special decorative combinations, in the decoration of the green spaces, in the spring flower beds, flower bands and groups of plants on the lawn. They are also used as cut flowers or they are cultivated in flower pots in forced crops.

Because of the various possibilities of cultivation and use as well as the existence of a large number of cultivars at the international level, they occupy important areas in all countries big flower producers, fact that demonstrates the special importance of this species. In this paper there are presented the results of the research regarding the behaviour of some cultivars of tulip in the ecological conditions of Craiova city.

MATERIAL AND METHODS

The biological material came from Holland and it was made up of seven tulip cultivars (*Candela, Golden Apeldoorn, Negrita, Pink Triumph, Red Triumph, Upstar, Red Giant*) and a botanical variety, *Tarda.*

The behaviour of the tulip cultivars was seen about in the didactic field of the Floriculture discipline from Craiova city. A classic technology of culture was applied.

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The area is situated on a plane ground with clay-sandy texture, away from the draughtiness. The area is characterized by a temperate continental climate with hot summers and cold winters, with accentuated thermic and pluviometrical contrasts from one month to the other. Generally, the summer months are in the period with deficit of humidity, thing that asks for irrigations. The annual average temperature oscillates between 10,5^{0}C and 11,5^{0}C.

The observations and the determinations were done during the period 2003-2006, in spring, and they were concerned with: the main phenophases (the spring, the appearance of the flower bud, the colouring of the bud, the blooming), the morphological characteristics and the decorative qualities (the length, the width and the number of leaves; the average height of the floral stem; the length and the diameter of the flower, the colour of the flowers).

It was established the number of days from the spring to the blooming and the duration of blooming, and according to their behaviour in the culture, the most indicated way of use was recommended.

RESULTS AND DISCUSSIONS

In 2003, the spring took place in March, in the interval 5.03 at *Negrita* cultivar and 15.03 at *Tarda.* The appearance of the bud in this year took place for all tulip cultivars, in the second decade of March, less *Tarda* at which the appearance of the bud took place at the beginning of April month. The period from the appearance of the bud up to its colouring was two-three weeks long. The beginning of the blooming, the mass blooming and the end of the blooming at all the studied cultivars took place in April, the duration of the blooming being between 6 days at *Negrita* and *Tarda* and 9 days at *Candela* and *Golden Apeldoorn* cultivars.

The number of days from spring to blooming was between 30 days at *Tarda* and 45 days at *Negrita* (graph 1).

In 2004 the spring was registered in February for the *Candela* and *Negrita* cultivars (10.02-14.02) and in March for the *Tarda* (22.03). The blooming took place at the beginning of April month at *Candela* cultivar (1.04), this being followed by *Tarda* and *Negrita* that bloomed on 7.04 and 8.04. The decoration period was between 7 days at *Candela* cultivar and 15 days at *Tarda*. The growing and development process from spring to blooming in 2004 occured in 16 days at *Tarda* and 53 days at *Negrita* cultivar.

In 2005 other 4 cultivars of tulips were introduced in the culture: *Pink Triumph, Red Triumph, Upstar, Red Giant.*

As for the spring, we noticed that in 2005 it took place in February at the *Golden Apeldoorn* (20.02) and *Red Giant* (22.02) cultivars, the other cultivars sprang in March, between 4.03-20.03. The appearance of the bud took place on 22.03 at *Golden Apeldoorn, Pink Triumph, Red Giant* cultivars, on 23.03 at *Candela* and *Upstar,* 1.04 at *Negrita* and *Red Triumph* and on 4.04 at *Tarda.* The duration from the appearance of the bud to the coloured bud was between 2 days at *Tarda* and 23 days at *Red Giant.*

As for the blooming, we noticed that it took place in April , starting with 7.04 at *Candela* and *Tarda,* 8.04 at *Golden Apeldoorn,* 11.04 respectively 12.04 at *Pink Triumph, Negrita, Red Triumph* and *Upstar* cultivars*.* The latest blooming took place for *Red Giant* cultivar (18.04). The blooming period was between 11 days at *Candela* and 17 days at *Pink Triumph*. The smallest number of days from spring to blooming in 2005 was registered at *Tarda* (18 days), and the biggest number (56 days), at *Red Giant* cultivar.

At the cultivars of tulips studied during 2003-2005, the average number of days up to the blooming in the three years was 21 days at *Tarda* and 42 days at *Negrita* (graph. 1). The average blooming duration was 9 days at *Candela,* 11 days at *Golden Apeldoorn* and *Negrita* and 12 days at *Tarda* (graph 2).

Regarding the spring in 2006, it was noticed that it took place in February at *Upstar* (22.02) and *Red Giant* (28.02), the other cultivars *Red Triumph, Pink Triumph* sprang in March in the interval 2.03-6.03.

The appearance of the bud took place on 16.03 for *Upstar,* 18.03 for *Red Giant* and 23.03, respectively 27.03 at *Pink Triumph* and *Red Triumph* cultivars. The period from the appearance of the bud and the coloured bud phase was between 10 days for *Red Triumph* and 26 days for *Red Giant* cultivar. The blooming took place in April starting with 5.04 for *Upstar,* 9-10.04 for *Pink Triumph* and *Red Triumph* cultivars*,* and 15.04 at *Red Giant.* The blooming duration was between 11 days at *Pink Triumph* and 21 days at *Upstar.*

In 2006 the smallest number of days from spring to blooming was registered at *Red Triumph* (35 days), and the biggest number (46 days), was registered at *Red Giant.*

In the period 2005-2006 it was noticed that the biggest number of days from spring to blooming was registered at *Red Giant* (51 days), and the smallest number was registered at the *Pink Triumph* (34 days). The average period of blooming was 14 days for *Pink Triumph,* 17 days at *Red Giant* and 16 days for the *Red Triumph* and *Upstar* cultivars*.*

Regarding the analyzed morphological characters, it was noticed that the climatic conditions had an important role in the growth and the development of the tulips.

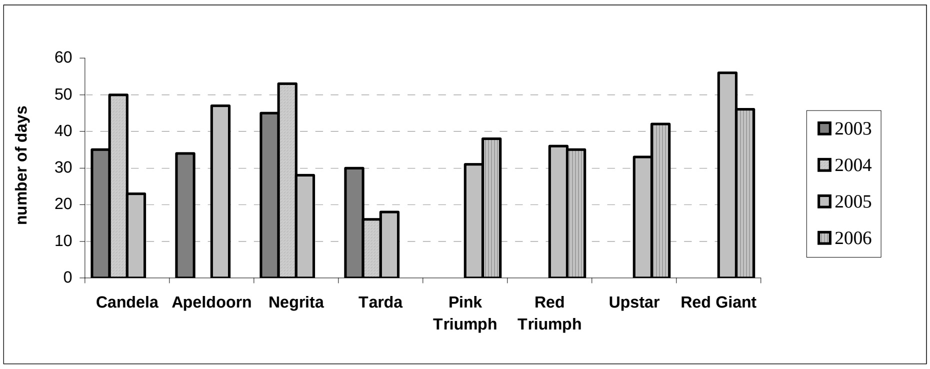
The number of leaves is relatively similar for all the cultivars, the average being of 4,4. The smallest number of leaves was noticed at *Red Triumph* (3,5) and the biggest at *Tarda* (6,0) (graph 3).

The length of the leaves is different, between 11 cm at *Tarda, Negrita, Pink Triumph* and 24 cm at *Red Giant.* For the other cultivars the leaves' length had intermediary values: 13,4 cm (*Upstar*), 16 cm (*Candela, Golden Apeldoorn*)*,* 17 cm (*Red Triumph*)*.* The width of the leaves have values between 2 cm at *Tarda* and 10,1 cm at *Red Giant.* These characters of the leaves complete the decorative effect of the flowers by number, dimension and colour.

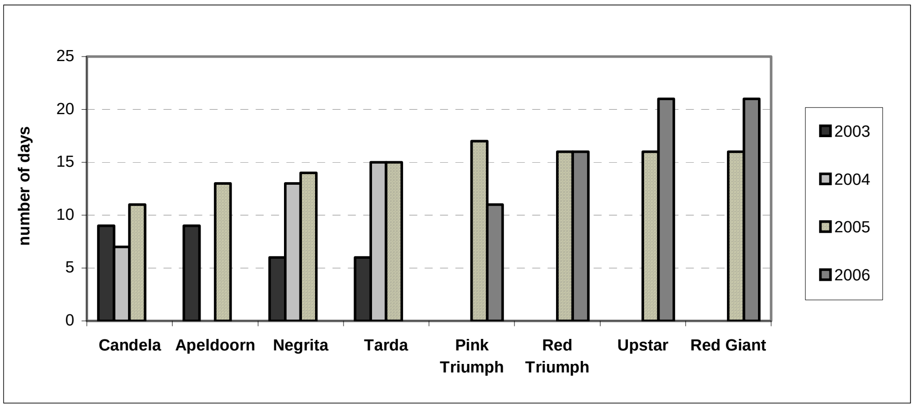
An important decorative element that determines the way of use of the flowers is the height of the stalk. From this point of view, the cultivar with the highest stalk is *Red Giant* (63 cm), followed by *Golden Apeldoorn* (38 cm) and *Red Triumph* (35 cm). The other cultivars have heights between 20-30 cm, and the smallest height was registered at *Tarda* (8 cm) (graph 4).

The main decorative element is represented by the flower, that is only one on a stalk and it decorates both by aspect and by its lively, varied colours. The *Red Giant* cultivar has the length of the flower of 10 cm and its diameter of 7,2 cm, with an aspect that gives it a special decorative effect. The *Candela* cultivar follows with a 6,6 cm length of the flower, but with a small diameter, 2,8 cm. The smallest length of the flower is noticed at the *Upstar* and *Negrita* cultivars (4,5 cm), and the smallest diameter at *Tarda* (2,2 cm) (graphs 5 and 6).

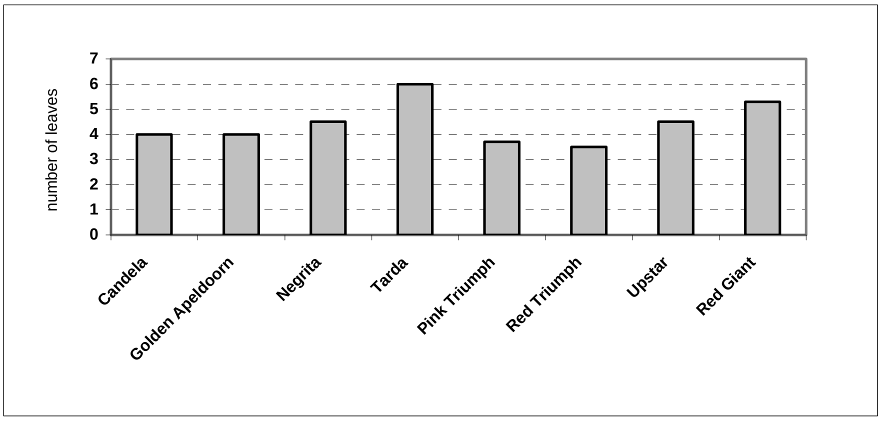
The flower presents 6 tepalous, it is simple and it can be of one single colour or of two colours. The colour is different: yellow (*Candela, Golden Apeldoorn*), red (*Red Triumph*), red-orange (*Red Giant*), dark violet (*Negrita*), dark pink (*Pink Triumph*), yellow with white (*Tarda*)*.*



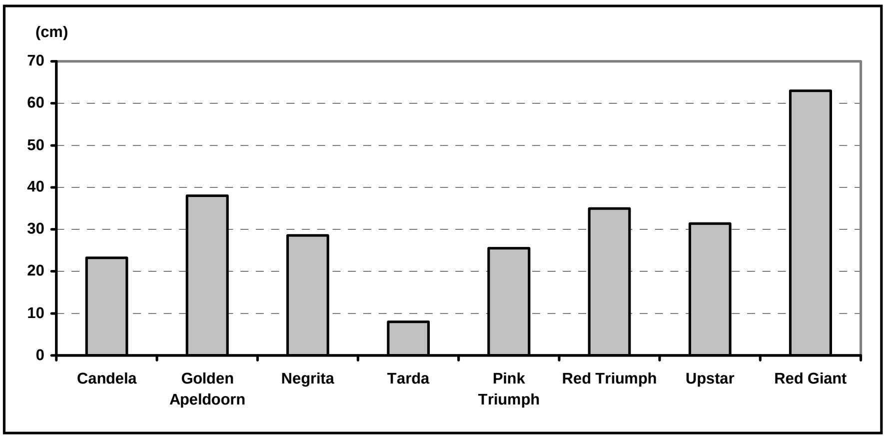
Graph 1. The number of days from spring to blooming



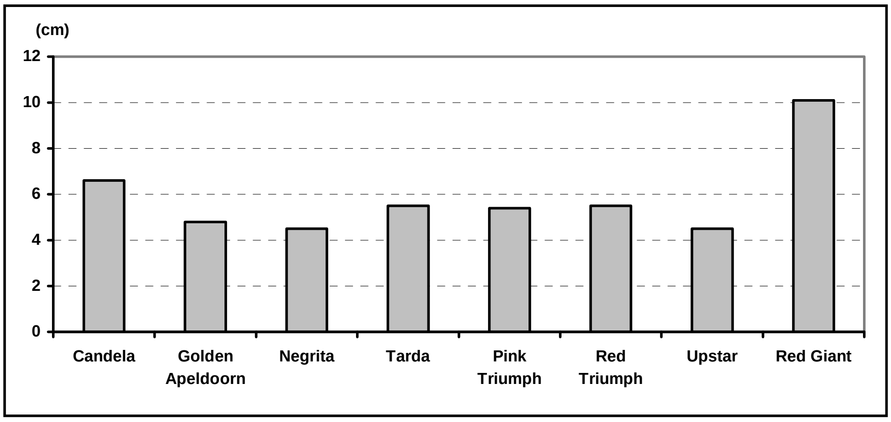
Graph 2. The duration of blooming at the cultivars of tulips studied



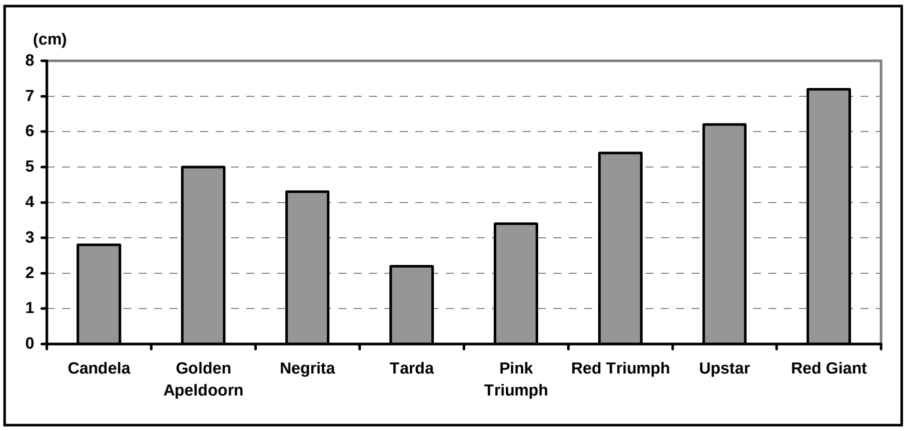
Graph 3. The average number of leaves per plant



Graph 4. The average height of the stalk



Graph 5. The average length of the flower



Graph 6. The diameter of the flower

CONCLUSIONS

1. The number of days from spring to blooming is between 16-18 days (*Tarda*) and 53-56 days (*Red Giant* and *Negrita*).

2. The blooming period of the researched cultivars was at the beginning of April month in 2004 and in the second decade of April, in the years 2005 and 2006.

3. The average duration of the decoration was between 9 days at *Candela* and aproximatively 18 days for *Upstar* and *Red Giant*.

4. The average height of the flower stalk was different, from 8 cm at *Tarda*, at the most of the cultivars it was between 23-38 cm and of 63 cm at *Red Giant.*

5. We recommend the studied tulip cultivars for the following uses: the decoration of the borders (*Tarda*); cut flowers (*Golden Apeldoorn, Negrita, Pink Triumph, Red Triumph* and *Red Giant*); groups on the lawn (*Candela, Negrita, Pink Triumph, Red Triumph, Upstar*).

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STUDIES AND RESEARCHES CONCERNING THE CONTAINERIZED CULTURE OF POINSETTIA PULCHERRIMA Grah. PLANTS

Fl. Toma, Ileana Cantaragiu, Sorina Petra[1]

KEY WORDS: Poinsettia, containerized culture, substrate, fertilizers

SUMMARY

The aim of our experiences was to establish the best variant of fertilization on the Poinsettia pulcherrima plants cultivated on peat substrate. We tested more fertilizers variants (mineral and organic) and we observed that the best results were obtained on the variant fertilized with Vitaflora 0,3 %, administrated weekly.

INTRODUCTION

Poinsettia is, undoubtedly, the most appreciated and requested pot flower for the Christmas' holiday. Over 150 billions plants are commercialized in December in around the world. Poinsettia is not only a very sensible plant on the day during but, in the same time, is a very sensible plant on the quality of nutrition. In this reason, we tested in our researches more fertilizers variants, both chemical and organic fertilizers.

MATHERIALS AND METHODS

The biological material was represented by rooted cuttings of offshoots with 8-10 cm long. After cutting rooting we pinched the offshoots and we planted its in two substrate tips: 2 parts peat + 2 parts manure + 2 parts leaves compost + 1 part sand for the control variant and only peat for the other variants.

The fertilization was applied by the scheme from table 1.

Table 1

The experimental variants

Variant	Fertilizer tips	Frequency of fertilization
V 1	-	-
V 2	Osmocote (4g/l peat)	at planting
V 3	Vilmorin (nutrient sticks)	at two months
V 4	VitaFlora (solution 0,3 %)	weekly
V 5	Complex NPK (solution 0,1 %)	at two weeks
V 6	Manure of ox (solution 0,1 %)	at three weeks
V 7	Manure of horse (solution 0,1 %)	at three weeks
V 8	Manure of bird (solution 0,1 %)	at three weeks

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The experiences were realized in two years, 2006 and 2007. Monthly we made the observations concerning the vegetative growing (the number and the length of offshoots growing after pinched, the length of plants and the number of offshoots internodes).

In the moment of maximum coloration of bracts we measured the number of bracts and the rosette of bracts diameter.

Before this moment, in the second year of the experiences, we made the agrochemical analyses of substrates for determination the nitrogen (nitrate and ammonium, using the colorimeter method), phosphorous (using the colorimeter method) and potassium (using the spectral method).

RESULTS AND DISCUSSIONS

We observed that the best vegetative growing of the plants comparatively with control variant were obtained in variants V 5, fertilized with solution NPK 15:15:15, in 0,1 % concentration and V 4, fertilized with solution VitaFlora 0,3 % (table 2).

Table 2

The variation of vegetative growing
(in accordance with the last observations from the end of November)

Variant	The no. of offshoots		The length of offshoots (cm)		The no. of internodes		The length of internodes (cm)	
	2006	2007	2006	2007	2006	2007	2006	2007
V 1	2,8	2,4	13,2	12,8	2,4	2,2	5,6	5,8
V 2	2,4	2,4	15,6	14,8	2,2	2,2	7,2	6,8
V 3	2,4	2,8	16,4	16,4	2,6	2,8	6,2	6
V 4	2,8	2,8	22,8	20,4	2,6	2,4	9	8,8
V 5	2,8	2,4	24	23,6	3	2,8	8	8,2
V 6	2,8	2,8	13,2	13,2	2,2	2,2	6	6
V 7	2,8	2,4	14,4	13,6	2.8	2,8	5,2	5
V 8	2,8	2,8	14,8	13,8	2,6	2,6	5,6	5,4

The height of the plants presented the best values on the variants V 5 and V 4, both in the year 2006 and 2007 (table 3, figure 1).

Table 3

The variation of vegetative growing
(in accordance with the last observations from the end of November)

2006								
Variant	V 1	V 2	V 3	V 4	V 5	V 6	V 7	V 8
The height of plant (cm)	17.2	19.2	21.2	26.8	28.2	17.4	18.2	18.8
The difference given control variant (%)	100	112	123	156	164	101	106	109
2007								
Variant	V 1	V 2	V 3	V 4	V 5	V 6	V 7	V 8
The height of plant (cm)	17.2	18.8	20.8	25.8	27.6	17.4	17.6	18.2
The difference given control variant (%)	100	109	121	150	160	101	102	106

V 1 – V 2

V 1 – V 3

V 1 – V 4

V 1 – V 5

V 1 – V 6

V 1 – V 7

V 1 – V 8

Fig. 1. The differences between the control variant and the other variants concerning the vegetative growing

The best values of number of the bracts and the rosette of bracts diameter were registered of the variants V 4, fertilized with solution VitaFlora 0,3 % and V 5, fertilized with solution NPK 15:15:15, in 0,1 % concentration (table 4, figures 2, 3).

Table 4

The variation of number of the bracts and the rosette of bracts diameter

Variant	The number of bracts		The diameter of the rosette of bracts	
	2006	2007	2006	2007
V 1	7,8	7,6	10	9,4
V 2	12,4	12,2	9,2	9
V 3	7,8	7,6	9	8,4
V 4	16	14,8	16	14,4
V 5	14,2	14,2	14,8	14
V 6	9,6	8,6	8,2	8
V 7	9,8	8,4	10	8,8
V 8	8,4	8,2	12,2	10,8


V 4


V5


V 2


V 1

Fig. 2. The aspect of rosette of bracts

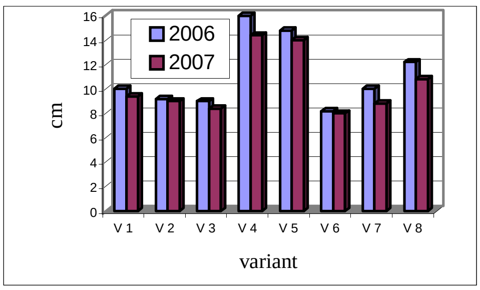

Fig. 3. The variation of diameter of the rosette of bracts

The agrochemical analyses showed a large variation of nitrogen, phosphorus and potassium, depending the variant (table 5).

Table 5

The variation of nitrogen, phosphorus and potassium

Variant	$N\text{-}NH_4^+$	$N\text{-}NO_3^-$	P_2O_5	K_2O
	mg/100g dry soil at 105°C			
V_1	0,76	3,25	8,09	11,9
V_2	0,86	5,72	10,6	18,52
V_3	0,90	16,16	11,8	28,47
V_4	3,82	30,89	13,6	40,7
V_5	3,28	18,83	9,76	32,4
V_6	1,07	6,43	8,09	11,6
V_7	1,12	4,79	8,53	10,7
V_8	1,14	6,32	10,49	12,1

The nitric nitrogen presented values over the maximum limits at variant V 4 (fig. 4) and the ammonium nitrogen presented values over the maximum limits at variants V4 and V 5 (fig. 5).

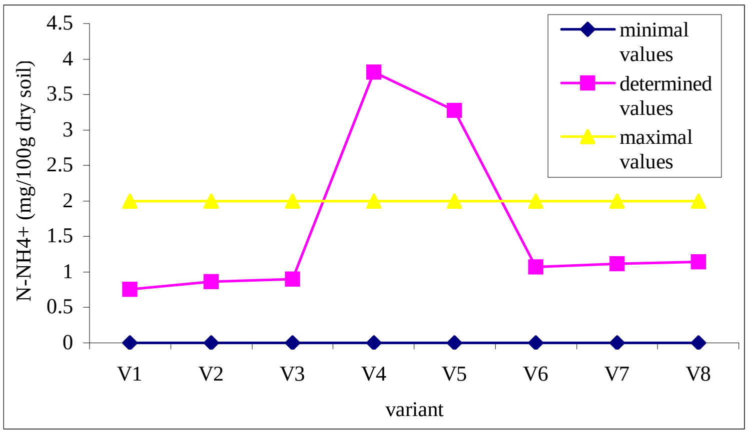

Fig. 4. The variation of $N\text{-}NH_4^+$ (mg/100g dry soil)

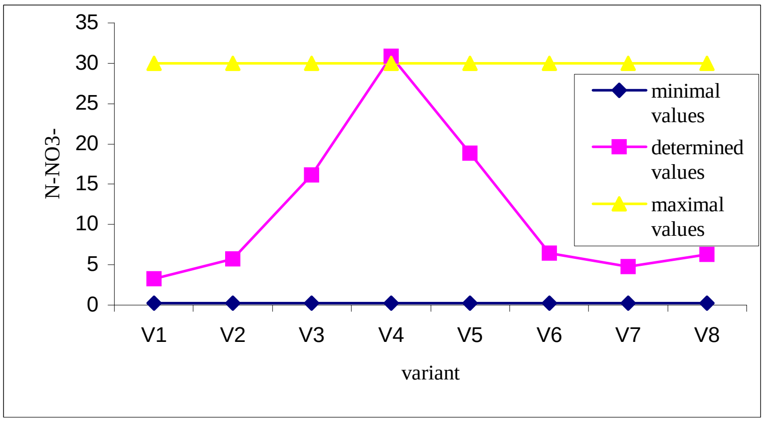

Fig. 5. The variation of $N\text{-}NO_3^-$ (mg/100g dry soil)

The content in phosphorus presented values over the maximum limits at variant V 4 (fig. 6) and the content in potassium presented values over the maximum limits at variants V4 and V 5 (fig. 7).

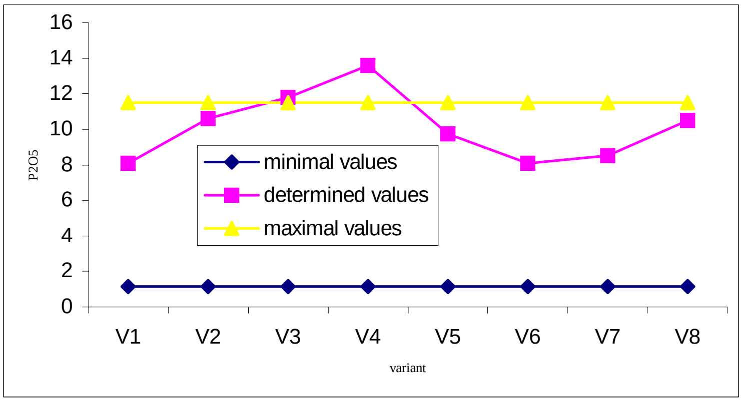

Fig. 6. The variation of P_2O_5 (mg/100g dry soil)

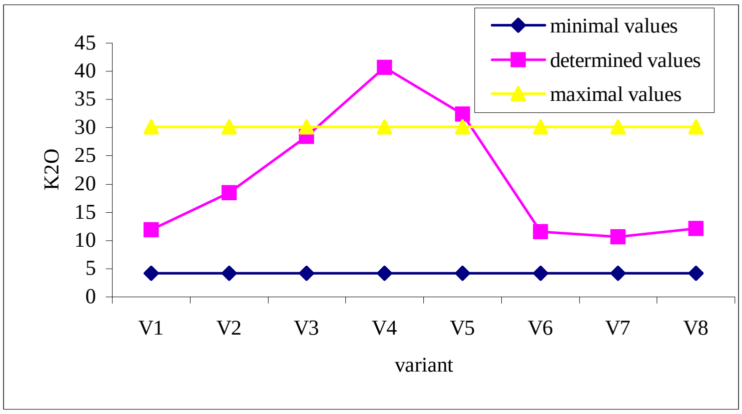

Fig. 6. The variation of K_2O (mg/100g dry soil)

CONCLUSIONS

Our researches showed that the best variant of fertilization for *Poinsettia pulcherrima* plants was the fertilizer VitaFlora, applied by solution 0,3 %, weekly.

The similar results, especially concerning the vegetative growing, were obtained with the fertilizer Complex NPK 15:15:15, applied by solution 0,1 %, one time of two week.

The organics fertilizations were determined small vegetative growing, small number of bracts and retarding of bracts coloration.

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STUDIES AND RESEARCHES CONCERNING THE IN VITRO PRODUCTION OF TUBEROSE PLANTING

Fl. Toma, Sorina Petra[1]

KEY WORDS: tuberose, micropropagation, explants, culture media, planting

SUMMARY

The aim of our researches was to establish the possibilities of the in vitro micropropagation of one of the most appreciated flowers plant – tuberose (Polyanthes tuberosa L.). In this reason we tested more explants tips, culture media and season of explants inoculation.

The best results were obtained on the variant of buds bulbs explants inoculated in April on the Murashige & Skoog 1962 culture media supplemented with 2 mg/l NAA + 0,5 mg/l KIN + 2 mg/l BAP.

INTRODUCTION

In Romania, tuberose is one of the most appreciated cut flowers. But the production of flower bulbs is a difficult and a long standing process. Therefore, in our researches, we used the in vitro multiplication methods for the tuberose planting production. These researches are only a small part form a big program of studies destined to understanding in details the biology and technology of these very beautiful flower.

MATHERIALS AND METHODS

The biological material was represented by buds taken from bulbs with 1-1,5 cm diameter and stem flowers belong to an aboriginal population at Bucharest area. These buds are inoculated on the five media culture, in April (the buds taken from bulbs) and in July (the buds taken from stem flowers).

The basal media culture was Murashige & Skoog 1962, supplemented with hormones NAA, KIN, BAP, in different ratio, depending on the variant (table 1).

The bulbs and the stem flowers were very well washed before disinfection. The buds provided from bulbs was disinfected in mercury chloride 0,1 % for twenty minutes and the buds provided from stem flowers was disinfected in mercury chloride 0,05 % for thirty minutes. After disinfection the buds were washed in 2-3 sterile water; before inoculation the buds were maintained in alcohol ethylic solution 70 %, for two minutes.

In the climatic room we maintained the following conditions: 20-22 °C in the day and 16-18 °C in the night; 80-85 % relative humidity; 16 hours illumination and 8 hours dark for the variants with buds provided from bulbs and six weeks entire dark and 16 hours illumination and 8 hours dark after for the variants with buds provided from stem flowers.

The rooting of regenerated plantlets was made in media culture Murashige & Skoog 1962 supplemented with 0,04 mg/l KIN + 1mg/l IBA + 0,1 mg/l GA_3.

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Table 1

The experimental variants

Variant	Hormones (mg/l)	Explants	Season of inoculation
V 1	0,2 NAA + 0,5 KIN + 2 BAP	buds form bulbs	April
V 2	0,2 NAA + 1 KIN + 2 BAP	buds form bulbs	April
V 3	0,2 NAA + 1,5 KIN + 2 BAP	buds form bulbs	April
V 4	0,2 NAA + 2 KIN + 2 BAP	buds form bulbs	April
V 5	2 NAA + 0,5 KIN + 2 BAP	buds form bulbs	April
V 6	0,2 NAA + 0,5 KIN + 2 BAP	Buds from stem flowers	July
V 7	0,2 NAA + 1 KIN + 2 BAP	Buds from stem flowers	July
V 8	0,2 NAA + 1,5 KIN + 2 BAP	Buds from stem flowers	July
V 9	0,2 NAA + 2 KIN + 2 BAP	Buds from stem flowers	July
V 10	2 NAA + 0,5 KIN + 2 BAP	Buds from stem flowers	July

The acclimatization of rooted plantlets was made on sand substrate under tunnel of polyethylene with 95 % relative humidity.

RESULTS AND DISCUSIONS

Our researches showed that the media culture had a determinate influence upon the percent of regenerated explants and the evolution of the plantlets regenerated from explants. But on the same media culture, the explants tips had the determinate factor for the in vitro multiplication coefficient (table 2).

Table 2

The evolution of explants from inoculation to transfer to rooting media

Var.	Regenerated explants		Plantlets regen./ explants	Total plantlets	Height of plants (cm)	No. of leaves
	nr.	%				
V 1	17,66	88,33	1,37	24,33	4,38	0,75
V 2	17,33	86,66	1.99	34,66	3,77	0,59
V 3	17,33	86,66	4,11	71,33	3,87	0,61
V 4	11,66	58,33	1,37	16,00	2,59	0,32
V 5	18,33	91,66	1,44	26,33	4,46	0,78
V 6	7,33	36,66	1,35	10,00	2,58	0,23
V 7	6,33	31,66	1,26	8,00	2,14	0,17
V 8	8,00	40,00	1,32	10,66	3,04	0,30
V 9	6,33	31,66	1,15	7,33	2,40	0,26
V 10	11,66	58,33	1,86	21,33	4,01	0,43

We observed that the explants consisting in buds from stem flowers were regenerated plantlets in an inferior percent comparatively with the explants consisting in buds provided from bulbs (figures 1-3).

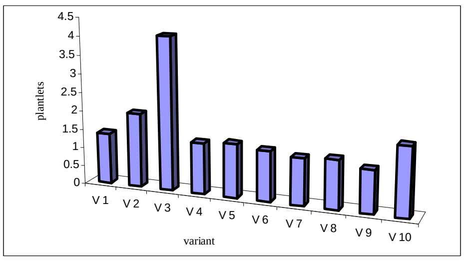

Fig. 1. The variation of plantlets regenerated per explants

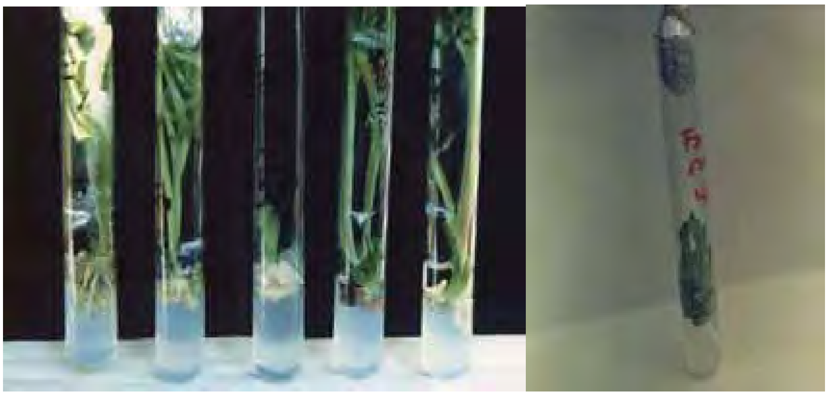

Fig. 2. Plantlets regenerated from bulbs explants

Fig. 3. Plantlets regenerated from stem flowers explants

We can also observed that the plantlets regenerated from the explants provided from buds were a superior growing comparatively with plantlets regenerated from explants provided from stem flowers (table 3).

Table 3

The evolution of plantlets on the rooting media and the resistance of acclimatization

Var.	Height of plants (cm)	Number of leaves	Number of roots	Lenght of roots (cm)	Plantlets passed to aclimatization		Plantlets aclimatizated	
					no.	%	no.	%
V 1	9	2,2	4,2	2,6	24	98,6	23,3	97,3
V 2	8,4	2,0	4,4	2,4	33	95,3	32	96,3
V 3	6,9	1,9	3,8	2,5	70	98,6	69	98,1
V 4	5,9	1,5	2,9	2,6	14,7	91,3	13,3	92,1
V 5	9,1	1,9	3,4	2,3	26,3	100	26,3	100
V 6	4	1	2,1	2,5	8,3	82,9	4	47
V 7	3,3	0,5	2,1	2,2	7	87,8	2,7	35,8
V 8	4,2	0,5	2,3	2,2	8,7	75,9	4,3	50,5
V 9	2,9	0,3	1,9	1,9	7,	95,8	3,3	49
V 10	4,3	0,7	2,3	2,4	18,7	87,2	14	74

The percent of acclimatized plants is, also, superior for the plantlets regenerated from buds provided from bulbs (figure 4).

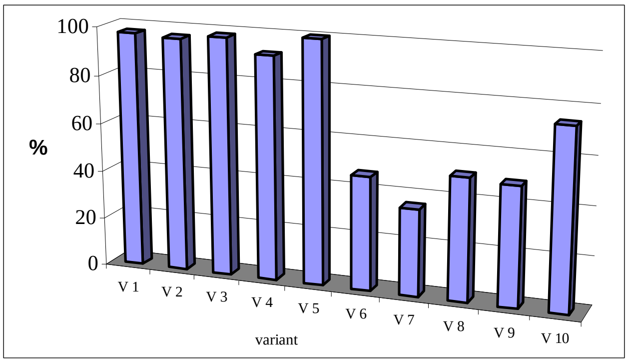

Fig. 4. The variation of percent of acclimatized plants

These superior values for the variants with explants regenerated from buds provided from bulbs are meeting concerning the in vitro multiplication coefficient, too (table 4, figure 5).

Table 4

The growing of the acclimatized plants until the enter in rest period

Var.	Number of leaves		Leaves length (cm)		Viable plants		In vitro multiplic. coeff.	The during of plants production
	*	**	*	**	nr.	%		
V 1	7,26	9,70	5,56	6,73	22,66	97,15	1,13	7,5
V 2	6,66	9,50	5,16	6,84	31,33	98,11	1,56	7,5
V 3	6,93	9,96	5,79	7,75	68,00	96,98	3,40	7,5
V 4	6,10	8,36	5,57	6,78	12,66	87,82	0,63	7,5
V 5	7,76	9,93	6,38	7,72	26,33	100,00	1,32	7,5
V 6	--	1,75	--	5,45	1,00	20,00	0,05	5,0
V 7	--	2,00	--	3,62	0,66	16,66	0,03	5,0
V 8	--	1,75	--	4,70	1,00	21,66	0,05	5,0
V 9	--	2,00	--	2,75	0,66	19,44	0,03	5,0
V 10	--	1,73	--	4,28	6,33	45,33	0,31	5,0

* the observations were made after to months from acclimatization

** the observations were made before one week of the enter in rest period

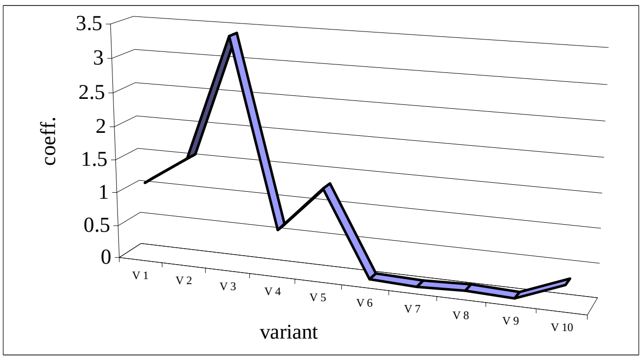

Fig. 5. The variation of in vitro multiplication coefficient

The statistical interpretation demonstrated that the variants V 1 – V 5, initiated from bulbs explants, exceed significantly the variants V 6 – V 10, initiated from stem flowers explants (table 5).

Table 5

The differences between variants concerning the in vitro multiplication coefficient

Var.	In vitro coeff.	The differences between variants and its signification						
		V 7, 9	V 6, 8	V 10	V 4	V 1	V 5	V 2
V 3	3,40	3,37 ***	3,35 ***	3,09 ***	2,77 ***	2,27 ***	2,08 ***	1,84 ***
V 2	1,56	1,53 ***	1,51 ***	1,25 ***	0,93 ***	0,43 ***	0,24 *	--
V 5	1,32	1,29 ***	1,27 ***	1,01 ***	0,69 ***	0,19 *	--	--
V 1	1,13	1,10 ***	1,08 ***	0,82 ***	0,50 ***	--	--	--
V 4	0,63	0,60 ***	0,58 ***	0,32 **	--	--	--	--
V 10	0,31	0,28 **	0,26 **	--	--	--	--	--
V 6,8	0,05	0,02	--	--	--	--	--	--
V 7,9	0,03	--	--	--	--	--	--	--

DL 5 % = 0,187; DL 1 % = 0,256 ; DL 0,1 % = 0,349

The number and the quality bulbs formed by plants produced in vitro are, also, superior on the variants V 1 – V 5, initiated from bulbs explants, comparatively with variants V 6 – V 10, initiated from stem flowers explants (table 6).

Table 6

The variation of number, quality and multiplication coefficient of bulbs produced from plants obtained in vitro

Var.	Number of bulbs per plants	The multiplication bulbs coefficient	Diameter of bulbs (cm)	Weight of bulbs (g)
V 1	3,53	16,00	1,15	3,35
V 2	3,26	20,93	1,11	3,34
V 3	4,20	57,20	1,17	3,37
V 4	2,94	7,46	1,13	3,11
V 5	4,14	21,60	1,11	3,33
V 6	1,75	0,33	0,79	2,58
V 7	2,00	0,26	0,75	2,66
V 8	1,50	0,33	0,87	3,12
V 9	1,00	0,13	0,65	2,00
V 10	1,89	2,40	0,74	2,09

The coefficient of bulbs multiplication presented the best values (57,20) in variant V 3, initiated from bulbs explants inoculated on media culture with 0,2 NAA + 1,5 KIN + 2 BAP (figure 6).

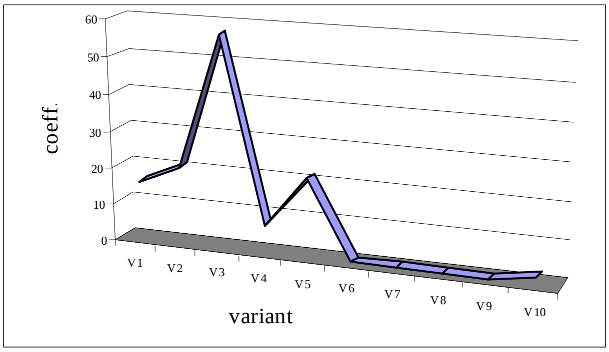

Fig. 6. The variation of bulbs multiplication coefficient

The results concerning the bulbs multiplication coefficient are, also the in vitro multiplication coefficient, very well assured by the statistical interpretation (table 7).

Table 5

The differences between variants concerning the bulbs multiplication coefficient

Var.	Bulbs Coeff.	The differences between variants and its signification							
		V 9	V 7	V 6, 8	V 10	V 4	V 1	V 2	V 5
V 3	57,20	57,07 ***	56,94 ***	56,87 ***	54,80 ***	49,74 ***	41,12 ***	36,27 ***	35,60 ***
V 5	21,60	21,47 ***	21,34 ***	21,27 ***	19,20 ***	14,14 ***	5,60 ***	0,67	--
V 2	20,93	20,80 ***	20,67 ***	20,60 ***	18,53 ***	13,47 ***	4,93 **	--	--
V 1	16,00	15,87 ***	15,74 ***	15,67 ***	13,60 ***	8,54 ***	--	--	--
V 4	7,46	7,33 ***	7,20 ***	7,13 ***	5,06 **	--	--	--	--
V 10	2,40	2,27	2,14		--	--	--	--	--
V 6, 8	0,33	0,20	0,07	--	--	--	--	--	--
V 7	0,26	0,13	--	--	--	--	--	--	--
V 9	0,13	--	--	--	--	--	--	--	--

DL 5 % = 2,969 ; DL 1 % = 4,067 ; DL 0,1 % = 5,542

CONCLUSIONS

The tuberose can be easy propagated in vitro, the results being very strong influenced by the explants type, and the culture media.

According with our researches the best results were obtained from explants consisting in buds provided from bulbs, inoculated in April on medium Murashige & Skoog 1962 supplemented with 0,2 mg/l NAA + 1,5 mg/l KIN + 2 mg/l BAP.

The explants consisting in buds taken from stem flowers were made inferior results for all the stages of in vitro multiplication but also at acclimatization.

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DETERMINATION OF ASCORBIC ACID THROUGH THE 2,6-DICHLOROPHENOL-INDOPHENOL METHOD FROM THE ANGIOSPERMATOPHYTA SPECIES

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KEY WORDS: medicinal plant extracts, 2,6-dichlorophenol-indophenol, antioxidant activity

ABSTRACT

This research is aimed to elucidate the chemical composition of the researched vegetal extracts, chemical composition that was previously slightly researched and the quantitative determination of the ascorbic acid through the 2,6-dichlorophenol-indophenol method.

The researched plant species were: Agrimonia eupatoria – sticklewort, Viscum album – European mistletoe and Veronica officinalis – Heath Speedwell.

INTRODUCTION

There is a worldwide special interest in medicinal plants and vegetal extracts due to their content in active principles that have shown to posses remarkable pharmacological properties.

The researched plants contain a series of antioxidant compounds such as: flavonoids, ascorbic acid, carotenoids, tannins, anthocyanidins, etc., which have specific pharmacological properties such as scarring healing, emollient, antibacterial and anti-inflammatory, these substances being used in the derma-cosmetic industry [1,2,3].

Ascorbic acid is one of the most found compounds that possesses antioxidant potential.

The multitude of physiological and biochemical processes, in which directly or indirectly ascorbic acid acts mediates, makes the role of this biological compound very important, it being vital to normal body metabolism [4].

The 2,6-dichlorophenol-indophenol method of analysis is based on the reduction properties of ascorbic acid on the 2,6-dichlorophenol-indophenol in an acid environment, when ascorbic acid is transformed into dehydroascorbic acid and the oxidized substance, which is colored, is transformed into its reduced form which is color-free.

The acid pH of the reaction environment is ensured by the oxalic acid.

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Acidity of the reaction environment is a must due to several motifs as follows:

- the loss of ascorbic acid from the extracts due to air oxidation is prevented;
- the reaction speed between the coloring agent and ascorbic acid is increased;
- the reductive action of foreign substances, found in the analyzed product, is greatly reduced, thus making the color change-over more clear.

As reactive and indicator the sodium salt of 2,6-dichlorophenol-indophenol that has a blue color and which in acid environment passes from blue to pink color.

MATERIALS AND METHDODS

Vegetal material provided by S.C. Fares S.A. Orastie:

- Agrimonia eupatoria – sticklewort,
- Viscum album – European mistletoe,
- Veronica officinalis – Heath Speedwell.

Reagents:

- sodium salt of 2,6-dichlorophenol-indophenol,
- methanol p.a. – Merck,
- oxalic acid p.a. – Merck,
- ascorbic acid – Roth,
- rutin - Roth.

Obtaining of the hydro-alcoholic extracts from the above plants was made via solid-liquid extraction method, using a Soxhlet extraction installation and in accordance with the process described by The Romanian Pharmacopoeia [5].

The extraction method was unitary, the operational parameters, namely the plant grinding degree, used solvent, solvent/plant ratio, extraction temperature and type, were identical, the only difference being the analyzed vegetal material.

Clear hydro-alcoholic extracts with specific color were obtained and were noted as follows:

- E_1 – methanol Agrimonia eupatoria – sticklewort extract,
- E_2 – methanol Veronica officinalis – Heath Speedwell extract,
- E_3 – methanol Viscum album – European mistletoe extract.

RESULTS AND DISCUSSIONS

The content in ascorbic acid is calculated according to the formula:

$$\text{Ascorbic acid (mg/ml)} = t \cdot n\,(V+V1) \cdot 100/V \cdot Vt$$

Where:

- t – titer of the 2,6-dichlorophenol-indophenol solution;
- n – number of mL of 2,6-dichlorophenol-indophenol solution used for titration;
- V – volume of product being used, in mL;
- V_1 – volume of oxalic acid 2% added, in mL;
- V_t – total volume of the titration solution, in mL;

In table 1 is presented the content in ascorbic acid of the analyzed vegetal extracts.

Table 1

Content in ascorbic acid of the analyzed vegetal extracts

Extract vegetal	Ascorbic acid [mg/100g vegetal material]
E_1	24.74 ± 1.23
E_2	13.62 ± 0.68
E_3	25.02 ± 1.25

According to the results obtained the content in ascorbic acid increases in the following manner:

European mistletoe > sticklewort > Heath Speedwell

The content in ascorbic acid is variable from one extract to another due to the chemical composition of the researched anatomical part of the plant and also due to the used solvent.

This is also confirmed by other studies according to which the α–tocopherol and quercetin have a protective effect towards the ascorbic acid.

The protection percentage is variable in accordance to the mixture ratio between these antioxidants, the researches showing that α–tocopherol and ascorbic acid as well as quercetin and ascorbic acid mixtures have a significantly better effect than other combinations.

In order to verify the above statements HPLC (High Performance Liquid Chromatography) was used to determine the content of the three analyzed vegetal extracts.

A seven points etalon regression line was drawn using quercetin, the correlation coefficient of the regression line being $r^2 = 0.999831$. It was found that in most cases all extracts that have shown high content in ascorbic acid also had a high content in quercetin (Heath Speedwell - 0,0022 mg/mL, European mistletoe - 0,0088mg/mL, sticklewort - 0,0038 mg/ml).

CONCLUSIONS

According to the results obtained, all the three analyzed vegetal extracts contain ascorbic acid.

European mistletoe extract contains the highest quantity of ascorbic acid while the Heath Speedwell has the lowest content in ascorbic acid.

All the results obtained confirm the fact that these plants are a natural source of ascorbic acid.

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DETERMINATION OF THE TOTAL CONTENT IN ANTHOCYANIDINS FROM THE ALCHEMILLA VULGARIS, ALLIUM URSINUM, ACORUS CALAMUS AND SOLIDAGO VIRGA-AUREA SPECIES

Dumitru Condrat[1], Florian Harja[1], Alfa Xenia Lupea[2]

KEY WORDS: medicinal plant extracts, UV-VIS spectra, anthocyanidins

ABSTRACT

The purpose of this paperwork is to establish the total content in anthocyanidins from the anatomical parts of several plants that have shown antioxidant potential. We have used spectrophotometric methods of research, in which the total percentage of anthocyanidins is determined by analyzing the solution extracts at wavelengths characteristic to anthocyanidins (490-540 nm), the choosing of the wavelength being made in accordance with the extraction solvent used

The tested plant species were: Alchemilla vulgaris –Lady's Mantle, Allium ursinum – Wild Garlic, Acorus calamus – Sweet Flag , Solidago virga-aurea – Golden Rod.

INTRODUCTION

The researched plants contain a various number of chemical compounds that according to their physico-chemical properties are exposed to oxydo-reduction processes when they come in contact wit reactive oxygen species ($O_2^{\cdot-}$, $HO^{\cdot}$).

Similar to flavonoids or tannins, which constitute distinct classes of compounds present in vegetal extracts, anthocyanidins constitute a class of substances more or less similar as far as chemical structure is concerned, but which are similar as far as origin and certain common physico-chemical properties are concerned, also having antioxidant capacities.

Their systematization is difficult because most of the natural compounds have more functions and can be attributed to different classes at the same time [1]. Anthocyanidins, in their most stable form, are salts of the 2- phenylbenzopyrylium cation (flavylium cation) with anions from organic and mineral acids.

The anthocyan term comes from Greek language from the words anthos (flower) and kyanos (blue) [2]. Anthocyans are present in nature as anthocyanins where the flavylium nucleus is bonding with carbon-hydrates or carboxylic acids residues. Anthocyans that contain only the phenylbenzopyrylium nucleus are called anthocyanidins or anthocianids [3].

The role of anthocyanidins does not limit only to their coloring properties and it was found that anthocyanidins are powerful antioxidants, having the capacity to inactivate

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the free radicals of the superoxide anion, free radicals that are responsible of several chronic diseases (cancer, cataract, cardio-vascular diseases, etc.).

The oxidation processes initiated by the free radicals attack the genetic system of the cells, meaning that are accompanied by mutational and carcinogenic effects [4].

Blocking or intercepting the free radicals may prevent or minimize the probability of such effects occurring. By comparing the activity of the anthocyans extracts on normal human intestinal cells and on carcinogenic intestinal cells proved that there is an inhibition of more than 60% of new carcinogenic cells formation by the blockage of the G1/GO and G2/M cellular cycles.

However, on a much lower scale of approximately 10% the formation of normal cells is also hindered [5]. The mechanism includes the increase and decrease the expression of certain genes, an important factor, which confirm the protector effect of anthocyans at molecular and hereditary levels.

The quantitative determination of the anthocyanidins is realized by methods that exploit the reddish-purple color of these substances. These methods are spectrophotometric methods that determine the total percentage of anthocyanidins by spectrophotometric measurements carried out at characteristic wavelengths (480-560 nm), wavelength choosing being made in accordance with the solvent being used.

MATERIALS AND METHDODS

The studies were carried out on extracts from the following plants, provided by S.C. Fares S.A. Orastie: Alchemilla vulgaris –Lady's Mantle, Allium ursinum – Wild Garlic, Acorus calamus – Sweet Flag, Solidago virga-aurea – Golden Rod.

Reagents: ethylic alcohol p.a. – Merck, chlorhydric acid p.a. – Merck, distilled water, cyanidine Roth standard.

Obtaining the hydro-alcoholic extracts:

1 g of vegetal product powder was cold-extracted (4°C) for 24 hours with 50 ml of solvent prepared by mixing ethylic alcohol (Merck) : chlorhydric acid 1.5 N (85:15). The solution such obtained was filtrated and completed with the same solvent up to 50 ml in volume.

The applied method of extraction was unitary, the operational parameters, namely the plant powder granulation, used solvent, the plant/solvent ratio, temperature and extraction type, were all the same, the only difference being the vegetal material being used.

Clear hydro-alcoholic extracts were obtained, each having specific color, noted as follows:

E_1 – Alchemilla vulgaris – Lady's Mantle extract;

E_2 – Allium ursinum – Wild Garlic extract;

E_3 – Acorus calamus – Sweet Flag extract;

E_4 – Solidago virga-aurea – Golden Rod extract.

In order to quantify the anthocyanidins the technique described by Markakis was used, this technique being based on knowing the specific molar absorbance of anthocyanidins at 530 nm [6].

The spectrophotometric measurements were carried out with the help of a UV-VIS Carl Zeiss-Jena spectrophotometer coupled with an Axxion Chromatography computer interface.

RESULTS AND DISCUSSIONS

The calculus of the total anthocyanidins is made using the formula:
Anthocyanidins (mg/ml) = A · d/98.2 · m
Where:
A – solution absorbance at 530 nm;
d – dilution factor;
98.2 – value of the absorbance of the 1% cyanidine standard with solvent;
m – the quantity of the vegetal material that was used, express in g.

In table 1 are shown the values for the absorbance of the four extracts and in table 2 the total content in anthocyanidins of the researched vegetal extracts.

Table 1
Absorbance values at λ= 530 nm of the researched extracts

Vegetal extract	Λ[nm]
E_1	0.332
E_2	0.306
E_3	0.090
E_4	0.016

Table 2
Total content in anthocyanidins of the researched hydro-alcoholic extracts

Vegetal extract	Anthocyanidins (mg cyanidine/100g vegetal material)
E_1	16.904
E_2	15.580
E_3	4.582
E_4	0.814

The total content in anthocyanidins from the four researched extracts is different, difference that comes from various factors. One of these factors that contributes to this variation is the temperature.

We presumed that the temperature has a positive influence on the sorbtion process and can be explained through the anthocyanidins transformation during sorbtion.

From chromatographic analyses it was found that the hydro-alcoholic extracts that have been passed over cationit do not contain aglicon. This observation shows that cyanidine is absorbed better than its aglicon.

From the obtained results one can see that the Lady's Mantle extract has the highest content in anthocyanidins while the Golden Rod extract has the lowest content, this being confirmed also by the color of the extracts.

CONCLUSIONS

The results obtained can be used to start a database that would be used to evaluate the preventive role of the researched extracts against the effects of free radicals and could contribute to the studies and application of the purified extracts in the pharmaceutical and cosmetic industry.

This study also contributes to the elucidation of the chemical composition of the reseached plants, their chemistry not being studied into too much detail previously.

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USING THE MORDANTS EXTRACTED FROM NATURAL SPECIES *RUMEX PATIENTIA* L. AND *STELLARIA MEDIA* (L.) VILL. FOR DYEING OF THE NATURAL FIBRES OF SILK AND FLAX WITH THE EXTRACTS OF *RUBIA TINCTORUM* L. AND *COSMOS SULPHUREUS* CAV.

Elena Săvulescu, Vasilica Luchian[1]

KEY WORDS: mordant, tinctorial plant, silk, flax, fibre

ABSTRACT

The use of plants for obtaining tinctorial extracts in order to mordant dyeing of textile fibres and coloring for food remains a concern of an increasingly large in the context of reducing the use of chemical dyes and pollution.

In the studies conducted were tested two species Rumex patientia and Stellaria media from which were obtained extracts used for mordanting of flax fibre and silk, to colour the fibres with extracts obtained from species Rubia tinctorum and Cosmos sulphureus. It was obtain similar colors at the treated of the natural fibres with plant extracts like the chemical mordants. Resistance to the dry friction and high temperatures of natural fibres, were close to the level of the chemical mordants.

The results obtained support the possibility to use the natural mordants in the painting process of natural fibres with the same characteristics like the chemical mordants. The advantages of plant extracts are to minimize pollution and the negative effects of chemicals products on health and the environment.

INTRODUCTION

There is a concern for the sustained use of the plants resources in the world. There is a concern for the sustained use of the plants resources in the world. In this respect, it is included the interest to use the plants as a source of colorings the textile fibres and foods. The plants used to dye the fibres were called tinctorials plants [3, 4, 5].

Using plants in order to dye the textile fibres of food has been a continuing concern of the inhabitants of the Romanian people [1, 2].

Some documents are proof on the last centuries regarding the dyeing, but especially the many carpets, embroideries or tapestry works, who meet in the museums of our country, in monasteries and churches say this [2].

The dyeing using the tinctorials plants is possible at the level of small art and peasant households, given that it involves a significant reduction of environmental pollution [6, 7].

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MATERIAL AND METHOD

In the experiments have used the samples of many 3 g from natural fibres and they will be painted with tinctorial plant extracts. The tinctorial extracts were obtain from dry flowers of *Cosmos sulphureus* (500 g / 1 kg fibre) and dry rhizome from *Rubia tinctorum* (250 g / 1 kg fibre). The flowers were harvest in the full flowering and the rhizomes in the autumn.

The quantity of water needed for extraction was 40 liters for 1 kg fiber and boiling time was 60 minutes for *Cosmos sulphureus* species and 120 minutes for the *Rubia tinctorum* species. The samples were degreasing with detergent and heat water before dyeing. The samples were treated before dyeing with the mineral mordants to obtain resistant and durable colors. In the same time, two natural mordants were tested with the extracts from *Stellaria media* and *Rumex patientia* species.

Three mineral mordants $KAl(SO_4)_2$ – 100 g/1 kg fiber, $CuSO_4$ – 50 g/1 kg fiber and $K_2Cr_2O_7$ – 50 g/1 kg fiber was used.

The natural mordants were make using extraction method from 1 kg herba fresh material / 1 kg fiber.

The water quantity needed for mordant was 40 l for each fiber kilogram and the boiling interval was 60 minutes. The fibres were rinsed after the mordant and after that, they were dye.

Two trials were provided with six variants dyed with extracts obtained from *Rubia tinctorum* si *Cosmos sulphureus species*.

The boil time was 30 minutes to dye the fibres. The samples of silk and flax fibers were rinse after dye and dried after. The samples fibres were test for dry friction resistance and high temperatures.

The samples were test for resistance to friction using a piece of white cotton cloth. The cotton cloth must remain white, which is give notes between 4 and 5 or gain a color tone between intense and light, which is granted with a note between 1 and 3.

The samples were cover with a white cotton cloth and iron at high temperatures with iron equipment. The cloth should not be color after iron. The notes give were between 4 and 5 for low color and the notes 1 to 3 for intense color.

RESULTS AND DISCUTIONS

The results of the silk and flax fibres dye with the tinctorial extract obtained from *Rubia tinctorum* species are present in annex 1.

The silk and flax fibres were not colored uniform in variant 1 when the mordant was not use and the tinctorial extract was from *Rubia tinctorum*, also presenting a weak resistance to dry friction and to the high temperatures (Table 1).

The color of the silk fibres was brown-reddish and lilac for the flax fibres when the mordants did not use.

The colors of the silk fibres were more intense that the flax fibres when the mordants were used. The best intensity of the colors was cherry when the fibres were treated with $KAl(SO_4)_2$ mordant (variant 2).

The silk fibres treated with the mordant of *Stellaria media* were color in beige-rose, close to the color obtained using $CuSO_4$ si $K_2Cr_2O_7$ mordants.

The silk fibres treated with the mordant of *Rumex patientia* were color in beige.

Table 1

Dry friction resistance and high temperature resistance of the silk and flax fibres dyed with the Rubia tinctorum extract

Fibre	Variant	Dry friction	High temperature
Silk	1. Untreated	3	3
	2. KAl $(SO_4)_2$	5	5
	3. $CuSO_4$	4,5	4,5
	4. $K_2Cr_2O_7$	5	5
	5. Extr. Stellaria media	5	5
	6. Extr. Rumex patientia	5	5
Flax	1. untreated	3	3
	2. KAl $(SO_4)_2$	5	5
	3. $CuSO_4$	4	4
	4. $K_2Cr_2O_7$	5	5
	5. Extr. Stellaria media	5	5
	6. Extr. Rumex patientia	5	5

The colors of flax fibres were less intense resulting different color tones of lilac, excepting the samples treated with $KAl(SO_4)_2$ when the color of the fibres was pink (variant 2).

All of treated silk and flax samples with natural extract obtained the close colors for the mineral mordants and the fibres had a good resistance to dry friction and to the high temperatures (table 1)

Table 2

Dry friction resistance and high temperature resistance of the silk and flax fibres dyed with the *Cosmos sulphureus* extract

Fibre	Variant	Dry friction	High temperature
Silk	1. Untreated	3	3
	2. KAl $(SO_4)_2$	5	5
	3. $CuSO_4$	4	4
	4. $K_2Cr_2O_7$	5	5
	5. Extr. Stellaria media	5	5
	6. Extr. Rumex patientia	5	5
Flax	1. Untreated	3	3
	2. KAl $(SO_4)_2$	5	5
	3. $CuSO_4$	4	4
	4. $K_2Cr_2O_7$	5	5
	5. Extr. Stellaria media	5	5
	6. Extr. Rumex patientia	5	5

The results of the silk and flax fibres dyed with the tinctorial extract from *Cosmos sulphureus* species were report in the annex 2. The silk and flax fibres were not colored uniform in variant 1 when the mordant was not use and the tinctorial extract was from *Cosmos sulphureus*, also presenting a weak resistance to dry friction and to the high temperatures (Table 2).

The silk and flax fibres were colored in rust then they were treated with $KAl(SO_4)_2$ mordant and with tinctorial extract from *Cosmos sulphureus*.

All fibres were color in brown-dark then they were treat with $CuSO_4$ mordant and with tinctorial extract from *Cosmos sulphureus*.

The color of flax fibres was beige-light when the samples were treated with *Stellaria media* extract, very close to variant 4 treated with $K_2Cr_2O_7$, and the flax fibres were colored in straw yellow.

The silk fibres treated with *Rumex patientia* extract were color in mustard.

All of fibres samples treated with natural mordants had a good resistance to dry friction and to the high temperatures like the mineral mordants.

CONCLUSION

The silk fibres dye with tinctorial extract from *Rubia tinctorumspecies* are more intense colored like the flax fibres.

The silk and flax fibres treated with tinctorial extracts had the similar colors like to the mineral treatment.

The silk and flax fibres treated with the natural mordants keep the maximum value for dray friction and high temperatures like the mineral mordants.

In the case of dyeing textile fibres, the recommendation is to use successfully the natural mordants because they are ecologic and the costs are low.

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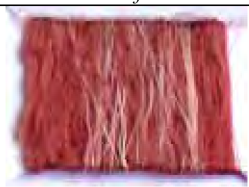
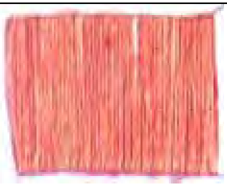
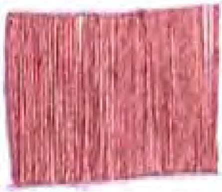
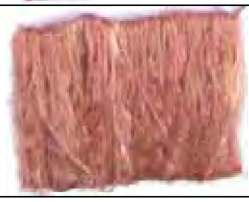
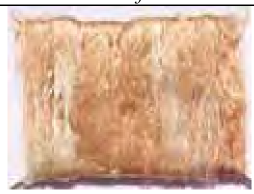
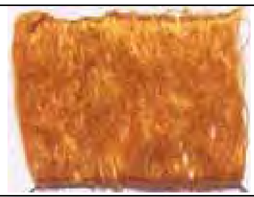
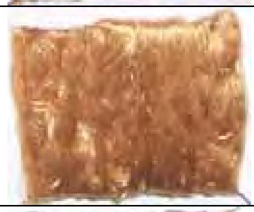
Annex 1

The colors obtained after dyeing the silk and flax fibres with tinctorial extract of *Rubia tinctorum* after using the mineral and natural mordants

Variants	*Silk fibers*	*Flax fibers*
Without mordant (V1)		
$KAl(SO_4)_2$ (V2)		
$CuSO_4$ (V3)		
$K_2Cr_2O_7$ (V4)		
Stellaria media (V5)		
Rumex patientia (V6)		

Annex 1

The colors obtained after dyeing the silk and flax fibres with tinctorial extract of *Cosmos sulphureus* after using the mineral and natural mordants

Variants	*Silk fibers*	*Flax fibers*
Without mordant (V1)		
$KAl(SO_4)_2$ (V2)		
$CuSO_4$ (V3)		
$K_2Cr_2O_7$ (V4)		
Stellaria media (V5)		
Rumex patientia (V6)		

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ASPECTS REGARDING MULTIPLICATION OF SAINTPAULIA IONANTHA WENDL. ON DIFFERENT TYPES OF SUB – LAYERS MIXTURES

Silvia Osiceanu[1]

KEY WORDS: *Saintpaulia ionantha Wendl., sub – layers*

SUMMARY

For experiments, there has been used young and adult Saintpaulias, from the collection of „Al. Buia" Botanical Garden in Craiova.

There have been grown on different sub-layers mixtures in different periods and there was studied the evolution of the plants in order tor establish the most favorable growing sub-layers mixtures and the most favorable time from multiplication.

INTRODUCTION

African Violet, Uzambar violet is nowadays one of the important cultures in the commerce with flowers and flower pots.

Saintpaulia type has the name of the German baron Walter von Saint Paul, governor of a province in Eastern Africa at the end of XIX.th century. The plant was remarked by his fiancee during one of her walks and sent after that in Germany from where it was spread all over the world.

Reaches Europe in 1893 and conquers it rapidly being awarded with the title „the greatest novelty" at the exhibition of gardners organized at the Royal Botanical Garden from Gand (Belgium).

Saintapaulia ionantha Wendl. is the species that set up the obtaining of all cultivated forms. The plant has a delicate radicular system fibrous, and it's small, acaulescent, with a height of just 10 – 15 cm. The leaves are set in a uniform rosette. The leafstalk is pulpy and the lamina, is also thick and pubescent. The form, margines and colour of the leaf is different from one type to another. The floral stalk are grouped in the center of the leaf rosette.

They are branched dichotomic. Inflorescence is a loose – cyme, made up of some small flowers, simple or double, coloured very differently. The fruit is a capsule that contains very small seeds (25000 seeds / 1 gram). The plant has, generally an elegance and a special fragility.

[1] „Al. Buia" Botanical Garden

MATERIAL AND METHOD

The favourable sub – layer must correspond to the needs of each species regarding physical features, and especially regarding the content of nutritive elements and of the pH. There are a lot of prescriptions with land mixtures, horticulturists have their own formulas of choosing and combining sub – layers. For establishing a sub-layer favourable to the growth and development of Saintpaulia ionantha plants, there have been made some mixtures of sub-layers using natural components (earthy red coal and earthy black coal) and natural compenents of mineral origin not treated and heat traeated (sand and perlite).

From this components there have been realized the following sub-layers for rootedeness:

V_1 – sand

V_2 – sand + earthy black coal 1:1

V_3 – perlite + earthy black coal 3:1

V_4 – perlite + earthy red coal 3:1

V_5 – perlite + silt

There have been used two types of seedling:

a_1 – leaf seedling with leafstalk

a_2 – leaf seedling with leafstalk and leaf fragments

Leaf seedling have been realized from young and adult leeves, but not too old. The leaf stalk has been shortened at approximately 2 cm. For rootedeness the leafstalk is burried in an oblique position until the basis of the limb.

Leaf seedling with leafstalk and leaf fragments must have the main nervier, for this is necessary to section the leaf in two parts through the main nervier, respecting the ploarity when planting.

The two types of seedling have been realized from the plants of the botanical garden collection from different times, during March and June. The roots are formed in approximately 3 – 4 weeks, and the new plants appear on the leafstalk (in a_1 case) and along the main nervier (in a_2 case) during other 6 weeks.

Analysis that have been made refer to the number of roots on the seedling, the number of plantules on the seedling and the length of the roots.

The method used for analysis was the analysis of the variation.

RESULTS AND DISCUSIONS

Regarding the aspect of lenght growing of the roots at leaf seedling with leafstalk these found favourable conditions in the sub – layers sand + earthy black coal 1:1; perlite + earthy black coal 3:1; perlite + earthy red coal 3:1, and in the case of the leaf seedling with leafstalk and roots fragment, the length of the roots is much longer on the sub-layer formed of perlite + earthy black coal, in June.

In March the best results were obtained at the leaf seedling with leafstalk and leaf fragments within the mixture of perlite + earthy red coal.

Concerning the number of roots on a seedling, very good results were obtained in March using the mixture formed of perlite + earthy red coal 3:1, and in June with the mixture of perlite + earthy black coal 3:1, and perlite + earthy red coal 3:1.

Regarding the number of plantules obtained on a seedling in March best results were obtained in March with the leaf seedling with leafstalk and also with the leaf seedling with leafstalk and leaf fragments in mixtures formed of perlite + earthy black coal 3:1 and perlite + earthy red coal 3:1, and in June good results were obtained also in the mixture formed of perlite + silt at the leaf seedling with leafstalk and leaf fragments.

CONCLUSIONS

Regarding the number of plantules obtained on seedling the best sub-layers were: perlite + earthy black coal 3:1, and perlite + earthy red coal 3:1.

From the point of view of the number of roots on a seedling the best mixtures were also those formed of perlite + earthy black coal 3:1, and perlite + earthy red coal 3:1, and taking into consideration the aspect of length growing of the roots.

Regarding the period of multiplication, this can be both in March and in June, but the best results are obtained in March.

The required qualities of the sub-layer are: porosity, thick texture, pH slight acid (6 – 6,5). The components of the sub-layer can be: perlite + earthy black coal 3:1, and perlite + earthy red coal 3:1. The sub-layer in which the Saintapaulia ianantha multiplies must be well oxygenated and at a normal temperature.

Table 1

Combined influence of the seedling types and of the sub-layer upon the number of plantules (March 2003)

Seedling type	Sub-layer	Number of plantules	%	Difference	Meaning
Leaf seedling with leaf stalk	sand	1,00	100	-	reference crop
	sand + earthy black coal 1:1	1,66	166	+ 0,66	-
	perlite + earthy black coal 3:1	3,33	333	+ 2,33	xxx
	perlite + earthy red coal 3:1	4,33	433	+ 3,33	xxx
	perlite + silt	2,00	200	+ 1,00	x
Leaf seedling with leafstalk And leaf fragments	sand	1,00	100	-	reference crop
	sand + earthy black coal 1:1	1,00	100	-	-
	perlite + earthy black coal 3:1	3,33	333	+2,33	xxx
	perlite + earthy red coal 3:1	3,33	333	+ 2,33	xxx
	perlite + silt	1,33	133	+ 0,33	-

DL 5% = 0,80; DL 1% = 1,10; DL 0,1% = 1,52

Table 2

Combined influence of the seedling types and of the sub-layer upon the number of plantules (June 2003)

Seedling type	Sub-layer	Number of plantules	%	Difference	Meaning
Leaf seedling with leafstalk	sand	2,00	100	-	reference crop
	sand + earthy black coal 1:1	2,33	116	+ 0,33	-
	perlite + earthy black coal 3:1	4,33	216	+ 2,33	xxx
	perlite + earthy red coal 3:1	5,00	250	+ 3,00	xxx
	perlite + silt	1,33	66	- 0,66	0
Leaf seedling with leafstalk And leaf fragment	sand	1,00	100	-	reference crop
	sand + earthy black coal 1:1	1,00	100	-	-
	perlite + earthy black coal 3:1	1,33	133	+ 0,33	-
	perlite + earthy red coal 3:1	3,00	300	+2,00	xxx
	perlite + silt	2,00	200	+ 1,00	xx

DL 5% = 0,63; DL 1% = 0,87; DL 0,1% = 1,19

Table 3

Combined influence of the seedling types and of the sub-layer upon the roots number (March 2003)

Seedling type	Sub-layer	Roots number	%	Diference	Meaning
Leaf seedling with leafstalk	sand	2	100	-	reference crop
	sand + earthy black coal 1:1	3	150	1	-
	perlite + earthy black coal 3:1	2,5	125	0,5	-
	perlite + earthy red coal 3:1	5	250	3	xxx
	perlite + silt	3	150	1	-
Leaf seedling with leafstalk And leaf fragment	sand	1	100	-	reference crop
	sand + earthy black coal 1:1	2,5	250	1,5	x
	perlite + earthy black coal 3:1	2	200	1	-
	perlite + earthy red coal 3:1	3	300	2	xx
	perlite + silt	1,66	166	0,66	-

DL 5% = 1,15; DL 1% = 1,58; DL 0,1% = 2,18

Table 4

Combined influence of the seedling types and of the sub-layer upon the roots a number (June 2003)

Seedling type	Sub-layer	Roots number	%	Difference	Meaning
Leaf seedling with leafstalk	sand	2,30	100	-	reference crop
	sand + earthy black coal 1:1	3,00	130	+ 0,7	-
	perlite + earthy black coal 3:1	5,00	217	+ 2,7	xxx
	perlite + earthy red coal 3:1	7,00	304	+ 4,7	xxx
	perlite + silt	3,30	143	+ 1,0	x
Leaf seedling with leafstalk And leaf fragment	sand	2,30	100	-	reference crop
	sand + earthy black coal 1:1	3,00	130	+ 0,7	-
	perlite + earthy black coal 3:1	2,60	113	+ 0,3	-
	perlite + earthy red coal 3:1	2,30	100	-	-
	perlite + silt	3,30	143	+ 1,0	x

DL 5% = 0,92; DL 1% = 1,26; DL 0,1% = 1,74

Table 5

Combined influence of the seedling types and of the sub-layer upon the length of the roots (March 2003)

Seedling type	Sub-layer	Length of roots	%	Difference	Meaning
Leaf seedling with leafstalk	sand	4,33	100	-	reference crop
	sand + earthy black coal 1:1	5,00	115	+ 0,66	-
	perlite + earthy black coal 3:1	5,66	130	+ 1,33	x
	perlite + earthy red coal 3:1	5,33	123	+ 1,00	-
	perlite + silt	4,66	107	+ 0,33	-
Leaf seedling with leafstalk And leaf fragment	sand	4,66	100	-	reference crop
	sand + earthy black coal 1:1	6,33	135	+ 1,67	x
	perlite + earthy black coal 3:1	6,66	142	+ 2,00	xx
	perlite + earthy red coal 3:1	7,33	157	+ 2,67	xxx
	perlite + silt	5,00	107	+ 0, 34	-

DL 5% = 1,26; DL 1%= 1,74; DL 0,1% = 2,39

Table 6

Combined influence of the seedling types and of the sub-layer upon the length of the roots (June 2003)

Seedling type	Sub-layer	Length of roots	%	Difference	Meaning
Leaf seedling with leafstalk	sand	5,66	100	-	reference crop
	sand + earthy black coal 1:1	7,33	130	+ 1,67	x
	perlite + earthy black coal 3:1	7,66	135	+ 2,00	x
	perlite + earthy red coal 3:1	7,33	130	+ 1,67	x
	perlite + silt	4,66	- 82	- 1,00	-
Leaf seedling with leafstalk And leaf fragment	sand	6,00	100	-	reference crop
	sand + earthy black coal 1:1	7,00	117	+ 1,00	-
	perlite + earthy black coal 3:1	8,66	144	+ 2,66	xx
	perlite + earthy red coal 3:1	7,00	117	+ 1,00	-
	perlite + silt	5,66	- 94	- 0,34	-

DL 5% = 1,61; DL 1% = 2,33; DL 0,1% = 3,07

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THE INFLUENCE OF THE ORGANIC COMPONENTS IN *"IN VITRO"* CULTURE ENVIRONMENT FOR THE GREENHOUSE CARNATIONS

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KEY WORDS: carnations, culture environment, vitamins, in vitro, glucides

SUMMARY

The experience was performed on three carnation breeds Amapolla, Tanga şi Katya, with the purpose of establishing the vitamins' influence (thiamine, pyridoxine, nicotinic acid and biotine), and the carbohydrates upon the organogenic reaction of the carnation meristem. The effect of these organic compounds arises both on the qualitative aspect and quantitative aspect, by a modification of the percentage of meristems which new forms the new plants, this path representing the main manner of orientation and guiding the organogenic reaction of the meristem.

From our studies it results that the vitamins favor the growth and evolution of the " in vitro" meristems, and the hormones have a well-known role of growing regulators upon the carnation meristems. For the carbohydrates we used the saccharose and glucose which drive upon the metabolism of the regulative substances of endogenous growth with major implications in the growth process.

INTRODUCTION

Once with the introduction in the culture environment of some inorganic mineral compounds (macro- and micro-elements), there are added also small quantities of organic substances, without which the *"in vitro"* culture is unconceivable. These compounds, which the plant can not extract from the soil, but which it synthesizes usually after the cellular metabolism, are made available for the meristem already prepared, by their incorporation in the culture environment. The effect of these organic compounds arises both on the qualitative aspect and quantitative aspect, by a modification of the percentage of meristems which new forms the new plants, this path representing the main manner of orientation and guiding the organogenic reaction of the meristem. Of the organic compounds, whose action shall be investigated as it follows, we mention: the vitamins and carbohydrates.

MATERIAL AND METHOD

Most studies consecrated to the vitamins' action emphasize the fact that these favor the growth and evolution of the *" in vitro"* meristems. Still, administrated in

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inadequate quantities and combinations, the vitamins can become a limitative factor in the process of new formation of new plants.

Of the vitamins with certain stimulating action we mention: the thiamine, which is administrated in quantities of 0,1 – 10 mg/l. Other vitamins used more often are: pyridoxine, nicotinic acid and biotine. Although these vitamins are not indispensable for the culture of meristems at carnations, still they are added due to precaution methods or due to the favorable effect signaled at other breeds.

In order to establish the influences of the vitamins upon the organogenic reaction of the carnation meristem there were used seven complex formulations of vitamins and additional organic compounds, used by: GAUTHERET (1942) (G), REINERT and WHITE (1953) (R and W), MURASHIGE and SKOOG (1962) (MS), WHITE (1963) (W), MOREL and MULLER (1964) (MM), CAMBORG and the co-workers (1968) (C) and SCHENK and HILDEBRANDT (1972) (SH).

For each formulation there were sampled 50 meristems from the Amapolla, Tanga and Katya breeds, under the conditions previously mentioned. All the compounds of the culture environments, except for the vitamins, have been maintained constant.

Although the composition of the 7 formulations is rather inhomogeneous, containing only vitamins and insitol (the averages MM and G), either more complex organic mixtures (the averages RW and SH), the obtained results are the maximum difference between the percentages at the new formed new plants being of only 3% (61,67% for the W environment, 64,67% for the RW environment).

In order to establish the influence of the carbohydrates upon the organogenous reaction of the meristem we have achieved the following experiences:

The evolution of the *"in vitro"* meristem, like all the tissues cultures is dependent on the presence in the culture environment of some glucose compounds. These are used as a heterotrophic source of carbon in order to compensate the effect of photosynthesis which develops at a very low level.

The establishment of the type and optimal concentration of culture has as a purpose both ensuring the necessary conditions of growing the meristem, and the guidance of the organogeous evolution of the tissues, being known the fact that they are especially sensitive at the quantitative and qualitative variation of the energetic support.

If the presence of the carbohydrates is unconceivable for an *" in vitro"* culture, we must take into account the fact that exceeding the optimal limit they can act also as an inhibitor of the photosynthetic functions (of the chlorophyll synthesis). In this regard there were settled some correlations between the quantity of carbohydrates and intensity of light from the ambient environment, also with significant effects upon the organogenesis.

In the plant, the saccharose is the form which is very often met as being easily transmitted from the tissue of the leaves in the flower and then towards the meristematic tissue or the storage tissues. However, for some *"in vitro"* cultures there were obtained good results using also other carbohydrates as the glucose or fructose.

For our experiments there were used only the saccharose and glucose, being mostly used in the meristems culture at carnations (Phillips, 1964; Mareş, 1979; Davis and the co-workers,1977).

The used quantities varied (from 10 to 10 g) between 10 and 50g/l, these meaning the minimum limit and the maximum one which can be applied in the *" in vitro"* culture. For each variant there were sampled in May 50 meristems, of approximatively 0,5 mm, from the Nordika breed.

RESULTS AND DISCUTIONS

For the experiments which followed there were used the MS vitamins, which had a relatively low content of compounds, but which had almost identical effects with those of some more complex formulations, very close ones:

Table 1

The effect of the vitamins and some organic compounds in the meristem culture at carnation (% new formed new plants)

Breed	Culture Environment							
	G (1942)	RW (1953)	MS (1962)	W (1963)	MM (1964)	G (1968)	SH (1972)	The average of the formulations
Amapolla	64	65	65	63	64	64	66	64,43
Tanga	62	63	63	60	61	63	64	62,29
Katya	64	63	62	62	60	61	63	62,14
Media	64,67	64,67	63,33	61,67	61,67	62,67	64,33	62,95

The effect of the vitamins upon the 3 breeds is identical (the differences between the new formation percentages. The appraisal of the effect of the carbohydrates was made after 8 weeks of culture, on a MS environment with 1µm K and NAA. After this interval, it was calculated, for each variant, the percentage of meristems which manifested a organogenous reaction in the direction of the new formation of new plants with or without roots. The variation diagram of the organogenous effect, due to the carbohydrates, drawn up on the grounds of the percentages of meristems with favorable reaction, emphasizes that the maximum of new formed new plants (63%) was achieved for the quantity of 30 g saccharose. Good results (61% new plants) were obtained also with 40 g/l glucose and saccharose 20 g/l.

Table 2

The effect of the carbohydrates in inducing the organogenesis at the carnation meristem (% formed new plants at the Nordika breed)

Specification	Quantity of carbohydrates (g)				
	10	20	30	40	50
Saccharose	47	61	63	51	26
Glucose	26	29	48	61	22

The qualitative aspect of the new formed new plants at the optimal concentrations of carbohydrates (30 g saccharose and 40 g glucose) do not present significant differences. Still, the color of the new plants obtained on the environment with glucose seems to be darker, especially during the first 6 – 7 weeks of culture. At the end of the culture period, the color of the new plants became even. This tendency might be owed to a better valorization of the glucose in the first culture days, knowing the fact that almost 50% of the carbohydrates are used in the first 2 culture weeks (Street, 1973). In this case, it seems that the glucose mono-carbohydrates was easily made available in the first stage, the saccharose requiring previously an enzymatic hydrolysis in glucose and fructose. For the experiments which followed, there were used 30 g/l saccharose, taking into account the good new formation of new rooted plants, in proportion to the other variants.

CONCLUSIONS

- The culture environment influences a lot the evolution of the *"in vitro"* meristems, especially by the content of macro-elements, hormones and due to the carbohydrates. The effect of the macro-elements, vitamins and pH was felt also in a smaller extent.
- In order to optimize the new formation of new rooted plants, it is recommended that the culture environment to contain saccharose, in quantity of 30 g/l, and in its absence, glucose 40 g/l. The optimal pH of the solution is of 5,5 - 5,75.

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THE INFLUENCE OF THE CLIMATIC CONDITIONS IN CULTIVATING MERISTEMS FOR CARNATIONS

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KEY WORDS: Meristems, carnations, temperature, effect of the light, in vitro

SUMARRY

The climatic conditions under which an "in vitro" culture is performed represents a limitative factor along with the cultivating and explant environment, with major implications in the evolution of the explant and the success of obtaining the carnation new plants. Out of the 3 more important climatic factors – light, temperature and humidity – from our experience, only the first 2 were taken into study, with a direct influence over the cultivating conditions.

From our studies, it results that:

- by studying the effect of the illumination duration over the number of new plants formed and rooted and the cultivating period, it was found out that the 16 hour photo-period is an optimum one, without affecting the quality of the obtained biological material.

- the temperature effect over the formation of new plants was proven to be significant

INTRODUCTION

The climatic conditions under which an *"in vitro"* culture is performed represents a limitative factor along with the cultivating and explant environment, with major implications in the evolution of the explant and the success of obtaining the carnation new plants. Out of the 3 more important climatic factors – light, temperature and humidity – from our experience, only the first 2 were taken into study, with a direct influence over the cultivating conditions. The humidity of the environment was deemed not to significantly influence the *"in vitro"* conditions, as the aseptic isolation with polyethylene foil (flasks) or aluminium foil (bowls) generally offers the explant a humidity close to saturation.

The action of the light in cultivating meristems implies 2 aspects: one is that of the light quantity, stated by the daily lighting period (photo-period) and by the luminous flow intensity and the second aspect is that of the light quality, represented by the illuminating type and light spectrum.

MATERIAL AND METHODS

In order to prove the light effect:

Under specific experimenting conditions in our laboratory, a study was initiated for responding to certain optimum requirements on the account of light efficiency as well as

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on that of culture saving up. For the experiment, 40W fluorescent lamps were used, of inland manufacture, with 2 types of colours “warhwhite" and “daylight” and 60, 70 and 100W incandescence light bulbs, of the “nitraphot” type.

In order for the resulted differences in the culture of meristems to be exclusively attributed to the photo-period, the experimenting conditions were kept constant for all variants.

An “agarised” culture environment was used. The growing temperature was maintained at 22 + 1^{o}Celsius and the illumination was performed at a luminous intensity of 3200 lucs, issued from 4 “DAYLIGHT” 40W fluorescent lamps.

Only apical meristems were sampled from the KATYA breed, of 0.5mm, with the apical dome and the first 2 pairs of foliar first leaves. Each experimental variant was organised in 3 repetitions, 20 meristems each.

0.5mm apical meristems were sampled from the KATYA breed. The photo-period was maintained at 16 hours per day, and the temperature at 200 +\- 1^o Celsius.

It was tried to establish an optimum intensity which would guarantee a proper nnew plants percentage of a good as possible of a quality, during a shorter period of time and an economic power consumption. Some notes were also taken regarding the process of roots' formation .

Regarding the effect of the light quality:

The light qualitative aspect is usually neglected in the studies concerning the *“in vitro”* cultures and this is due to the lamps used, which are either manufactured especially for this purpose or are normal lamps. Mori and the co-workers (1969) recall concerns in this direction, especially in mixed use of fluorescent light with the incandescent one.

In order to properly use our laboratory with a lighting equipment with a range adequate to the *“in vitro”* culture for carnations, en experiment was organised in 5 variants, by only using the fluorescent light.

- **V1 -** Daylight 40W lamps;
- **V2 -** Warmwhite 40W lamps;
- **V3** – Mixed Warmwhite and Daylight lamps (for the 2 variants an incandescent lighting was also used)
- **V4** - Nitraphot 60W light bulbs;
- **V5** – mixed fluorescent lamps and light bulbs

It was seen to the lighting intensity to be equal in all cases (2400 lucs), and the photo-period used was of 16 hours.

In order to prove the temperature effect:

One of the advantages of the merismatic culture is that of being able to create optimum lighting and temperature conditions during the entire culture incubation period, regardless of season and climatic conditions throughout the year.

For the *“in vitro”* culture, the temperatures used most often are those ranging in between 18 – 25^o Celsius.

For the experiments of determining the optimum temperature for carnations, 6 variants were used:

- **V1** =18 ^{0}C
- **V2** = 20 ^{0} C
- **V3** = 22 ^{0} C
- **V4** = 24 ^{0} C
- **V5** = 26 ^{0} C
- **V6** = With a temperature difference of (22 ^{0} C during the day and 18 ^{0} C at night)

The lighting was identical for all variants, of 2400 lucs and a 16 hour photo-period. The effect of the temperature was evaluated based on the number of formed new plants, with a height of 2cm, by also calculating the average culture duration necessary for the new plants to reach this height. Some estimations were also done regarding their rooting.

RESULTS AND DISCUTIONES

In order to prove the effect of the illumination period (photo-period)

7 variants were studied, with a photo-period of 12 to 24 hours (at an in interval of 2 hours), in order to meet the aim of continuously reducing the electric power consumption, our experiments being oriented towards establishing the optimum illuminating period, which would correspond to an increased percentage of corresponding plant quality, new formed in a culture interval as small as possible and an economic power consumption.

Table 1

The photo-period effect over the formation of new plants in cultivating meristems.

Lighting hours	Total of lighting hours	Course of lighting	New formed new plants	W consumption \ h \ plant	+ - d new plants	significance
V1=12	734	61.15	25.66	572	-	-
V2=14	831	59.38	29.33	569	3.67	XXX
V3=16	940	58.73	31.33	600	5.67	XXX
V4=18	982	54.44	34.66	566	9.00	XXX
V5=20	1074	53.72	35.00	614	9.34	XXX
V6=22	1176	49.73	36.00	648	10.34	XXX
V7=24	1173	48.89	38.66	607	13.00	XXX

The results obtained (table 1) highlight that the length of the photo-period from 12 hours V1 to 24 hours V7 and result in a very significant growth (up to 50.7%) of new plants, a drop by 12 – 24 days of the total culture course and an increase in the total light consumption with 439 hours of lighting.

This observation gives the impression that the continuous lighting (V7) represented the greatest advantages, carrying the highest number of new formed new plants (38.66%) and a minimum of days of culture (48.89). However, it must not be neglected either that the electric power consumption is close to maximum, meaning 1173 lighting hours. The results obtained in relation to the 2 extremes (V1 and V7) draw the attention over the photo-period of 18 hours which offers certain advantages, 34.66 new plants in 54 days of *“in vitro”* cultivation, with 972 hours of lighting. There are obtained, inn relation to the minimum photo-period of 12 hours (V1), a 35.1% increase in new plants, a decrease in the culture duration by one week, a higher consumption by only 248 lighting hours. From a quality point of view, the new formed new plants did not indicate outstanding discrepancies between the experimental variants, except for the 12 hour photo-period, where sporadic chlorosis was evinced, also probably due to the long stage (61 days) of *“in vitro”* culture.

For our experiments, performed thenceforth, as well as for the current works regarding the meristem culture for carnations, only the 16 hour photo-period was used.

Some indirect relations (Mares, 1979) point out a decrease in the size of the *"in vitro"* new formed new plants, due to the decrease of the photo-period.

Regarding the effect of the light intensity:

The light may not only influence the evolution of the explant by photo-period, but also by its intensity. Generally, the first way is used: the distance between cultures and lighting lamps is of approximately 30cm, in order to guarantee a proper ventilation. By tracking the same criteria for evaluating the effect of the lighting intensity, as in the photo-period, the number of formed new plants was studied. To this effect, five variants were studied, with the light intensity between 800-4300 lucs \ cm square. The illumination was performed by DAYLIGHT 40W fluorescent lamps (Table 2).

Table 2

The effect of the light intensity over the new formation of new plants in cultivating meristems.

Lucs/ square m	Total of lighting hours	consumption W/h/pl	Course of the culture	% Formed new plants	+,- d new plants	Significance
V1=800	942	160	52.33	29.23	-	-
V2=1600	1034	323	57.42	32.00	2.67	XXX
V3=2400	992	446	55.14	33.33	4.00	XXX
V4=3200	1008	555	56.03	36.33	7.00	XXX
V5=4300	969	723	53.83	35.67	6.33	XXX
DL5%=1.0	DL1%=1.4	DL0.1%=2.0				

From analysing the data obtained (table 2), there result very significant increases in the number of new formed new plants by increasing the light intensity (by over 4 times). A small variation of the culture average duration is noted, where 2 cm long new plants are obtained, the amplitude being of only 5 days. The reverse correlation between the increase in the percentage of new plants and the culture duration noted in the photo-period case does not occur in this case here anymore, as the lowest number of new plants (29.33%), and shortest culture period (52 days) are obtained at the lowest light intensity (800 lucs). This apparent anomaly is explained by the fact that by aiming to obtain new plants of the same size, the increase in length at a low light intensity was more accentuated due to a forced elongation of the new plants to the limit of those 2cm and, therefore, an implicit shortage in the total culture period. All the same, the quality of the new plants obtained was unsatisfactory, the lack of an optimum light quantity was indicated by generalising certain colourisations, probably due to an etiolation at the level of the entire variant (V1).

Light intensity.

These symptoms were sporadically evinced, even at a light intensity of 1600 lucs (V2), which we calculated as lower limit of the light flow necessary to cultivating the carnation meristems.

Due to the good results obtained under the aspect of quality and percentage of the formed new plant, we deemed the 2400 lucs variant as optimum. The direction towards this variant (V3) was also determined by economical reasons, as the maximum number of new plants obtained at 3200 lucs (V4) is accomplished under conditions of increasing the electrical power consumption (from 446 to 555 W/h/pl). The increase does not compensate the accomplished increase.

In our case, a rooting improvement concomitantly with the increase was not noticed.

The results regarding the light qualitative effect were evaluated by calculating the percentage of new formed new plants and average culture duration where the new plants have reached 2cm, and V5 with mixed lighting was taken as reference.

From the data shown in table 3, it results that the differences are insignificant for most variants. For the variants with fluorescent lamps (V1 – V3), no changes were produced due to the light quality. The variant with incandescent lighting was significantly weaker.

Table 3

The effect of the light quality in cultivating meristems for the VIRGO carnation breed

Variants	Culture duration (days)	Formed new plants	+ - d new plants	Significance
V1	56.11	33.00	-	-
V2	54.23	31.66	-2.66	0
V3	56.09	33.66	+0.66	-
V4	53.33	33.33	+0.33	-
V5	53.78	34.66	+1.66	-

For the experiments that followed, an exclusively fluorescent lighting was used, with mixed lamps (V3). For this option, it was also taken into account that the average culture duration within variant V3 is of 56 days, meaning it is approximately equal to the other variants (53-56 days).

The results obtained and shown in table 4 prove that the temperatures used do not influence the new plants, the differences being insignificant.

Table 4

The effect of the temperature in cultivating meristems for the VIRGO carnation breed.

Variants	Culture duration (days	Formed new plants	+ - d new plants	Significance
V_1=18^{0}C	57.34	32.66	-	-
V_2=20^{0}C	57.98	31.00	-1.66	-
V_3=22^{0}C	56.33	32.33	-0.33	-
V_4=24^{0}C	55.11	34.76	+2.00	-
V_5=26^{0}C	54.07	32.66	-	-
V_6=22-18^{0}C	56.74	33.33	+0.67	-
		DL5%=2.17		

The cultivating period of the new plants does not differ too much either, the average culture duration ranging between 54 days for V5 and 58 days for V2.

The qualitative estimations over the obtained new plants have drawn the attention over a good foliar structure for the variants with temperatures ranging between 18 and 24^{o}C and an improper structure (aqueous and transparent) at a temperature of 26^{o}C. However, for the V5 variant, the rooting was the best, indicating a positive effect of the higher temperature over the rooting than over the new formation.

The V6 variant, where alternation in temperatures was used, did not furnish significant increases in new plants from a quantitative aspect or from a qualitative one, by comparison to the V1 and V4 variants. For those experiments that followed, the temperature in the rooms for growth was adjusted to 20°C +/-2°C, so in an environment where generally no differences are evinced in the evolution of the experimental material.

CONCLUSIONS

Regarding the influence of some climatic factors over the meristem culture for carnations, the following conclusions are drawn from our research:

- By studying the effect of the lighting duration over the number of formed and rooted new plants and that of the cultivating period, it was found out that the 16 hour photo-period is optimum, without affecting the quality of the obtained biological material.
- For the 16 hour photo-period, the most reduced consumption of electrical power was also accomplished. That is why for the experiments organised thenceforth and as well as for the current works concerning the meristem culture for carnations the 16 hour photo-period is used.
- Regarding the effect of the light intensity, very significant differences were obtained for all variants, approximately proportional with the increase of this factor. By taking into account the power saving, the proper quality of the formed new plants and the duration of the culture, the 2400 lucs variant was proven to be the best. The improvement of the rooting was not noticed to be concomitant with the increase of the light intensity. The light quality proven by using the 5 sources of lighting did not significantly influence the results obtained (except for the incandescent lighting). For practical and economical reasons, it is recommended to use the lighting only with mixed fluorescent lamps, meaning the V3 variant, where the culture duration is approximately the same as for the other variants.
- the temperature effect over the formation of new plants was proven to be significant

From our experiments, the temperatures inside the growing rooms was set at 20 +/- 2°C.

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“IN VITRO” VEGETATIVE REPRODUCTION THROUGH MINI-CUTTINGS OF THE GREENHOUSE CARNATION

Halaciuga Mirabela- Luminita[1], Popa Aurel[2]

KEY WORDS: Carnations, vegetative reproduction, in vitro, mini-cuttings

SUMMARY

For the reproduction of carnations through mini-cuttings we have used pants identified as lacking viruses belonging to the Katya breed, thus they have established 7 alternatives according to the position of the mini-cutting on the mother plant, from the 6th mini-cutting on the top to the 6th mini-cutting at the base of the plant.

After approximately 4 to 6 weeks of vegetation “in vitro” the new plants were used either for a new reproduction through mini-cuttings or they were passed to acclimatization.

The pants reproduced through mini-cuttings represented a good genetic stability maintaining the color typical for their variety and a natural environment.

INTRODUCTION

The carnations, the “flowers of gods”, are among the most spread and most appreciated flowers in the floral art thanks to their decorative qualities, their resistance as cut flowers, the risen productivity and the economic efficiency.

In recent years, to obtain all these they have used the latest discoveries of technical sciences, biology, biological engineering, and atomic energy, for the creation of new varieties but especially in the rendition of new qualities and shapes in the growth of carnations.

MATERIAL AND METHODS

For the reproduction of carnations through mini-cuttings they used pants identified as lacking viruses from the Katya breed. From the mother plants, situated in flower pots, they took no induced cuttings, which after they had been shaped, they were used for drawing meristems.

The detached meristems, having between 0.4 and 0.6 mm (with two pairs of bladed primroses) were inoculated on a growing environment identical to that used for the new formation of small plants. The obtained pants, with the height of 2 cm, were not acclimatized, but they were maintained in the culture for 10 weeks more. All this time they

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grew until they reached 8 to 10 cm and till they formed 8 to 10 internodes. These new small plants represented the initial material meant for the reproduction through nodal mini-cuttings. For the shaping of the mini-cuttings, the new plants extracted from the test tubes were displayed in Petri vases. The operation was executed on sterile tables. The extracted plants were sectioned at the middle of every internode, starting from the top. After the detachment of the sectioned internode they executed the shaping of the future mini-cutting through the removal of the under nodal stem at the base of the node and the cutting of the leaf at about 0.5 cm.

The mini-cuttings obtained this way were transferred to the growing area in the detachment order from the top to the base. They used a MS growing environment with 0.5 MM K and NA A. After approximately 4 to 6 weeks of growing "in vitro" the mini-cuttings inoculated new formed rooted plants. The nodal leaves of the mini-cuttings necrotized after 2-3 weeks of growing, without affecting the growth of the future new plants. Sometimes, at the basis of every mini-cutting there were formed more new plants (2, 3 pieces), which grew in parallel, having the same root.

The new plants formed were used either for a new reproduction through mini-cuttings, or they were passed to acclimatization. For a better usage of the new formed material, they also tried to acclimatize the remains of the rooted plants (remained after the detachment and the shaping of the mini-cuttings). The evolution of the latter was not satisfactory because the percentage of the new plants which were acclimatized was very small (under 25%). Because if this cause they gave up this practice, using for the reproduction only nodal mini-cuttings.

The success of the reproduction through mini-cuttings may be influenced by the different behavior of one of the ex nodal plants, as a result of position of the mother plant (Ruddle, 1977, Ladany, 1981). Still, Henegariu and the co-workers (1981) did not notice this phenomenon, the lack of uniformity in the new formation of rooted plants having no connection with the different position of the mini-cuttings.

For the investigation of this strange phenomenon they organized an experiment which put into practice the capacity for reproduction of every mini-cutting, on the basis of the percentage of the rooted new plants obtained at every foliar floor (nodal).

As initial material they used 300 new plants (grouped in three categories) from the Katya breed. They established seven positions, according to the position of the mini-cutting on the mother plant, from the 6^{th} mini-cutting at the top to the 6^{th} mini-cutting at the base. All in all they took care of 2100 plants in the first reproduction through mini cuttings

RESULTS AND DISCUTIONES

The appreciation of the new results was made after 4,5 weeks of growth, time in which the mini-cuttings new formed small rooted plants of about 2,3 cm. After the appreciation of the percentage of the new formed plants, they chose 300 plants, used for a new cycle of reproduction through mini-cuttings. The experiment took place between June and October and included an initiation cycle of the reproduction through mini-cuttings and two smaller cultures.

The obtained results proved the existence of very significant differences in the evolution of mini-cuttings, thanks to the position they had on the mother plant. The capacity of new formation was maximum (82,78%) at the mini-cuttings from the top, V1 dropping progressively when reaching the base. The mini-cuttings at the base V7 only formed 51.11% new rooted plants, the effect of the position being obvious.

The reaction of the small carnations regenerated from mini-cuttings –according to the position of the mini-cutting.

The capacity of reproduction through mini-cuttings diminished thanks to the short new formation (qualitative) at the basic mini-cuttings, noticing an increase in the number of the new plants formed and with an obvious basic callus formed. These small new plants were not introduced in the calculation of the new formation, having small chances of survival after acclimatization. In fact, a result similar to that obtained by us can also be noticed to other species to which the reproduction was made by mini-cuttings, as: chrysanthemum,(Lazar and Cachită_Cozma, 1981, vine (Ladany,1981) or eucalyptus (Burand and Boudeth, 1979).

With carnations it has been already mentioned that the drawing of axillary meristems led to the decrease of the new formation as compared to the apical ones. Thus it seems logical to admit that this characteristic will also be preserved in the case of reproduction through nodal mini-cuttings, this way being checked the capacity of new formation of axillary meristems.

This phenomenon can be explained also through the basis of the content of the endogenous components, accumulated at the level of each internode, which determine a different behavior for every mini-cutting, in similar growing conditions “in vitro”.

An impoverishment of these components in under cultures could explain the reduction of the capacity of reproduction from 73,66% in the initial culture to 66,62 % in the second subculture. This reduction of the reproductive potential through mini-cuttings is owed to an accentuated decrease of the percentage of new formation in the basic mini-cuttings, (V7), (from 58,67% to 42,44%).

The mini cuttings at the top, (V 1) and from the middle, (V 2 and V 5) at their turn proved less accentuated decreases (insignificant) of the reproductive potential in subcultures. After the reproduction through mini-cuttings they obtained 4403 small plants , among which: 1547 in the initial culture , 1457 in the first subculture and 1399 in the second subculture. The real potential of this method is higher, especially if all these new plants are kept for usage for the new reproduction. This way, in the case of our experiment, if we had used all the small plants from the initial culture for reproduction in subcultures, we could have obtained after the second subculture 35036 plants. Using six subculture per year, on the basis of the average percentage of new reproduced plants, (69,89%), it results that 289841 plants can be obtained, starting from on meristem which generated a small plant.

Table 1

The Effect of the Position of the Mini-cutting in the Reproduction “In Vitro” through Mini-cuttings

Varian	Percentage of new plants reproduced through mini cuttings			The average Variants (%)
	First reproduction	Under culture		
		I	II	
V1	84,67	83,33	80.33	82,78
V2	80,00	77,00	78,67	78,89
V3	77,67	75,33	69,33	74,44
V4	78,33	71,00	72,67	74,00
V5	69,00	66,67	65,00	66,89
V6	65,33	60,00	58,00	61,11
V7	59,67	51,33	42,33	51,11
The average of Under cultures	73,66	69,38	66,62	69,89

CONCLUSIONS

The reproduction “in vitro” through mini-cuttings constitute an efficient method for multiplication which allows the reproduction of about 80,000 small plants in one year. At the estimation of the capacity of reproduction through mini-cuttings, one should keep in mind the influence the position of the mini-cutting on the new plant has (82,78% to the mini-cuttings at the top and 51,11% to the mini-cuttings at the base), together with the decrease of the capacity for reproduction to 66,62% in the second subculture).

The reproduction through mini-cuttings “ in vitro” offers a good genetic stability to the reproduced material.

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RESEARCHE REGARDING THE MONITORIZATION AND CONTROL OF THE *ERWINIA AMYLOVORA* (BURILL) WINSLOW BACTERIA IN THE APPLE ORCHARDS FROM THE OLT COUNTY TERITORY

Mitrea Rodi[1], Nicolae Tomita[2], Stefan Camelina[3]

KEY WORDS: apple, Erwinia amylovora, monitorization, Romania

ABSTRACT

Signalized for the first time in America (1817) „fire blight" has extend in Canada, Mexic and other countries from the west of Europe (England 1957, Netherland 1966, Poland 1966, Denmark 1968, West Germany 1971, France 1972, Belgium 1972, Est Germany 1974). In Romania the disease has been signalized for the first time in 1992, in the following years spreading in almost all the fruitgrowing area from our country.

The losses produced by the fire blight are immeasurable. The pathogen agent present a high capacity of spreading, many of the spreading ways can be controled by man.

INTRODUCTION

In 1992 in Romania have been signalized 2 hotbeds of fire blight produced by the Erwinia amylowora bacteria. One at Braila and other at Maracineni, nearby Pitesti (V. Severin and others. 1994). The signalization year, is often with 2-3 years after the dissease appearance, being discover after developing on many plants (Lecomte and Paulin 1989).

In 1993 the dissease has quikly extend in 19 localities from 9 county (Constantinescu and others 1994). In the first year after the disease signalization there has been destroy almost 300 ha cultivated with pear tree, quince tree and apple tree.

Because *Erwinia amylovora* is an phytosanitary quarantine organism in 1993 the Agriculture and Food Ministery has emit the Order nr. 28/1993 „regarding the measures in order to limit the spreding and the damages determined by the fire blight produced by Erwinia amylovora", according to that order existing the obligation to made at least 2 controls, of all the plants suspect to be infected.

Despite all that in 1998, the fire blight has been monitorized in 34 county, respective 8 county from Moldova (Botosani, Suceava, Neamt, Iasi, Vaslui, Bacau, Vrancea, Galati), 10 county from Muntenia (Buzau, Braila, Ialomita, Calarasi, Ilfov, Prahova, Dambovita, Giurgiu, Arges, Teleorman), 2 county from Dobrogea (Tulcea and Constanta), 5 county from Oltenia (Valcea, Olt, Gorj, Dolj, Mehedinti) and 9 counties from Transilvania (Harghita, Brasov, Mures, Sibiu, Salaj, Cluj, Alba, Hunedoara and Timis).

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[2] Plant Protection
[3] Colegiul National "Fratii Buzesti"

From the attack degree point of view, Erwinia amylovora has been signalized with a extrem powerful degree attack in 3 counties, area with every powerful attack has been recorded in 5 counties, area with potential of powerful attack has been signalized in 21 counties, area with medium potential attack has been signalized in 23 counties and area with low potential attack signalized in 24 counties.

MATERIAL AND METHODS

The evolution of fire blight produced by *Erwinia amylowora* has been followed during 2 years (2004 – 2005) in the apple orchards from Olt county. The varieties cultivated in these orchards are: Jonathan, Golden, Starkrimson, Prima, Idared, Frumos de Voinesti, Romus.

There has been surveillance the following orchards: S.C. Corias Corabia 530 ha, Primaria Plesoiu 145 ha, S.C. Vitipomicola Samburesti 53 ha, S.C. Rovifruct Iancu Jianu 40 ha and SCDA Strejesti 39 ha.

The inspections have been made during the periods with the most favorable conditions for the disease symptoms manifestation: April-May-June and September-October.

The sample from the suspects trees has been send for analyze to the Central Laboratory for Phytosanitary Carantine Bucarest.

During the same period there has been made treatments for controlling the bacteria. Choosing the right moments for treatment has been made function the phenological phases and the bacteria evolution.

RESULTS

The disease evolutions include 3 phases, each with specific symptoms and specific control measures: the inflorescences burn, the copses burn and ulcerations developing. Not all these phases appear each year.

The inflorescences burn is usually the first symptom which appear early in the spring through the direct infection of the open flowers.

It can be affect a single flower or the entire inflorescence. In the beginning the flowers appear hydrolyzed, then withered, turn brown and became black. The flowers drop or remain attached in the tree. Sometimes, on warmly and rainy weather from peduncle pouring out drops of liquid.

On the leaves, the attack manifest as brown stain, which extend occupying the limb. Usually the leaves remain attached in the tree, constitute an important symptom for the detection of the infected trees.

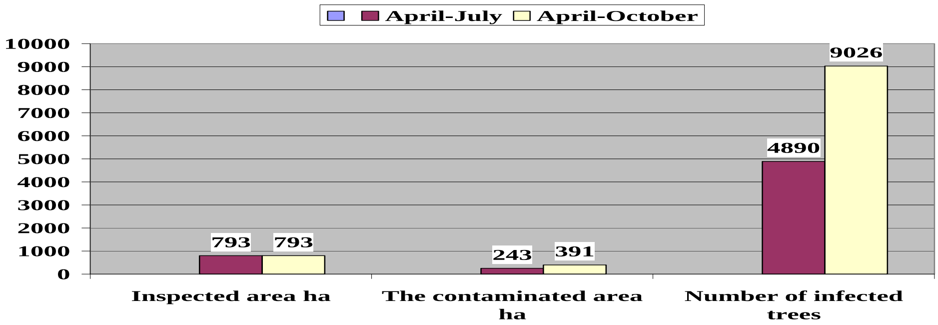
The copses and branches are after the inflorescences, the most sensitive organs of the plants.

On the young copses appear brown lesions around them. As a consequence the superior part of the copse withered, dry and bend as a crutch.

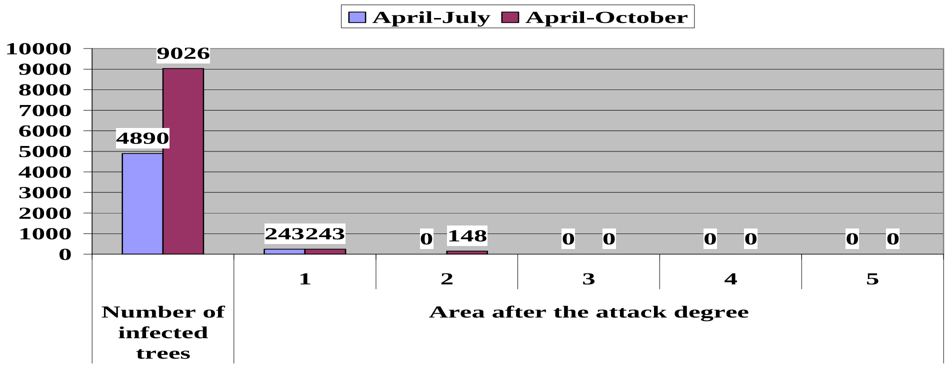
On rainy weather, starting with blossom, on the attacked copses appear drops of liquid. The infected copses have dead leaves, persistent appearing like burned.

The disease appears only on the green fruits and only occasionally can appear lesions after harvest. The attacked fruits turn brown, wrinkle and remain attached on the branches, sometimes become mummified.

During 2004, following the inspection and the laboratory analyzes results, from the inspected area of 793 ha during April-July, has been confirmed the presence of *Erwinia amylovora* on 243 ha at a number of 4890 trees with first attack degree (Graph 1).



Graph 1. The area contaminated by *Erwinia amylovora* fungus in Olt county 2004



Graph 2. Area classification after the attack degree produced by *Erwinia amylovora* fungus in Olt county 2004

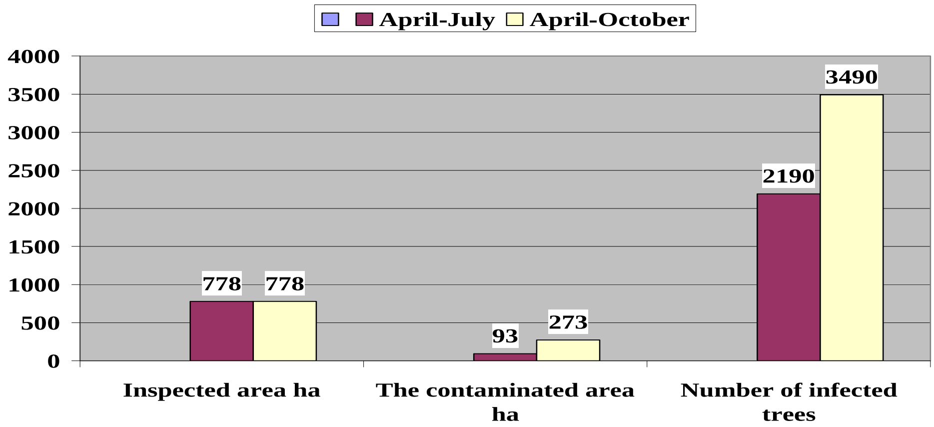
During autumn of 2004 on the inspected area of 793 ha it has been confirmed the presence of the bacteria at a number of 9026 trees from 243 ha with first degree attack and 148 with second degree attack (Graph 2). From the monitorization during April-July in 2005, the inspected area has been of 778 ha, the bacteria attack being confirmed on 93 ha, at a number of 2190 trees, with first degree attack .During autumn in 2005 on the inspected area of 778 ha it has been confirmed the presence of the bacteria on 273 ha with first degree attack, at a number of 3490 trees (Graph 3, 4).

During 2004 the control of the *Erwinia amylovora* has been made on a surface of 382 ha apple orchards.

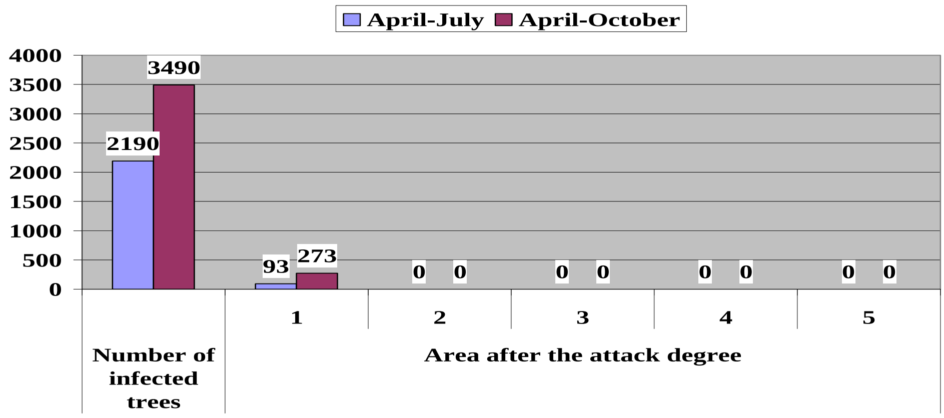
The treatment has been applied ante-floral with Alcupral 50 PU, dose 0,2%.

The treatment has been applied prior in the orchards where Erwinia amylovora has been confirmed through laboratory analyzes.

During 2005 the control of the Erwinia amylowora bacteria has been made ante-floral with Funguran OM 50 on 320 ha.



Graph.3. The area contaminated by *Erwinia amylovora* fungus in Olt county 2005



Graph 4 Area classification after the attack degree produced by *Erwinia amylovora* fungus in Olt county 2005

CONCLUSIONS

Erwinia amylovora is an organism of phytosanitary quarantine, the "fire blight" being a very damaging disease, which can produce important loses.

Consequently the monitorization during 1998, in Romania has been signalized an extreme attack in 3 counties, very powerful degree attack in 21 counties, among these the Olt county. The fire blight can be easily recognized through the characteristic symptom of leaves burn and the young copses bend like crutch.

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ESTABLISIHING THE TROPHICAL CHAINS FROM THE VINEYARD SUSCEPTIBLE TO BE MODIFIED THROUGH POLUTION

C. Stan, Rodi Mitrea, O. Tuca, I. Mitrea, Daniela Ciupeanu[1], Cremeneanu V.[2]

KEY WORDS: viticultural ecosystem, trophic pyramid

ABSTRACT

The vine from the vineyards influence direct and indirect the environment through a series of changes (the modification of the atmposhere composition by raising the oxigene; reducing the amplitude of the daily, monthly, annualy temperature; the modification of the atmospherical humidity; reducing the soil errosion, preventing the decrease of the soil fertility, aso.), which rasfrang on the vine. During the time, the viticultural ecosystem has suffer major modification due to the intervention of some new factors (diseases, pests, new varieties, tillage aso.) which have detrmined the change of the cropping system initially establish function the environmental conditions and croping means. Unfortunately, the changes has not been always in the benefit of obtaining better products or the environment.

The pesticides mass application make that the impact, the contact between them and the environment to be very high. In the vineyard from the Didactical Station Banu Maracine during 2007-2008, within the low risk technology for controling the harmful organisms there has been used a series of pesticides, in order to study the effect of these pestsicides on the contain and raports within the viticultural ecosystem.

INTRODUCTION

The vine from the vineyards influence direct and indirect the environment through a series of changes (the modification of the atmposhere composition by raising the oxigene; reducing the amplitude of the daily, monthly, annualy temperature; the modification of the atmospherical humidity; reducing the soil errosion, preventing the decrease of the soil fertility, aso.), which finally affect the vine. The reciprocical influence between the vine and the environment are different function the natural environment and the one improved by human, as well the cropping system (I. Olteanu, 2007).

MATERIAL AND METHOD

The research has been made in the S.D.Banu Maracine vineyard from the University of Craiova. The treatment scheme has been applied in production conditions, at the Feteasca alba variety on a area of 5000 m^2, with 1400 vines, with 2500 m^2 for each variant.

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[2] ALCEDO

The weeding has been made using a spraying device Vermorel type, using the product Cosmic 4 l/ha, in 300 l of water. The phytosanitary products has been applied with the spraying machine Corsair with a 300 liters capacity.

RESULTS AND DISCUSSION

During the time, the viticultural ecosystem has suffer major modification due to the intervention of some new factors (diseases, pests, new varieties, tillage aso.) which have detrmined the change of the cropping system initially establish function the environmental conditions and crooping means. Unfortunately, the changes has not been always in the benefit of obtaining better products or the environment.

The viticultural biocoenosys it is an semi-artificial biocoenosys, constitute from the viticultural plantation and all it organisms (the soil microorganisms, phytopathogens agents, pests, aso.) present in the croping space (biotope), which live in stabile trophical correlation and other nature (fig. 1).

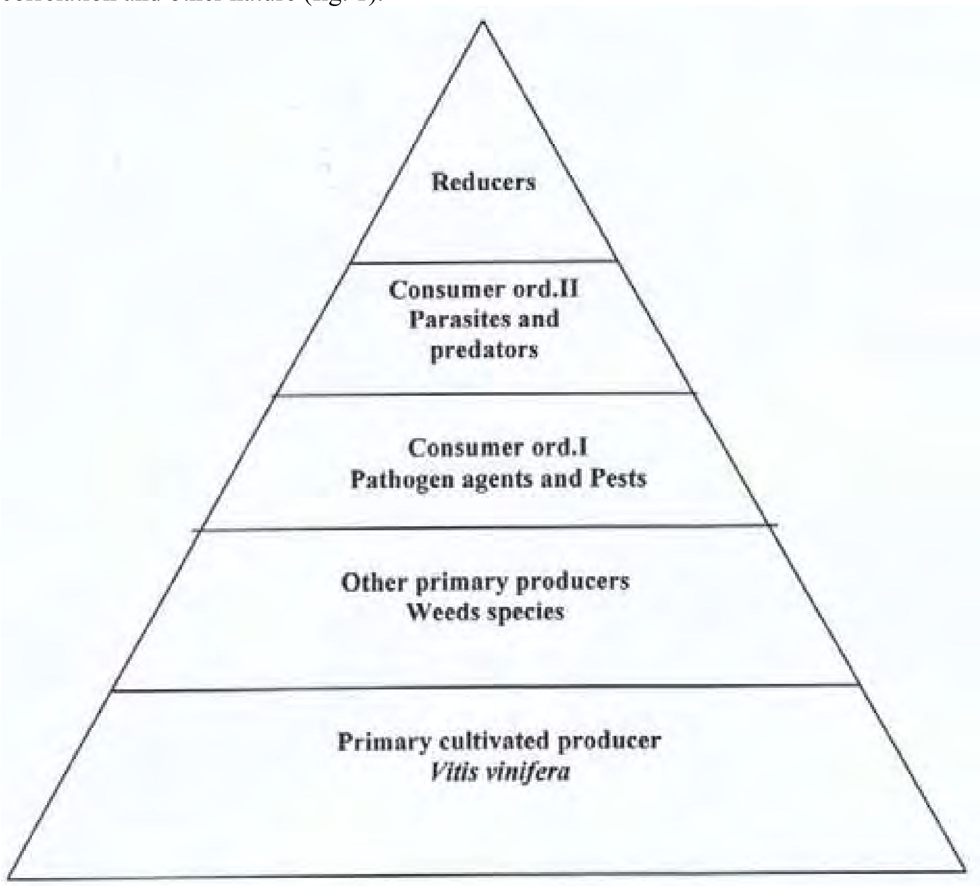

Fig. 1. The trophic pyramid specific for the viticultural biocoenosys

The ecological interaction between the biotic and abiotic factors of the agricultural ecosystem are presented in the figure nr. 2. The viticultural biocoenosys it is more simple than the natural biocoenosys (meadow, forest, aso.) and present a more reduce stability and complexity.

The **primary producer** in the viticultural biocoenosys it is the vine which often it is represented by the biosystem graft/vine cut.

<table>
<tr><th>Ecological factors</th><th>Interraction degree</th><th>Factorial type</th><th>Interraction type</th><th>Ecological clasification</th></tr>
<tr><td>1. CLIMATIC FACTORS
- temperature
- light</td><td>Primary periodical</td><td rowspan="2">Abiotic</td><td rowspan="2">Ecological factors interdepending on density</td><td rowspan="2">BIOTYPE</td></tr>
<tr><td>- air humidity
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<tr><td>2. PHYSICAL FACTORS
- non-climatic
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<tr><td>3. EDAFIC FACTORS
- soil type and texture
- micro clasification</td><td>Non-periodical</td><td>Abiotical and biotical</td><td rowspan="2">Ecological factors which depend on density</td><td>BIOCOENOSYS</td></tr>
<tr><td>4. AGRICULTURAL FOOD FACTORS
- Intraspecifical relations
- Interspecifical realtions</td><td>Secondary periodical</td><td>Biotical</td><td>AUTOCOENOSYS</td></tr>
</table>

Fig. 2. The ecological interaction between the biotical and abiotical factors of the viticultural ecosystem

Together with the vine, as primary croped producer, are different herbaceous species, which usually are target for the control measures.

Stability and self-regulation in the viticultural ecosystem are made by human through action on the agricultural phyto-technical sub-system (trimming, fertilization aso.) and of the social-economic sub-system (materials, energetical base aso.).

The profound intervention of the human in the viticultural ecosystem led to powerfull disequilibrium, thus the issues caused by pests or diseases could not be solved using the cultural and phisical methods, which led to the seeking for other control methods more efficient. Thus, we enter in the era of the chemical methods used for controling the harmfull organisms. The pesticides applying it is one of the most important factors which affect the biodiversity, the pesticides represent substances of complex chemical synthesis, toxical or very toxical, foreign for the viticultural ecosystem. The used of the pesticides on large scale, has imposed the exact understanding of the way those substances move function different elements of the viticultural ecosystem.

The viticultural ecosystem repesenting a unit of the biotical and abiotical factors, the circulation of the pesticides comprise the circulation in the soil, water, air and biosoenosys. The target organisms (harmful) recieve by the way a small quantity of pesticide, named „agricultural disponibility", which represent in fact the most important quantity for controling the pest, the rest accumulating in the soil and on other elements of the viticultural ecosystem. Thus, the pesticides generate important danger regarding the internal poluting of the environment (water, air, soil) and of the crop, and also to the appearance of the resistance phenomenon of the harmful organisms to certain phytopharmaceutical products.

The circulation posisbilities of the pesticides residues in the trophic chains within the viticultural ecosystem are presented in the figure nr. 3.

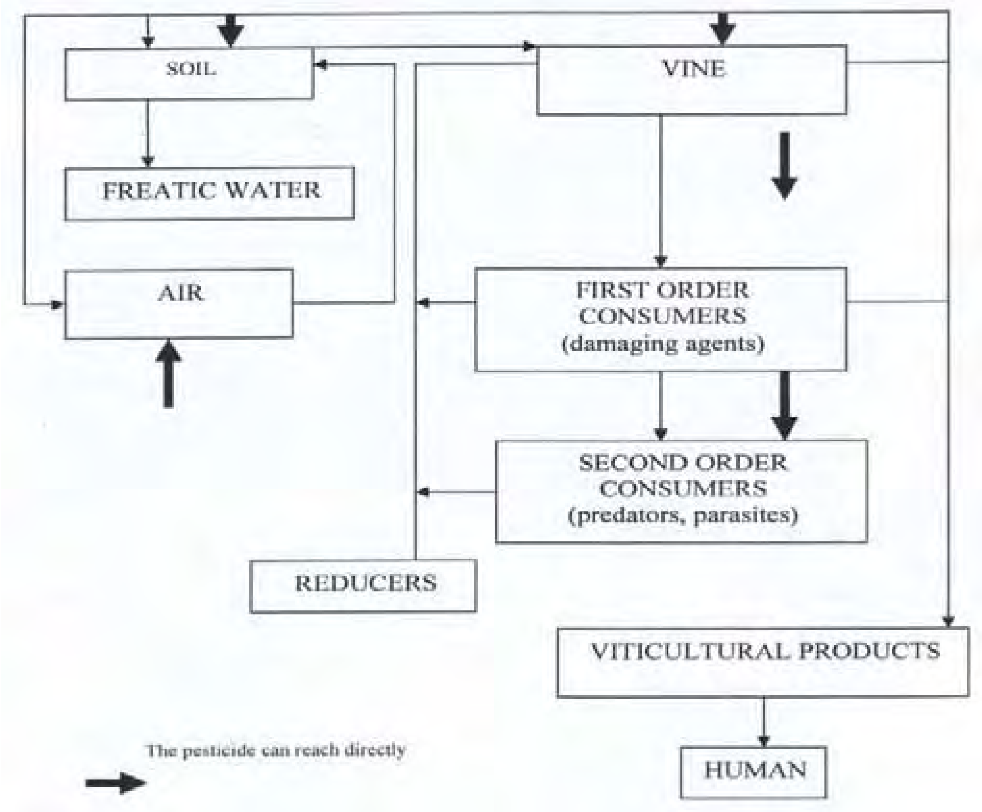

Fig. 3. The circulation of the pesticides residues in the trophic chains within the viticultural ecosystem

Mass applying of the pesticides make that the impact, the contact between them and the environment (soil, air, other organisms than the one to be treated), to be very powerful. From this reason, the ecological studies must prove that a pesticide or a group of pesticides does not alter the contain and the raports from the ecosystem, the pesticides acting only in the direction and destined purpose.

The processing of the data related to the pesticides intervention with local or systemic action at the level of the trophic chains from the vineyard are presented in the fig. nr. 4.

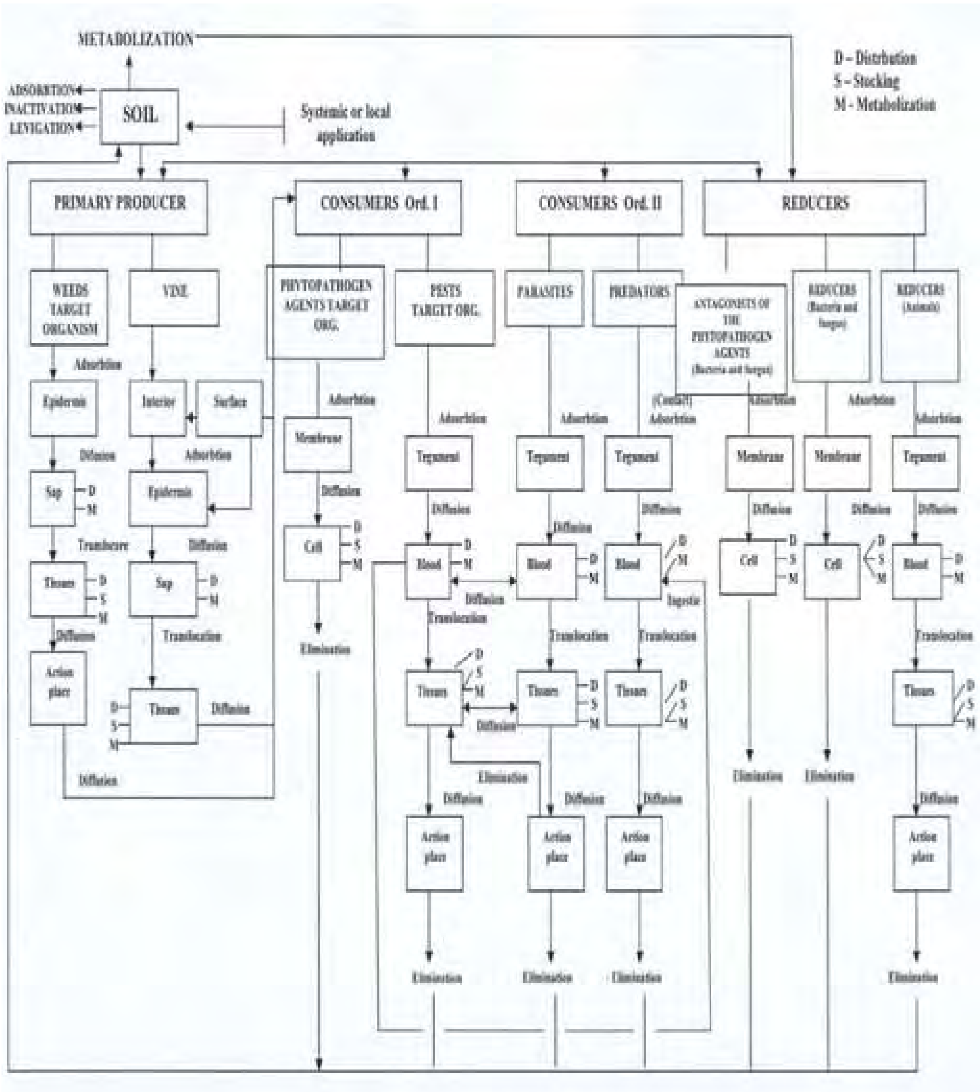

Fig. 4. The intervention of the pesticides at the level of the trophic chains within a vineyard

As it can be observed from this figure even if at the begining the pesticide quantity folliage applied accumulate mainly on plants, afterwords through rainfall wash and leaves fall the substance accumulate in soil, where the circulation it is made due to some complex processes especially the biological and phisical ones.

CONCLUSIONS

The agricultural ecosystem are a special category of ecosystem from the category of ecosystem build by human.

The biodiversity of the viticultural ecosystem it is lower than of the natural ecosystem, because in time they have become vulnerable to the action of physycal factors, but especialy to the action of the biological factors.

The dislocation of the natural ecosystem and their replacing with agricultural ecosystem has not led to the extinction of the pre-existent ecological niche, but to their transformation in „some potential ecological niche", which offer conditions for their occupation by other species, mainly the harmful ones.

The profound intervention of the human in the viticultural ecosystem led to powerfull disequilibrium, thus the issues caused by pests or diseases could not be solved using the cultural and phisical methods, which led to the seeking for other control methods more efficient.

A great part of the „cultural energy" introduce by human in the viticultural ecosystem serve to the regulation of the abondence and frequence of different species that live on the vine.

The control of the harmful organisms has necessitated the use of biocides (pesticides) which represent one of the most important factors that affect the biodiversity, the pesticides are substance of chemical synthesis, toxic or very toxic.

The target organisms (harmful) recieve by the way a small quantity of pesticide, named „agricultural disponibility", which represent in fact the most important quantity for controling the pest, the rest accumulating in the soil and on other elements of the viticultural ecosystem.

Thus, the pesticides generate important danger regarding the internal poluting of the environment (water, air, soil) and of the crop, and also to the appearance of the resistance phenomenon of the harmful organisms to certain phytopharmaceutical products.

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THE DEVELOPMENT STAGES MORPHOLGY OF THE *CYDIA POMONELLA* L. SPECIES

Tuca O., Mitrea I., Stan C.[1], Cremeneanu C.[2]

KEY WORDS: Cydia pomonella L., adult, egg, larva, pupa

ABSTRACT

The codling moth Cydia pomonella L. (formerly Laspeyresia pomonella and Carpocapsa pomonella); Order Lepidoptera, Family Tortricidae is one of the most serious pests of apples, but the larvae may also attack pears, walnuts, quince, and other fruits. The larva is the familiar "apple worm."

The codling moth butterflies are distinctive because its wings are crisscrossed with lighter gray lines, and there is a bronze or copper-colored patch near the outer margins of the forewings that distinguishes this moth from others found in apple orchards. The butterflies are 8 mm long, when it is at rest with its wings folded, and has a 17-19 mm wingspan.

The egg have a diameter of 1,0-1.2 mm, whitish, circular, flattened, slightly swollen in the middle. Milky-white at first, then, a few days later, with presence of a reddish ring at the periphery.

The newly hatched larva is yellowish-white with a black head, the fully grown larva is 18 to 21 mm long, body pale pink to reddish, and has a dark brown head.

The pupa is 10 to 12 mm long, yellow-brown to dark brown. Occuring in silky cocoon.

INTRODUCTION

The codling moth *Cydia pomonella* L. (formerly *Laspeyresia pomonella* and *Carpocapsa pomonella*); Order Lepidoptera, Family Tortricidae is one of the most serious pests of apples, but the larvae may also attack pears, walnuts, quince, and other fruits. The larva is the familiar "apple worm."

Studies regarding the morhoplogical aspects of the development stages are very important for the Plant Protection specialists for corect identification, in order to establish the right treatments for controling the codling moth *Cydia pomonella* L.

MATERIAL AND METHOD

For the research regarding the morphology of the development stages of the plum moth *Cydia pomonella* L. (adult, egg, larva, pupa) there has been made observations and measurments with the binocular.

The biological material has been collected from the plum orchards within the Didactical Station Banu Mărăcine.

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RESULTS AND DISCUSION

The buterflies of the *Cydia pomonella* L. species, have a dark-brown body, very obvious and characteristic brown oval marking, surrounded by 2 shiny golden brown lines, tending towards the bronze. The codling moth butterflies are distinctive because its wings are crisscrossed with lighter gray lines, and there is a bronze or copper-colored patch near the outer margins of the forewings that distinguishes this moth from others found in apple orchards.

The posteriors wings are coloured uniform in grey-brown and are delicately ciliated. Their appearance blends well with most tree bark, making them difficult to detect.

The butterflies are 8 mm long, when it is at rest with its wings folded (fig. 1).

Fig. 1. *Cydia pomonella* L. adult

The wings span of the *Cydia pomonella* L. species has been ranged between 17,2 – 18,5 mm, messuring on an average of 17,7 mm (table 1).

Table 1

The wings span of the plum moth *Cydia pomonella* L., at the S.D. Banu Mărăcine

Analyzed adults	Wings span (mm)
7	17,2
12	18,5
37	17,5
29	17,7
10	18,1
5	17,4
Average for 100 adults	13,98

Regarding the eggs dimension, we noticed that the eggs have a diameter of 1,0-1.2 mm, whitish, circular, flattened, slightly swollen in the middle. After laying the egg is milky-white, then, a few days later, with presence of a reddish ring at the periphery.

The newly hatched larva is yellowish-white with a black head, the fully grown larva is 18 to 21 mm long, body pale pink to reddish, and has a dark brown head (fig. 2).

From the analyze of the recorded data the length of the larva body has been ranged between 18,3 and 21,2 mm, with an average of 11,84 mm (table 2).

Fig. 2 *Grapholitha funebrana* Tr., larva

Table 2

The variation of the *Cydia pomonella* L. larva length at S.D. Banu Mărăcine

Studied larva	Length (mm)
15	18,3
25	19,5
39	20,4
13	20,8
8	21,2
Average of 100 larva	20,04

Chrysalis have a yellow dark to brown colour, it's just a little longer for the female than the male.

The chrysalis dimensions for the *Cydia pomonella* L. species, in the central area of Oltenia presented values ranged between 10 – 12 mm with an average of 11,38 mm (table 3).

Fig. 3 *Grapholitha funebrana* Tr., chrysalis

Table 3

The chrysalis length variation of the *Cydia pomonella* L. at S.D. Banu Mărăcine

Analyzed chrysalis	Length (mm)
25	10,7
12	10,9
32	11,3
21	11,8
10	12,2
Average of 100 chrysalis	11,38

CONCLUSIONS

In the climatic conditions of the S.D. Banu Maracine the developemnt stages of the plum moth *Cydia pomonella* L. presented the following features:

- the butterflies of the *Cydia pomonella* L. species, have a dark-brown body. The codling moth butterflies are distinctive because its wings are crisscrossed with lighter gray lines, and there is a bronze or copper-colored patch near the outer margins of the forewings that distinguishes this moth from others found in apple orchards. The posteriors wings are coloured uniform in grey-brown and are delicately ciliated.

- the butterflies are 8 mm long, when it is at rest with its wings folded.

- the egg have a diameter of 1,0-1.2 mm, whitish, circular, flattened, slightly swollen in the middle.

- The newly hatched larva is yellowish-white with a black head, the fully grown larva is 18 to 21 mm long, body pale pink to reddish, and has a dark brown head.

- the chrysalis have a yellow dark to brown colour, it's just a little longer for the female than the male. The chrysalis dimensions for the *Cydia pomonella* L. species, in the central area of Oltenia presented values ranged between 10 – 12 mm.

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OBSERVATIONS ON THE EFFICACY OF SOME INSECTICIDES IN *DELIA ANTIQUA* MEIG. PEST CONTROL

Ioana Marius[1], Loredana Beatrice Frăsin[2]

KEYWORDS: Delia antiqua Meig., efficacy, control.

ABSTRACT

The insect Delia antiqua Meig is one of the dangerous pests of onion, producing crops damages of until 20 – 30%, which is the reason why this insect control has a special importance. Among the 30 tested products, very good results, with over 90% efficacy, had those based on fosmet 50% (Imidan 50 WP – 0.1%), phosalone 30% (Zolone 30 PM – 0.2%) şi phosalone 35% (Zolone 35 EC – 0.2%).

INTRODUCTION

The onion fly - *Delia antiqua* Meig. is spread all over Europe, in Asia, North Africa, North and South America (Ibrahim, 1978). In our country this pest was reported in large populations during last years, especially in Moldavia, Muntenia, Oltenia and Banat (Suster, 1944).

The onion fly attacks a large number of plants of *Liliaceae* family, but the most important damages were reported in onion, garlic and leek crops.

MATERIAL AND METHODS

Research studies were accomplished in the years 2006-2007, in the experimental fields of the Phitosanitary Unit of Dâmbovita county, Romania. Treatments were applied on warning. The frequency of attack was calculated using the following formula:

$$F\% = \frac{n}{N} \times 100$$

where:

F = frequency of attack;
n = number of attacked plants or organs;
N = number of analysed plants or organs.

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Table 1

Efficacy of some insecticides in onion fly - *Delia antiqua* Meig. control at the Phitosanitary Unit of Dâmbovița county in the year 2006

No.	Product	Active ingredient	Concentration [%]	Number of analysed plants	Number of attacked plants	Frequency of attack [%]	Efficacy [%]
1.	IMIDAN 50WP	phosmet 50%	0.1	200	2	1.00	92.00
2.	ZOLONE 30PM	fosalone 30%	0.2	200	2	1.00	92.00
3.	ZOLONE 35EC	fosalone 35%	0.2	200	1	1.00	96.00
4.	SINORATOX PLUS	dimetoate + cipermetrin	0.075	200	5	2.50	80.00
5.	SINORATOX PLUS	dimetoat + cipermetrine	0.015	200	4	2.00	84.00
6.	FASTAC 10EC-RV	cipermetrine 100 g/l	0.015	200	4	2.00	84.00
7.	SINORATOX 35EC	dimetoate 35%	0.1	200	12	3.00	70.37
8.	KARATE 2,5EC	lambda cihalotrine 25 g/l	0.015	200	8	2.00	80.25
9.	FYFANON 31R	malatione	0.15	200	6	1.50	85.18
10.	FYFANON 31A	malatione	0.15	200	6	6.00	76.92
11.	MÜLBEKNOCK EC	nilbemectine	0.05	300	6	2.00	89.28
12.	MÜLBEKNOCK EC	nilbemectine	0.075	200	5	2.50	80.00
13.	MÜLBEKNOCK EC	nilbemectine	0.1	200	5	2.50	80.00
15.	SUMI-ALPHA 5EC	esfenvalerate	0.075	200	6	1.50	85.00
16.	Untreated control	-	-	100	37	37.00	-

Date of treatments application: 24.04.2006; 04.05.2006; 29.06.2006; 09.07.2006.

Table 2

Efficacy of some insecticides in onion fly - *Delia antiqua* Meig. control at the Phitosanitary Unit of Dâmbovița county in the year 2007

No.	Product	Active ingredient	Concentration [%]	Number of analysed plants	Number of attacked plants	Frequency of attack [%]	Efficacy [%]
1.	IMIDAN 50WP	phosmet 50%	0.1	450	3	0.66	98.73
2.	ZOLONE 30PM	fosalone 30%	0.2	450	12	2.67	95.62
3.	ZOLONE 35EC	fosalone 35%	0.2	200	4	1.00	90.12
4.	SINORATOX PLUS	dimetoate + cipermetrine	0.075	300	11	3.66	80.35
5.	SINORATOX PLUS	dimetoate + cipermetrine	0.1	300	25	8.33	83.10
6.	FASTAC 10EC-RV	cipermetrine 100 g/l	0.015	300	17	5.66	88.51
7.	SINORATOX 35EC	dimetoate 35%	0.1	300	85	28.33	42.56
8.	KARATE 2,5EC	lambda cihalotrine 25 g/l	0.015	300	25	8.33	83.10
9.	FYFANON 31R	malatione	0.15	300	17	5.66	88.51
10.	FYFANON 31A	malatione	0.15	200	5	2.50	83.87
11.	MÜLBEKNOCK EC	nilbemectine	0.05	200	8	4.00	77.78
12.	MÜLBEKNOCK EC	nilbemectine	0.075	200	12	6.00	70.73
13.	MÜLBEKNOCK EC	nilbemectine	0.1	200	12	6.00	65.71
15.	SUMI-ALPHA 5 CE	esfenvalerate	0075	200	15	7.50	68.75
16.	Untreated control	-	-	100	56	56.00	-

Date of treatments application: 27.04.2007; 07.05.2007; 27.06.2007; 17.07.2007

Observations and laboratory determinations were done for to establish the efficacy of the experimental products.

The efficacy of the experimental products was calculated using Abott's formula:

$$E\% = [1 - a_2/(N - M_2)] \times 100$$

where:

E	=	product efficacy;
a_2	=	number of attacked leaves for the untreated control;
N	=	total number of analysed leaves;
M_2	=	number of unattacked leaves for the untreated control.

RESULTS AND DISCUSSIONS

Results on the efficacy of the insecticides in the year 2006 to control *Delia antiqua* Meig. are presented in table 1. As one can see, very good efficacies, of over 90% had the insecticides IMIDAN 50WP - 0.1% (92.00%), ZOLONE 30PM – 0.2% and ZOLONE 35EC– 0.2%.

Good efficacies, of over 80% had also the products SINORATOX PLUS - 0.075 % and 0.015 %, FYFANON 31R - 0.15%, Mülbeknock EC - 0.05% and 0.075% şi Sumi-Alpha 5EC – 0.075. The lowest efficacy, of 70.37%, had the product based on dimetoate 35% - SINORATOX EC.

Results on the efficacy of the insecticides in the year 2007 are presented in table 2. As we can see from the respective data, in this year the best efficacies, of over 90%, were obtained after treatments with the same products, IMIDAN 50WP - 0.1% (92.00%), ZOLONE 30PM – 0.2% and ZOLONE 35CE– 0.2%.

Good eficacies, of over 80%, had also the following products SINORATOX PLUS - 0.075 % and 0.015 %, FASTAC 10EC - RV%, KARATE 2.5EC –0.015%, FYFANON 31R – 0.15 % and FYFANON 31A – 0.15 %.

CONCLUSIONS

The onion fly - *Delia antiqua* Meig. attacks a large number of plants of *Liliaceae* family, but produce the most damages to onion, garlic and leek crops.

Crop losses for onion may reach 20 – 30% which is the reason for this insect control has a special importance.

From 30 tested insecticides, very good results, with an efficacy of over 90%, had the products based on fosmet 50% (IMIDAN 50WP – 0.1%), fosalone 30% (ZOLONE 30PM – 0.2%) and fosalone 35% (ZOLONE 35EC – 0.2%).

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OBSERVATIONS ON THE EFFICACY OF SOME INSECTICIDES IN *HOPLOCAMPA MINUTA* CHRIST. PEST CONTROL

Ioana Marius, Loredana Beatrice Frăsin[1]

KEY WORDS: Hoplocampa minuta Christ., efficacy, control

ABSTRACT

Among the tested insecticides, the following products had the best results in Hoplocampa minuta Christ. pest control (with an efficacy of over 90%): FRV 37 PU – 0.05% (90.25%); Sinoratox 35 CE – 0.15 % (95.30 %); Decis 25 WG – 0.003% (94.30%); Faster 10 EC – 0.02% (92.86 %); Decis 2.5 EC – 0.03% (97.20%) and Fastac 10 CE-RV – 0.015% (92.40%).

INTRODUCTION

Black plum sawfly - *Hoplocampa minuta* Christ. is spread in our country all over the area of plum trees cultivation, at over 600 m altitude (Isac Lucia, 1980). This pest has one generation per year (Rogojanu, 1959).

The knowledge of the insecticide products efficacy has a special importance for this insect control.

MATERIAL ŞI METODĂ

Research studies were accomplished in the years 2006-2007, in the experimental fields of the Phitosanitary Unit of Dâmbovita county, Romania. Treatments were applied on warning. The frequency of attack was calculated using the following formula:

$$F\% = \frac{n}{N} \times 100$$

where:

F = frequency of attack;
n = number of attacked plants or organs;
N = number of analysed plants or organs.

Observations and laboratory determinations were done for to establish the efficacy of the experimental products.

The efficacy of the experimental products was calculated using Abott's formula:

$$E\% = [1 - a_2/(N - M_2)] \times 100$$

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where:

E	=	product efficacy;
a_2	=	number of attacked leaves for the untreated control;
N	=	total number of analysed leaves;
M_2	=	number of unattacked leaves for the untreated control.

RESULTS AND DISCUSSIONS

Results on the efficacy of the insecticides in the year 2006 to control *Hoplocampa minuta* Christ. pest are presented in table 1.

Table 1

Efficacy of some insecticides in black plum sawfly - *Hoplocampa minuta* Christ. pest control at the Phitosanitary Unit of Dâmbovița county in the year 2006

No.	Product	Active ingredient	Concentration [%]	Efficacy [%]
1.	FRV 37PU - 0.05%	malation	0.05	90.00
2.	DECIS 25WG	deltametrine 25 g/l	0.003	96.30
3.	FASTER 10EC	cipermetrine	0.02	90.20
4.	DECIS 2.5EC	deltametrine 25 g/l	0.03	98.10
5.	FASTAC 10EC-RV	cipermetrine 100 g/l	0.015	90.40
6.	SINORATOX 35EC	dimetoate 35%	0.1	96.10
7.	CARBETOX 50CE	malation 50 %	0.175	82.35
8.	DANEX 80SP	triclorfon 80 %	0.15	88.31
9.	IMIDAN 50WP	fosmet 50 %	0.05	81.67
10.	NOGOS 50EC	DDVP 500g/l	0.1	76.34
11.	ZOLONE 35EC	fosalon 35 %	0.2	78.30
12.	PERFECTION CE40	dimetoate 40 %	0.1	76.87
13.	NUDRIN 90WSP	metomil 90 %	0.05	68.09
15.	OLITOX 50PU	carbaryl 50 %	0.15	79.62
16.	Untreated control	-	-	-

Date of treatments application: 11.04.2006.

As one can see, very good efficacies, of over 90% had the insecticides FRV 37PU - 0.05%; DECIS 25WG - 0.003% ; FASTER 10EC - 0.02%; DECIS 2.5EC - 0.03%; FASTAC 10EC-RV - 0.015%; SINORATOX 35EC- 0.1%.

Good efficacies, of over 80% had also the products CARBETOX 50CE, DANEX 80SP and IMIDAN 50WP.

The lowest efficacy, of 68.09%, had the product based on metomil 90% - NUDRIN 90WSP.

Results on the efficacy of the insecticides in the year 2007 are presented in table 2. As one can see from the respective data, in this year the best efficacies, of over 90%, were obtained after treatments with the same products, FRV 37PU - 0.05%; DECIS 25WG - 0.003% ; FASTER 10EC - 0.02%; DECIS 2.5EC - 0.03%; FASTAC 10EC-RV - 0.015% ; SINORATOX 35EC- 0.1%.

Good eficacies, of over 80%, had also the following products CARBETOX 50CE, DANEX 80SP and IMIDAN 50WP.

Table 2

Efficacy of some insecticides in black plum sawfly - *Hoplocampa minuta* Christ. pest control at the Phitosanitary Unit of Dâmbovița county in the year 2007

No.	Product	Active ingredient	Concentration [%]	Number of analysed fruits	Efficacy [%]
1.	FRV 37PU - 0,05%	malation	0.05	100	90,05
2.	DECIS 25WG	deltametrine 25 g/l	0.003	100	92,30
3.	FASTER 10EC	cipermetrine	0.02	100	90.04
4.	DECIS 2,5EC	deltametrine 25 g/l	0,03	100	95,30
5.	FASTAC 10EC-RV	cipermetrine 100 g/l	0,015	100	94,40
6.	SINORATOX 35EC	dimetoate 35%	0.1	100	94,50
7.	CARBETOX 50CE	malation 50%	0.175	100	85.09
8.	DANEX 80SP	triclorfon 80%	0.15	100	80.58
9.	IMIDAN 50WP	fosmet 50 %	0.05	100	83.48
10.	NOGOS 50EC	DDVP 500g/l	0.1	100	76.34
11.	ZOLONE 35EC	fosalone 35%	0.2	100	70.52
12.	PERFECTION CE40	dimetoate 40%	0.1	100	73.60
13.	NUDRIN 90WSP	metomil 90%	0.05	100	69.45
15.	OLITOX 50PU	carbaryl 50 %	0.15	100	76.67
16.	Untreated control	-	-	100	-

Date of treatments application: 07.04.2007

CONCLUSIONS

Hoplocampa minuta Christ. is spread in our country all over the area of plum trees cultivation, at over 600 m altitude.

Among the tested insecticides, the following products had the best results in Hoplocampa minuta Christ. pest control (with an efficacy of over 90%): FRV 37PU – 0.05% (90.25%); SINORATOX 35EC – 0.15% (95.30 %); DECIS 25WG – 0.003% (94.30%); FASTER 10EC – 0.02% (92.86 %); DECIS 2.5EC – 0.03% (97.20%) and FASTAC 10CE-RV – 0.015% (92.40%).

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RESULTS FOOD CONCERNING TO CONTROL OF CODLING MOTH (CYDIA POMONELLA L.) IN THE CONDITIONS OF FRUIT GROWING VOINESTI

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KEY WORDS: concerning; codling moth; pheromone; insecticides biological; efficiency

ABSTRACT

Codling moth (Cydia pomonella L.) remains to be a very important pest in most apple orchards. This paper presents the results performed between 2005 - 2008 with home new insecticides for pest control in field plots. The results were interpreted comparatively for biological products, chemical insecticides and untreated check. The main results obtained were the following: -with two treatments/each generation, Carpovirusine conc. 0,1% had the maximal efficacy in controlling the all stages of Cydia pomonella L. -the insecticide TREBON 30 EC conc. 0,03 % was very effective in controlling the pest.- the importance of the pheromone traps in establishing the spreading are of the pests was remarked, the appreciation of the opportunity of treatments applying according to population level and establishing the optimal time for treatment warning.

INTRODUCTION

The integrated combat, worked out already in the year 1959 and adopted also in our country (1986), proved itself corresponding, to the greatest degree, to the needs of the agriculture, of society in general.

In tree growing, the basic principle of the integrated protection is constituted by the combination of different biological, chemical, agro-technical, genetic combat methods, so that the share of the biological methods may increase significantly, simultaneously with the reduction of the pesticide products.

Due to the favourable pedo-climatic conditions and to the geographical position, in the tree growing basin Voineşti, the greatest culture share is detained by the apple tree..

So, at SCDP Voineşti the integrated combat started after the year 1987 by applying this modern concept to the apple tree orchards.

The apple worm (Cydia pomonella L.) is one of the most important pests in tree growing (Sonica Drosu, 1997).

In the majority of the apple tree orchards, in the last years a powerful attack Cydia pomonella was registered..

The causes which generated this situation were: the lack of winter treatments and the accumulation of an important biological reserve; the different evolution of the climatic factors (temperature and humidity); the non-observance of the warnings; the use of insecticides with reduced biological efficiency and others. So, at the inadequately treated trees, in the last years the frequency of the wormy fruits raised to values between 25 and 60%.

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So, the adoption of an efficient strategy became necessary, which – together with a correct treatments warnings - shall lead to the attack limitation, under the conditions of the reduction of the polluting insecticides consumption and for obtaining of healthy crops (Albertina Şerboiu, Cecilia Bolbose, 2004).

The paper presents the results obtained at S.C.D.P. Voinesti under the conditions of the years 2005-2008, using the pheromone ATRAPOM as a means for the monitoring and the warning of the apple trees worm, microbiological products and the "Chemical standard" variant.

MATERIAL AND METHODS

The researches were organized on an experimental lot within the din Farm nr. 1 of S.C.D.P. Voinesti, at the Ionathan breed, on the graft bearer $M_{106.}$ The crown form is free palmate, with planting distances of 4 x 3.5 m, the intervals between the trees being maintained with grass and on the rows herbicidation being applied during the summer. The trees age = 14 years. The experience was organized with 9 variants in the period of the years 2005-2007 – and respectively 3 variants in the year 2008. The variant has 5 trees (a tree = a repetition), like:

2005 – 2007

V_1 – SILPOSAN CA – 2 conc. 0.2%
V_2 – LASER 240 SC (Spinosad 240 SC) conc. 0.06%
V_3 – NEEMAZOL conc. 0.5 %
V_4 – CARPOVIRUSINE conc. 0.1 %
V_5 – BIO 4510 Sarja conc. 0,15 %
V_6 – CALYPSO 480 SC conc. 0.02 %
V_7 – KARATE ZEON conc. 0.015 %
V_8 – TREBON 30 EC conc. 0.03 %
V_9 – MT. NTR.

2008

V_1 – INSEGAR 25 WG conc. 0.03 %
V_2 – TREBON 30 EC conc. 0.03 %
V_3 – MT. NTR.

The pest biology was pursued by periodical visual observations, performed in the orchard - and also with the help of pheromone ATRAPOM attackers, by 2 weakly readings, with the change of the pheromone at 45 days and with a norm of 3 traps /ha. So, with the help of pheromone attractors , also the appearance and the duration of each generation was registered; the first flight maximum, the punt beginning, the attack risk evaluation and the establishing of the optimal warning period.

The treatments were applied at warning with the treatment pump Atomizir STHIL 400. The solution quantity per ha was 1500 l – 3 l/tree. The microbiological products were applied combined with fungicide products recommended for the combat of the principal foliare diseases (scurf - mildew).

The results evaluation was performed at the beginning of September, before the fruit harvesting. 200 fruits /variant were examined at the generation I, respectively 300 fruits at generation II and III.

RESULTS AND DISCUSSIONS

a) The combat with new microbiological products (table 1).

At the end of the first generation, at the variants treated with biological products, the attack frequency was comprised between 1.5%–4.0%, as compared with the "untreated witness" variant 16.5 % (between the years 2005-2006), respectively values comprised, at the end of the generations 2 and 3, between 1.3 – 3.6 % in the year 2005, as compared with the "untreated witness" variant 24.3%. Before the fruit harvesting, the products biological efficiency was evaluated, values between 1.0 - 4.0 % attacked fruits being registered, respectively 90 - 95 % apples free of attack, as compared with 27.5 – 31.5% wormy fruits at the “untreated witness”.

Table 1

The efficiency of some new biological insecticides in the combat of the species Cydia pomonella L.

VARIANT (PRODUCT)	Conc. %	Year	Generation I-a			Generations II and III		
			Efficiency %					
			Total obs. fruits. trees + the drop	Of which attacked		Total obs. fruits. trees + the drop	Of which attacked	
				Nr.	%		Nr.	%
SILPOSAN CA-2	0.2	2005	200	5	2.5	300	6	2.0
		2006	200	4	2.0	300	5	1.6
LASER 240 SC	0.06	2005	200	8	4.0	300	10	3.3
		2006	200	6	3.0	300	4	1.3
NEEMAZOL	0.5	2005	200	10	5.0	300	11	3.6
		2006	200	7	3.5	300	5	1.6
CARPOVIRUSINE	0.1	2005	200	3	1.5	300	4	1.3
		2006	200	4	2.0	300	3	1.0
BIO 4510 Sarja	0,15	2005	200	6	3.0	300	10	3.3
		2006	200	3	1.5	300	8	2,.
MT. NTR.	-	2005	200	63	1.5	300	73	24.3
		2006	200	55	27.5	300	59	19.6

b) The combat with new insecticide products.

The efficiency of the products KARATE ZEON conc. 0.015 %, TREBON 30 EC conc. 0.03 %, CALYPSO 480 SC conc. 0.02 % and INSEGAR 25 WG conc. 0.03% is presented in the table nr. 2. At the end of June, after the generation I of the apples worm, the frequency of the fruits with attack in these variants was comprised between 1.0 – 3.0%, whereas at the “untreated witness” values between 21.5 – 25.5% apples with attack were registered.

At the final observation, before harvesting (the decade II of September), at the chemically treated variants between 1,3 – 6,3% fruits with attack were noted, as compared with 18.6 -22.3% powerful attacked fruits (1-3 galleries / fruit), at the “untreated witness” variant.

For the great majority of the apple tree breeds that compose the present assortment, an important number of chemical treatments are necessary annually, which inevitably lead to high production costs and to costly technologies.

To these are added the aspects directly connected to the repeated environment - at soil and plant level - pollution, with secondary negative effects also on the agro-bio-cenotic equilibrium of the orchards.

Starting with the economical and ecological considerations, the reconsideration of the phyto-sanitary protection on new - integration and rationalization - criteria is imposed, with the significant diminution of the chemical factor and the development of other, less polluting means and methods.

Tabelul 2

The biological efficiency of some new chemical insecticides in the combat of the species Cydia pomonella L.

VARIANT (PRODUCT)	Conc. %	Year	Generation I-a			Generations II and III		
			Efficiency %					
			Total obs. fruits. trees + the drop	Of which attacked		Total obs. fruits. trees + the drop	Of which attacked	
				Nr.	%		Nr.	%
TRIBON 30 EC		2007	200	4	2,0	300	7	2,3
		2008	200	3	1,5	300	5	1,6
INSEGAR 25 WP		2008	200	2	1,0	300	4	1,3
KARATE ZEON (STD)		2005	200	6	3,0	300	19	6,3
		2006	200	7	3,5	300	17	5,6
CALYPSO 400 EC (STD)		2006	200	5	2,5	300	6	2,0
		2007	200	2	1,0	300	4	1,3
MT. NTR.	-	2007	200	43	21,5	300	56	18,6
		2008	200	51	25,5	300	67	22,3

CONCLUZII

1. The integrated combat supposes the promotion and the extension of biological and biotechnical measures and means, as an alternative with perspective to the present chemical treatment complexes.

2. Among the new microbiological products studied at S.C.D.P. Voinesti in the period 2005-2008, with the best biological efficiency in the attack limitation, the product CARPOVIRUSINE conc. 0.1% (98.7 – 99.0 % attack free fruits) was remarked..

3. At the chemical treated variants, the products INSEGAR 25WP conc.0.03% and TREBON 30 EC conc. 0.03 % proved the best combat action, realizing till 99% healthy fruits.

4. The use of the specific pheromone attractors permits the correct monitoring of the pest population and the establishing of the optimal warning and treatment applying periods.

5. The remake of the tree growing patrimony, where the apple tree represents the priority species, is possible only by promoting in culture of the new genetic disease resistant assortment, which can offer the guarantee for obtaining of qualitative, competitive fruits, with minimal costs and under the conditions of protecting the environment.

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POPULATIONS OF BENEFICIAL AND PEST ARTHROPODS UNDER DIFFERENT CONTROL SYSTEMS IN APPLE ORCHARDS

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KEY WORDS: arthropods, diversity, control systems, apple orchards

ABSTRACT

The comparative study on the beneficial fauna and the pests under two treatment systems (low polluting treatment system and conventional system) in 2 apple orchards was carried out. Three sampling methods were used to catch the arthropods between April–September in 2007 and 2008: beating branches of trees into entomological funnel, yellow sticky traps and pitfall trapping. The beneficial fauna was represented mostly by Heteroptera (Fam. Miridae-Deraeocoris lutescens Sch.), Hymenoptera (Fam. Calcididae and Braconidae) and Coleoptera (Fam. Coccinellidae-Coccinella spp., Adalia bipunctata L., Fam. Carabidae-Bembidion properans L.). The main pests belong at following: Thysanoptera (Fam. Thripidae-Thrips spp.), Homoptera (Fam. Aphididae, Cicadelidae), Coleoptera (Fam. Chrysomelidae- Chaetocnema tibialis Illig.*, Aphthona spp., Nitidulidae-Meligethes aeneus* F.).

INTRODUCTION

A sustainable crop protection strategy attempts to keep the balance between yield losses due to pests and undesirable side effects of control measures. The arthropod communities on apple and the effects of pest control treatments on these populations have been well studied in Europe (Mezaros, Z. et al., 1984; Jenser, G. and al., 1999) and North America (Madsen, H. F. & Madsen, B. J., 1982; Brown, M.W. and W.V. Welker, 1992; Brown, M.W. and J.J. Schmitt, 2001).

In Romania there are also many studies about the biodiversity in apple orchards toward it notes those elaborated in Research-Development Institute for Plant Protection (Margarit Gr., Serboiu Albertina, Hondru N., 1996; Baicu T. and al., 1997; Hondru N., Chireceanu Constantina, 1997, Chireceanu Constantina and Drosu Sonica, 2000; Drosu Sonica, 2000).

The study reported in this paper was undertaken to demonstrate to pest managers/farmers the importance of the improved management of the apple ecosystem using less chemical with input into the environment. The comparative study on the beneficial fauna and the pests under two treatment systems in apple orchards were carried out.

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MATERIAL AND METHODS

The studies were carried out during 2007-2008 in two apple orchards situated in different geographic areas: Baicoi, a hilly setting and Baneasa, near Bucharest (plain area). The orchards had used different treatment systems in previous years: intensive treatments in Baicoi and IPM practice in Baneasa respectively. The experiments were set in two plots (variants): a 0.5 ha plot that underwent a low pollution risk treatment and a 0.5 ha plot that incurred the conventional treatment that the farm used extensively in the entire orchard.

Three sampling methods were used to catch the beneficial and pest arthropods:
(i) beating branches of trees into entomological funnel with a 0.5 sq m opening, twice a month (100 branches) from May to August; (ii) yellow sticky traps installed by 5s in each variant kept for one week each; (iii) the pitfall trapping method used for epigean fauna; 5 traps were installed twice a month and were kept for 5 days in each variant.

The collected material was kept in alcohol at 70% then examined and identified under the binocular and classified in systematic groups.

RESULTS AND DISSCUSIONS

The composition and numerical abundance of the beneficial fauna in the 2 ecosystems (orchards with different treatment record), collected by way of the 3 methods (branch beating, yellow sticky traps and pitfall traps) is presented in tables 1 and 2.

Table 1

The list of the beneficial fauna, Baicoi, 2007

Order/Family	Species	Number individuals			
		Low risk		Standard	
		B	Y	B	Y
ACARINA	*Trombidium holocericeum* L.	**8**		**12**	
ARANEE		**24**	**14**	**30**	**9**
HYMENOPTERA		**38**	**51**	**30**	**68**
Ichneumonidae		4	2	2	4
Chalcididae		12	29	6	37
Braconidae		6	10	4	22
Formicidae		16	10	18	5
COLEOPTERA		**4**	**17**		**28**
Coccinelidae	*Chilocorus bipustulatus* L.		3		5
	Coccinella 7 punctata		3		7
	Halyzia 14 punctata L.		6		10
Cleridae	*Trichodes pavalius* Ill.		3		4
	Necrobia violacea L.		2		2
Scarabeidae	*Cetonia aurata* L.	4			
NEUROPTERA /Chrysopidae	*Chrysoperla carnea* Steph.	**4**	**2**	**2**	
DIPTERA		**42**	**72**	**30**	**85**
TOTAL		**120**	**156**	**104**	**190**

B-fauna collected by beating method; Y-fauna collected by yellow sticky traps

In Baneasa orchard (table 2), a larger range of species (19 listed) belonging to more systematical groups (15 families and 10 orders) is observed than in Baicoi orchard (8 species, 8 families, 6 orders) (table 1). The total catch in the first two methods that used in both orchards was higher in Baneasa (359 at low risk variant and 341 at standard) that in Baicoi (276 and 294 respectively). Intensive pest control and the destruction of the trophic chain in previous years explain the fact that in the Baicoi orchard the catch was smaller than in Baneasa.

Among representative families and species, the following have stood out: Acarina *(Trombidium holocericeum* L.), Lycosidae, Miridae *(Deraeocoris lutescens* Sch.), Chalcididae, when using the branch beating method, Chalcididae, Braconidae, Coccinelidae (*Chilocorus bipustulatus* L., *Coccinella spp*.), when using the yellow sticky methods and Lycosidae, Collembola, Carabidae (*Bembidion properans* L.), Staphylinidae, Anthicidae (*Anthichus hispidus* L.), Diptera, when using the pitfall traps method. The presence of Formicidae family representatives is justified by the presence of aphids, without being direct predators.

Table 2

The list of the beneficial fauna, Baneasa, 2007

Order/Family	Species	Number individuals					
		Low risk			Standard		
		B	Y	P	B	Y	P
ACARINA	*Trombidium holocericeum* L.	**18**			**10**		
ARANEE/Lycosidae		**52**	**9**	**91**	**42**	**5**	**73**
MYRIAPODA				**35**			**17**
COLLEMBOLA				**31**			**28**
DERMAPTERA		**4**		**1**	**2**		
NEUROPTERA/ Chrysopidae	*Chrysoperla carnea* Steph.	**6**		**10**			
HETEROPTERA		**42**		**7**	**57**		**2**
Miridae	*Atractotomus mali* Mey.D	8			7		
	Deraeocoris lutescens Sch.	28			26		
	Zygimus nigriceps Fall.			5			2
Pyrrhocoridae	*Pyrrhochoris apterus* L.			2			
	Scantus aegyptus L.				6		
Coreidae	*Syromastes marginatus* L.				6		
Beritydae	*Metacantus elegans* Curt.	6			12		
HYMENOPTERA		**68**	**58**	**84**	**58**	**45**	**71**
Chalcididae		22	30	2	18	22	5
Braconidae		8	15		6	13	
Formicidae		38	13	82	34	10	66
COLEOPTERA		**20**	**33**	**64**	**19**	**28**	**65**
Coccinelidae	*Chilocorus bipustulatus* L.	8	19		4	10	
	Adalia bipunctata L.	8			9		
	Coccinella 7 punctata		7			12	
Cleridae	*Trichodes ircutensis* Lax.		2			1	
	Trichodes favarius Ill.		3			2	
Cantharidae	*Cantharis annularis* Men.	2	2		6	3	
Carabidae	*Carabus coriaceus* L.			6			3
	Amara aenea Dejean			1			1
	Bembidion properans L.			33			30
Staphylinidae		2		13			12
Anthicidae	*Anthichus hispidus* L.			11			19
DIPTERA		**12**	**37**	**55**	**14**	**61**	**42**
TOTAL		**222**	**137**	**378**	**202**	**139**	**298**

B-fauna collected by beating method; Y-fauna collected by yellow sticky traps; P-fauna collected by pitfall traps

Concerning the seasonal dynamics of the beneficial fauna, those sampled by branch beating method is presented in figure 1. It is highlighted that in the experimental variant (low polluting products) the number of the arthropods sampled increased from May to August; in July was less effective of both experimental and conventional variant because of climatic conditions (high temperature).

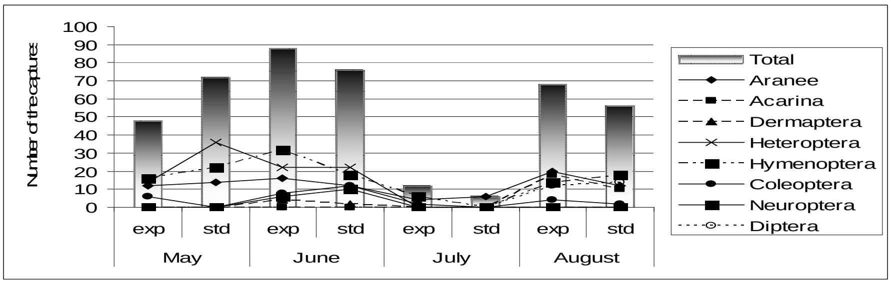

Fig. 1. The seasonal dynamic of the beneficial fauna sampled by branch beating method, Baneasa

The higher abundance and a larger range of species of the beneficial fauna at Baneasa than at Baicoi is explained by the higher population of the pest, the food for the beneficials, maintained by the IPM system in this orchard. The list of the pest fauna collected by branch beating and yellow sticky methods in the two orchards is presented in table 3.

Table 3

The list of the pest fauna, 2007

Order/Family	Species	Number individues			
		Baneasa		Baicoi	
		B	Y	B	Y
ACARINA/Tetranychidae	*Tetranychus viennensis* Zach.				**32**
THYSANOPTERA		**52**	**103**		**52**
Tripidae	*Thrips spp.*	52	78		52
Phlaeothripidae	*Haplothrips niger* Osborn		25		
HOMOPTERA			**82**	**94**	**47**
Aphididae	*Aphis fabae* Scop.		21	90	
			25	4	32
Cicadellidae	*Empoasca solani* Curtis		27		
	Macrosteles laevis Ribaut		3		
Psyllidae	*Psylla mali* Schm.		6		15
HYMENOPTERA Tenthredinidae	*Hoplocampa testudinea* Klug.		**12**		**7**
COLEOPTERA		**116**	**25**	**54**	**64**
Chrysomelidae	*Chaetocnema tibialis* Illig.	10		14	
	Haltica spp.	10		14	
	Aphthona spp.	22		16	
Nitidulidae	*Meligethes aeneus* F.	34	18		30
Latridiidae	*Corticarina gibbossa* Hrbst.	40			
Apionidae	*Apion ervi* Kirbi		3		2
Buprestidae	*Agrilus simatus* Ol.		4		3
Bruchidae	*Spermophagus sericeus* Geoffr.			10	29
LEPIDOPTERA	larve	**14**	**19**		
DIPTERA		**14**	**44**	**26**	**17**
TOTAL		**196**	**285**	**174**	**212**

B-fauna collected by beating method; Y-fauna collected by yellow sticky traps

The table 4 shows that in 2008 the total of catch of the beneficial fauna increased in low risk variant. *Trombidium holocericeum* L., Lycosidae and *Coccinella spp.* were the representative amount of individuals in 2008 comparatively with 2007.

Table 4

The evolution of the beneficial fauna, Baneasa

Order/Family	Representative species	Number individuals			
		Low risk		Standard	
		2007	2008	2007	2008
ACARINA	*Trombidium holocericeum* L.	**18**	**40**	**10**	**28**
ARANEE/Lycosidae		**152**	**186**	**120**	**157**
MYRIAPODA		**35**	**14**	**17**	**7**
COLLEMBOLA		**31**	**50**	**28**	**23**
DERMAPTERA		**5**	**6**	**2**	**1**
NEUROPTERA /Chrysopidae	*Chrysoperla carnea* Steph.	**6**	**10**	**10**	**9**
HETEROPTERA		**49**	**35**	**59**	**23**
Miridae	*Deraeocoris lutescens* Sch.	39	27	35	14
Nabiidae, Beritydae, Coreidae		10	8	24	9
HYMENOPTERA		**210**	**255**	**174**	**118**
Chalcididae		54	52	45	18
Braconidae		23	37	19	19
Formicidae		133	166	110	81
COLEOPTERA		**117**	**326**	**112**	**145**
Coccinelidae	*Chilocorus bipustulatus* L., *Coccinella spp.*	42	249	35	102
Cleridae	*Trichodes spp.*	5	43	3	29
Cantharidae	*Cantharis annularis* Men.	4		9	
Carabidae	*Bembidion properans* L.,	40	34	34	14
Staphylinidae		15		12	
Anthicidae	*Anthichus hispidus* L.	11		19	
DIPTERA		**104**	**98**	**117**	**112**
TOTAL		**737**	**1020**	**639**	**623**

CONCLUSIONS

- The results obtained confirm that the abundance and the range of the entomofauna in apple orchards are influenced by the management of treatments in those eco-systems.
- The total catch was higher in Baneasa orchard (with IPM practice in previous years) than in Baicoi orchard (with intensive treatments).
- The total catch was relatively equal in the two variants (both low risk and conventional treatment) using the beating branches method and yellow sticky traps rather than the pitfall traps, where the total catch was higher comparatively, due to a higher number of epigean fauna.
- From a systematic perspective, the beneficial fauna listed in Baneasa belonged to 19 species in 15 families and 10 orders; at Baicoi 8 species, 8 families and 6 orders were listed.

- Among representative families and species of the entomofauna, the following have stood out: Lycosidae, Acarina *(Trombidium holocericeum* L.), Miridae *(Deraeocoris lutescens* Sch.), Chalcididae, when using the branch beating method, Chalcididae, Braconidae, Coccinelidae (*Chilocorus bipustulatus* L., *Coccinella spp*.), when using the yellow sticky methods and Lycosidae, Collembola, Carabidae (*Bembidion properans* L.), Staphylinidae, Anthicidae (*Anthichus hispidus* L.), Diptera, when using the pitfall method.
- The pests were representad by following: *Thrips spp*, *Haplothrips niger* Osborn, *Aphis fabae* Scop., *Empoasca solani* Curtis, *Chaetocnema tibialis* Illig., *Aphthona spp., Meligethes aeneus* F., *Corticarina gibbossa* Hrbst., Diptera in the samples from Baneasa and *Tetranychidae, Thripidae, Aphididae, Nitidulidae, Bruchidae,* Diptera, in Baicoi orchard.

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BEAUVERIA BASSIANA *(Bals.)Vuill.* CONIDIOGENESIS PROCESS IN STATIONARY CULTIVATION CONDITIONS

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KEY WORDS: Beauveria bassiana, culture media

ABSTRACT

The capacity of entomopathogenic microorganisms Beauveria bassiana to use different nutritional substrates represent one of the factors that influence their effectiveness in biological control of harmful insects. Different B. bassiana isolates vary in their requirements for nutrition, pH, incubation period. In this paper are presented investigations performed on laboratory scale regarding the effect of some parameters during the fungal cultivation period, mainly the influence of carbon and nitrogen source on B. bassiana sporulation. The fungal strains used in experiments are originating in different Romanian habitats.

INTRODUCTION

The entomopathogenic fungi *Beauveria bassiana,* commonly isolated from soil and dead insects (Andrei et al., 1999, 2003) is made up as a mycoinsecticide which has been proposed for the microbial control of insect pests. The success of microbial control programmes depends on a multitude of factors including the pathogen's virulence, host specificity, persistence, an adequate mass-production method.

B. bassiana conidia are the most appropriate propagule for field use, because they are the infectious units showing greater stability under dry conditions and application than hyphae or blastospores (Feng et al., 1994).

Conidia production techniques have been developed overseas; taking into account the fact that strains with different origins respond differently toward media composition and microbiological parameters, this study aimed to evaluate the effect of various factors on conidia yield for some Romanian *B. bassiana* strains.

MATERIALS AND METHODS

Naturally-occuring *B. bassiana* strains have been isolated from dead insects and maintained in sporulated form on agar culture medium (peptone-dextrose-agar), at 4^0C. Two stage technique for production of *B. bassiana* conidiospores is used. The liquid medium used in the first stage of cultivation (the inoculation medium) contains a supply of carbohydrate (for energy) and nitrogen (in the form of KNO_3, an inorganic nitrogen, from wich proteins can be synthesised) wich are essential for growth.

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The submerged culture (inoculum) was inoculated in Erlenmmeyer flasks in sporulation media; the stationary cultivation period was 19-21 days at 26^0C. The initial pH was 5. For conidial counts the Thomas-Bürker hemacytometer is used. The conidial production was assessed in different experimental variants: modified media containing various carbon/nitrogen sources and various pH values, various proportion between the medium quantity and the fungal growth surface, various cultivation period. Conidial viability was determined by plating serial dilution on PDA medium.

RRESULTS AND ISCUSSION

The results regarding the effect of some carbon source on *B.bassiana* conidiogenesis are presented in table 1.

Table 1

B. bassiana conidiogenesis in liquid medium with various carbon sources

Carbon source (1%)	*Beauveria bassiana* strain			
	BbLd 1\90	BbTd 1\90	BbPi 1\90	BbGm 1\90
	Conidia count (x10^9) \ 50 cm			
Molasses	18,88	13,87	27,23	13,98
Starch	17,10	11,73	12,05	20,05
Zaharose	14,43	11,25	16,22	19,64
Glucose	13,28	16,02	17,06	10,58
Fructose	7,95	9,90	17,92	9,28
Maltose	14,9	10,2	15,32	9,27
Arabinose	11,89	11,03	12,07	14,85
Celulose	3,52	11,97	14,26	0,42
Lactose	16,18	13,36	30,42	17,98

Molasses, glucose, fructose and maltose have induced the highest percentage of conidiogenesis in the case of BbPi1\90 strain, corresponding values of 5.46, 3.41, 3.58, 3.06 (x10^8 conidia\cm^2); starch, sucrose, arabinose, cellulose and lactose have induced the highest percentage of conidiogenesis in the case of BbGm 1\90 strain, the corresponding values 4.0, 3.92, 2.97, 2.85, 6.08 respectively (x10^8conidia\cm^2). Increasing the concentration of molasses from 1 to 2% resulted in 1.2-fold increase of biomass amount. Furthermore, the amount of biomass has decreased by 1.2% when the concentration of molasses was 2.5%, respectively with 4%, when the concentration of molasses was 3%. The conidiogenesis process was not significantly affected by the variation of molasses concentration between 1 and 3%, the conidia number being between 20.2 to 21.8 (x10^{10})\150 cm^2. The conidia production for *B. bassiana* strains were similar and were between 12.14 and 18.06 (x10^9\50 cm^2), with maximum 27.23, 30.42 registered at BbPi1\90 strain, when it was used molasses, lactose as a source of carbon. The minimum - 0.42 respectively 3.52 - were registered to BbGm 1\90 strain, respectively BbLd 1\90 strain, in culture medium containing cellulose.

Using the ratio between the maximum and minimum conidia number produced by several strains in culture media containing a specific glucid, as an indicator of *B.bassiana* ability for the effective use of the carbon source, can do the consideration that molasses, starch, sucrose, glucose, fructose, maltose, lactose and arabinose whose ratio varies between 1.3 to 1.9 are carbohydrate effective recovered by *B.bassiana* in the conidiogenesis process. As a consequence, may be considered that any of these carbohydrates can be used as a source of carbon in the composition of culture media and the selection of one or another may be done only on economic criteria.

The cellulose use as carbon source resulted in small conidia production (except BbTd1\90 strain) and value ratio was 35, indicating that *B. bassiana* ability to use cellulose is very different from one strain to another. Therefore the introduction of cellulose in culture media must be preceded by testing the capacity of each *B.bassiana* strain to use it.

Results of experiments on the influence of sources of nitrogen on *B. bassiana* growth and sporulation are presented in Tables 2 and 3.

The experiments for the optimum source of nitrogen selection, using molasses as a source of carbon, have emphasized the fact that, although peptona ensures maximum conidia production, all other five products tested resulted in similar conidia amounts, in the case of soya grist, wheat groats, corn extract, respectively slightly lower conidia amount if yeast extract or flax groat is used (table 2).

Table 2

B. bassiana conidiogenesis in liquid medium with various nitrogen sources

Nitrogen source (0,8%)	Conidia number (x 10^9) \ 50 cm^2 - BbLd 1\95 strain				
	repetitions			Average	
	(I)	(II)	(III)	after 2 experiments	after 3 experiments
peptona	21.62	26.60	24.20	24.11	24.14
soya grist	20.41	24.16	22.46	22.28	22.34
wheat groats	20.12	22.52	13.28	21.32	18.64
corn extract	18.98	22.41	19.32	20.69	20.63
Yeast extract	17.35	21.53	20.56	19.44	15.81
flax groat	15.43	20.74	13.15	18.08	16.44

Table 3

B. bassiana conidiogenesis in medium with different concentrations of nitrogen sources

Nitrogen source	Concentration (%)	Conidia number (x10^9) \ 100 cm^2 - BbD 1\94 strain		
		repetition		
		(I)	(II)	(III)
	0.8	26,01	26,92	26.18
peptone	10	26.29	26.34	25.39
	1.2	22.95	24.15	22.19
	0.8	22.13	22.22	20.23
soya grist	1.0	22.71	22.24	21.84
	1.2	21.94	23.64	22.01
	0.8	22.84	23.15	22.32
corn extract	1.0	24.41	25.50	24.04
	1.2	19.68	19.74	18.93
	0.8	18.34	16.09	19.32
yeast extract	1.0	19.09	21.13	20.47
	1.2	16.02	14.10	14.44
	0.8	17.51	22.09	20.11
flax groat	1.0	21.15	24.80	22.72
	1.2	22.01	25.73	24,92

Data presented in Table 3 demonstrate the fact that the variation of the sources of nitrogen concentration between 0.8 and 1.2% does not induce significant changes in conidia production. The optimum nitrogen source concentration in a medium containing 1.5% molasses is 0.8% in the case of peptona, 1% for corn extract and yeast extract, 1.2% for soya grist and flax groat. Positive effect of vegetable by-products on fungal conidiogenesis can be explained by the high content of essential amino acids. During the period of cultivation takes place not only percentage increase of protein, but also modifying them, thus it becomes accessible for microbial cell. Otherwise, from economic reasons, attention is increasingly targeted to by-products resulted in the food industry; these contain nutrients which, singly or amended with mineral elements, can be used successfully in the composition of culture media for entomopathogens mass production.

The results regarding the initial pH influence of culture media on *B.bassiana* conidiogenesis is presented in Table 4. pH values between 4 and 6.5 have not resulted in significant variations in production conidia increase, the optimum pH being between 5 and 6. The practical importance of this result is that, if using extract corn or soya grist it is not necessary pH correction because initial pH value corresponds with the optimum one.

Table 4

The influence of culture media pH on *B.bassiana* conidiogenesis (BbMm1\95)

pH value	*B. bassiana* conidia number ($x10^9$) \ 50 cm^2		
	repetition		average
	1	11	
4.0	20,16	22.19	22.17
4.5	20.13	23.07	21.60
5.0	27.94	25.89	26.91
5.5	26.16	25.47	25.81
6.0	26.29	25.83	26.06
6.5	26.04	26.34	26.19

CONCLUSIONS

Different fungal strains can utilise in a different way the same carbon, respectively nitrogen source for fungal biomass and conidia production.

Agro-industrial residues - soya grist, corn extract, flax groat –led to product yields similar to those obtained in a fully supplemented medium and can be used to develop cost-effective *B. bassiana* fermentation medium.

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OBSERVATIONS ON THE SELECTIVITY OF SOME INSECTICIDES AGAINST THE INSECTS WHICH PARASITIZE THE *HYPHANTRIA CUNEA* DRURY. PEST

Loredana Beatrice Frăsin[1]

KEY WORDS: Hyphantria cunea Drury., selectivity, insecticides

ABSTRACT

The main limiters of Hyphantria cunea Drury are the following parasites: Drino inconspicua Meig. (Diptera, Tachinidae), Brachymeria intermedia Nees. (Hymenoptera, Chalcididae), Psychophagus omnivorus Walk. (Hymenoptera, Pteromalidae).The highest degree of parasitism had Drino inconspicua Meig.species (29%). In regard to the insecticides selectivity against the useful fauna, the biological product based on Bacillus thuringiensis and the Onevos 35EC – 0.2% product had a high selectivity, the average degree of parasitism being 19%.

INTRODUCTION

The fall webworm - *Hyphantria cunea* Drury is a polyphagous insect with two generations per year (Manolache et al., 1975; Boguleanu, 1968). It attacks over 120 species of trees and arbors (mulberry tree, maple tree, apple tree, pear tree, plum tree etc) shrubs (wild privet, rose etc) and even herbaceous plants (dahlia, corn, sunflower, nettle etc).

During last years, caterpillars produced complete losses of leaves and, as a consequence, trees were destabilised. When the attacks repeat for a few years, trees may dry out (Paşol et al., 2007).

MATERIAL AND METHODS

Research studies were accomplished in the years 2003 - 2006 within the orchards from the experimental fields of the Phitosanitary Unit of Dâmbovita county, Romania where important populations of fall webworm - *Hyphantria cunea* Drury. were found.

9 products from different chemical groups were tested in the control experiments and the frequency of attack was calculated using the formula:

$$F\% = \frac{n}{N} \times 100$$

where:

F = frequency of attack;

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n = number of attacked plants or organs;
N = number of analysed plants or organs.

Treatments application was done on warning. It was used the following formula to establish the efficacy of tested products:

$$E\% = [1 - a_2/(N - M_2)] \times 100$$

where:

E = product efficacy;
a_2 = number of attacked leaves for the untreated control;
N = total number of analysed leaves;
M_2 = number of unattacked leaves for the untreated control.

The control efficacy was estimated by establishing the attacked organs percent, first at the end of each generation and then at the end of vegetation period. 100 attacked leaves were sampled and analysed in order to establish the natural parasitism.

The samples were isolated in separate test tubes and kept into laboratory until their flight to identify the parasites.

The 9 products were tested and compared with the untreated control to observe the selectivity of some insecticides on the useful fauna.

RESULTS AND DISCUSSIONS

Results about the efficacy of insecticides used, between 2004 - 2006, to control the fall webworm - *Hyphantria cunea* Drury are presented in table 1.

As one can see, the best efficacy, of over 90%, during the 3 years of observations had:

- the biological insecticide based on *Bacillus thuringiensis* (0,1%), the DIPEL WP product, with an efficacy between 90.24 and 91.17%;
- the insecticide with DDVP 35% as active ingredient - the ONEVOS 35EC product, wich applied on a concentration of 0.2%, had an efficacy between 92.68 and 94.11%;

The lowest efficacy, of 56.98% in 2004, 43.90% in 2005 and 58.82% in 2006, had the insecticide SUMITHION 50EC with fenitrothion 50% 100g/l as active ingredient.

Results about the parasites identified on the larvae and pupa of *Hyphantria cunea* Drury are presented in table 2.

During the 4 years of observations, as one can see from the data, 29% of larvae were parasited by *Drino inconspicua* Meig. - *Diptera, Tachinidae* (rate of parasitation between 24.20% in 2005 and 33.08% in 2006), 6.82% of pupa by *Brachymeria intermedia* Nees. - *Hymenoptera, Chalcididae* and 2.30% of pupa by *Psychophagus omnivorus* Walk. - *Hymenoptera, Pteromalidae*.

Table 1

Efficacy of some insecticides in *Hyphantria cunea* Drury. control at the Phitosanitary Unit of Dâmbovița county

Nr. crt	Active ingredient	Product	Concentration (%)	Year	Number of analysed organs	Number of attacked organs	Number of attacked organs for the untreated control	Frequency of attack (%)	Efficacy (%)
1.	Triclorfon 80%	Danex 80SP	0.2	2004	100	34	93	34	64.00
				2005	100	21	82	21	75.00
				2006	100	10	34	10	70.58
2.	Cipermetrine 100 g/l	Fastac 10EC-RV	0.015	2004	100	26	93	26	72.04
				2005	100	31	82	31	62.19
				2006	100	9	34	9	73.52
3	Quinalphose 25%	Ecalux 25EC	0.1	2004	100	29	93	29	68.81
				2005	100	20	82	20	75.60
				2006	100	13	34	13	61.76
4.	Dichlorvos 500 g/l	Nogos 500EC	0.15	2004	100	30	93	30	67.74
				2005	100	15	82	15	81.70
				2006	100	15	34	15	55.88
5.	Fenitrothion 50%	Sumithion 50EC	0.1	2004	100	40	93	40	56.98
				2005	100	46	82	46	43.90
				2006	100	14	34	14	58.82
6.	Carbaril 50%	Oltitox 50PU	0.25	2004	100	34	93	34	63.44
				2005	100	38	82	38	53.65
				2006	100	8	34	8	76.00
7.	DDVP 35%	Onevos 35EC	0.2	2004	100	6	93	6	76.34
				2005	100	6	82	6	80.48
				2006	100	2	34	2	82.35
8.	*Bacillus thuringiensis*	Dipel WP	0.1	2004	100	9	93	9	93.54
				2005	100	8	82	8	92.68
				2006	100	3	34	3	94.11
9.	Diflubenzurone 25%	Dimilin 25 WP	0.02	2004	100	22	93	22	90.32
				2005	100	16	82	16	90.24
				2006	100	6	34	6	91.17

Table 2

Results about the identified parasites at *Hyphantria cunea* Drury. larvae and pupae at the Phitosanitary Unit of Dâmbovița county

Year	Total parasitized larvae and pupae (%)				Parasitized larvae with *Drino inconspicua* Meig. (%)				Parasitized pupae with *Brachymeria intermedia* Nees. (%)				Parasitized pupae with *Psychophagus omnivorus* Walk. (%)			
	2003	2004	2005	2006	2003	2004	2005	2006	2003	2004	2005	2006	2003	2004	2005	2006
	31.82	43.71	32.32	44.63	26.32	32.40	24.20	33.08	3.70	8.15	6.30	9.13	1.80	3.16	1.82	2.42
Average	38.12				29				6.82				2.30			

Table 3

Observations on some insecticides selectivity towards the useful fauna

No.	Commercial name of product	Active ingredient	Degree of parasitism [%] in the year:				Average
			2003	2004	2005	2006	
1.	Danex 80SP	Triclorfon 80%	2.76	4.00	3.02	2.74	3.13
2.	Fastac 10EC-RV	Cipermetrine 100 g/l	7.08	5.14	6.22	7.28	6.43
3.	Ecalux 25EC	Quinalphose 25%	3.98	4.15	6.78	3.89	4.70
4.	Nogos 500EC	Dichlorvos 500 g/l	1.19	3.93	2.10	3.30	2.63
5.	Sumithion 50EC	Fenitrothion 50%	3.76	5.75	5.93	6.04	4.87

The parasitism rate varied according to the annual climatic conditions. Thus, the average parasitism rate was of 44.63% in 2005 and just of 31.82% in 2006, the difference being of 12.81%.

For a successful chemical control of the fall webworm - *Hyphantria cunea* Drury, without affecting the natural enemies, 9 insecticide products were tested and the results were compared with those from the untreated control. Thus, from table 3, it results that the highest selectivity towards the entomophagous insects had the biological product DIPEL 25WP, based on *Bacillus thuringiensis*, with an average parasitism rate of 28.35%.

A quite high protection of useful entomofauna presented the ONEVOS 35EC product, based on DDVP 35%. The average parasitism rate, after treatments with this insecticide, was of 19.00% and varied between 16.72% and 23.69%, the rest of the products having values less than 7%.

CONCLUSIONS

Hyphantria cunea Drury. is a pest which produce important damages in the apple trees orchards of Dâmbovița county. During last years, caterpillars produced complete losses of leaves and, as a consequence, trees were destabilised. When the attacks repeat for a few years, trees may dry out (Pașol et al., 2007).

Biological product, based on *Bacillus thuringiensis* and organophosphoric product based on DDVP 35%, had very good results in the fall webworm control, with an efficacy of over 90%. These products and their concentrations were DIPEL WP - 0,1% and ONEVOS 35EC - 0,2%.

The main limiters of *Hyphantria cunea* Drury. populations are the following parasitoids of larvae and pupa:

- *Drino inconspicua* Meig. - *Diptera, Tachinidae;*
- *Brachymeria intermedia* Nees. - *Hymenoptera, Chalcididae;*
- *Psychophagus omnivorus* Walk. - *Hymenoptera, Pteromalidae.*

The parasitism rate varied in different years between 31.82% and 44.63%. The highest parasitism rate had *Drino inconspicua* Meig. species.

Together with the biological product DIPEL WP, which had the highest selectivity (an average of 28.35%), the product ONEVOS 35EC had an average parasitism selectivity of 19%.

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STUDIES ABOUT THE BEHAVIOUR OF SOME APPLE TREES CULTIVARS ON THE LEAF MINER - *PHYLLONORYCTER CORYLIFOLIELLA HB. (GRACILLARIIDAE, LEPIDOPTERA*) ATTACK IN THE CLIMATIC CONDITIONS OF MĂRĂCINENI - ARGEŞ FRUIT-GROWING AREA

Loredana Beatrice Frăsin[1]

KEY WORDS: Phyllonorycter corylifoliella Hb., degree of attack, cultivars

ABSTRACT

Jonathan and Idared apple trees cultivars had resistence on the leaf miner attack, the degree of attack being of 8.55%, and 10.15% (average values). Prima and Pioneer apple trees cultivars were the most affected, with a degree of attack of 6.15% and 51.95%, with 53.60% and 43.30% more than for Jonathan apple trees cultivar.The average density of mines on a leaf is different in terms of cultivar. The lowest measured value was for Jonathan apple trees cultivar, with an average density of mines on a leaf of 0.79 in 2003 and 0.42 in 2004.

INTRODUCTION

The leaf miner - *Phyllonorycter corylifoliella* Hb. is spread all over the european continent, whithout the palearctic area, in North America and Asia. In Romania we find this pest almost all over the country, the areas with highest densities of populations, where damages are significantly larger, being concentrated mainly in the center of the country (Frăsin Loredana, 2005).

MATERIAL AND METHODS

Research studies were accomplished in the years 2003 and 2004 within the orchards from an experimental field of the Research Institute for Fruit Growing - I.C.D.P. Mărăcineni, Argeş, Romania where important populations of leaf miner - *Phyllonorycter corylifoliella* Hb were found.

The frequency of attack and the intensity of attack were the indicators calculated to evaluate the attack, for 10 different apple trees cultivars.

The frequency of attack was calculated using the formula:

$$F\% = \frac{n}{N} \times 100$$

where:

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F = frequency of attack;
n = number of attacked plants or organs;
N = number of analysed plants or organs.

A marking scale with 6 classes was used to estimate the intensity of attack, as follows:

0 - 0 degree of attack;
1 - 1 to 3% degree of attack;
2 - 4 to 10% degree of attack;
3 - 11 to 25% degree of attack;
4 - 26 to 50% degree of attack;
5 - 51 to 75% degree of attack;
6 - 76 to 100% degree of attack.

The intensity of attack was calculated using the following formula:

$$I\% = \frac{\sum (i \times f)}{n}$$

where:

I = intensity of attack;
i = mark or percent of attack;
f = number of attack situations at each mark;
n = total number of attack situations.

The degree of attack was calculated using the following formula:

$$GA\ \% = \frac{F \times I}{100}$$

where:

F = frequency of attack;
I = intensity of attack;

These indicators were calculated for 10 apple trees cultivars in the year 2003.

RESULTS AND DISCUSSIONS

In foreign literature there are vague references about the behaviour of some apple trees cultivars on pests attack (Graf et al., 1992; Gagne şi Baret, 1994) and only one reference about the behaviour of the spotted tentiform leafminer (Nyrop et al., 1990). These last researchers showed that although mines distribution on leaves varies by cultivars, the first generation mines distribution on leaves follow in parallel the eggs distribution for all cultivars.

A larger number of mines were present at cultivars with more leaves on a sprout (Idared cultivar, for example), on leaves 2-4. Eggs were layed on the first three leaves for cultivars with less leaves (Cortland cultivar, for example), as a consequence, the mines followed this distribution.

Table 1

Some apple cultivars' behaviour
on leaf miner's (*Phyllonorycter corylifoliella* Hb.) attack
at I.C.D.P. Mărăcineni - Argeş, in the year 2003

No.	Apple tree cultivar	Frequency of attack [%]	Intensity of attack [%]	Degree of attack [%]	
				Limits	Average
1.	Generos	43.00	39.18	12 - 21	16.85
2.	Idared	28.00	36.25	8 - 12	10.15
3.	Florina	56.00	33.04	15 - 24	18.50
4.	Pionier	90.00	57.61	43 - 61	51.85
5.	Starkrimson	96.00	46.35	39 - 50	44.50
6.	James Grieves	84.00	50.35	38 - 49	42.30
7.	Prima	98.00	63.41	54 - 69	62.15
8.	Golden Delicious	58.00	47.58	23 - 32	27.60
9.	Romus	81.00	42.47	28 - 42	34.40
10.	Jonathan	38.00	22.50	6 - 11	8.55

From the 10 apple trees cultivars within the orchards of the Research Institute for Fruit Growing - I.C.D.P. Mărăcineni, the most resistant on leaf miner - *Phyllonorycter corylifoliella* Hb. attack was Jonathan cultivar with an average degree of attack of 8.55%, as one can see in table 1.

Table 2

Average density of mines per leaf for different apple cultivars
at I.C.D.P. Mărăcineni - Argeş, in the years 2003 and 2004

Apple trees cultivar	Year					
	2003			2004		
	Mines per leaves (average density)	Difference		Mines per leaves (average density)	Difference	
		to Golden Delicious cultivar	to Jonathan cultivar		to Golden Delicious cultivar	to Jonathan cultivar
Golden Delicious	2.25	-	-1.46	1.77	-	-1.35
Jonathan	0.79	+1.46	-	0.42	+1.35	-
Florina	1.07	+1.18	-0.28	0.70	+1.07	-0.28
Generos	1.61	+0.64	-0.82	1.29	+0.48	-0.87

A close degree of attack was noticed to Idared cultivar, the average value being 10.15%. The highest degree of attack was observed to Prima and Pionier cultivars (62.15 and 51.95%), 53.60 and 43.30% more than for Jonathan cultivar.

There are also differences among cultivars as for the average density of mines per leaf. The lowest values were observed to Jonathan apple trees (0.79 mines per leaf in the year 2003 and 0.42 in the year 2004). The highest values were observed to Golden

Delicious apple trees in the year 2003 (2.25 mines per leaf) and to Generos apple trees in the year 2004 (1.29 mines per leaf), as one can see in table 2.

CONCLUSIONS

The leaf miner - *Phyllonorycter corylifoliella* Hb. is one of the pests which produce important damages in apple trees orchards, the areas with the highest densities of populations, where damages are significantly larger, being concentrated mainly in the center of the country (Frăsin Loredana, 2005).

Jonathan and Idared apple trees cultivars have resistence on leaf miner attack, the degree of attack having average values of 8.55%, and 10.15%. Prima and Pioneer apple trees cultivars were the most affected, with a degree of attack of 62.15% and 51.95%, which is 53.60% and 43.30% more than for Jonathan apple trees cultivar.

The average density of mines on a leaf was different in terms of cultivar. The lowest measured value was for Jonathan apple trees cultivar, with an average density of mines on a leaf of 0.79 in 2003 and 0.42 in 2004.

Golden Delicious in the year 2003 and Generos in the year 2004 presented the highest density – the average value being 2.25 for the first and 1.29 for the second one.

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THE EFFICIENCY IN USING THE NEGOTIABLE PERMITS IN ACHIEVING SUSTAINABLE DEVELOPMENT

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KEY WORDS: efficiency, negotiable permits, environment, sustainable development

ABSTRACT

The economy of exhaustible resources is a facinating problem because it mixes economic and ecology matters (Hotteling, 1931) that should be solved through global activities that should be a mix between the public policies with administrating externalities and the public goods. In this context, the Brundland Report (1987) states that the term "sustainable development" is the development that can answer to the present needs of development without compromising the capacity of the future generation to exist, respective to realize a correlation between economic growth and usage of natural resources. Nevertheless the economic analysis of the environment is showing a subevaluation of the usage of the natural resources by refering to their social cost from, at least, three reasons: the property rights are not defined, the existance of externalities and the state intervention through subventions. These problems can be solved, according to the specialits, through a Coase or Pigou approach.

The sustainable development is one of the greatest human ideals, the specialits are trying to accomplish an optimum between economy, ecology and society. Taking into consideration the state investment in order to settle the economic actors comportaments the instruments used can be: for regulation, financial ad economical, social.

The paper is aiming to underline the role of the negotiable permits in achieving the environmental policy objectives by comparison with other instruments in order compare the their results with those of the other used instruments so their use can be justify from an economic point of view.

ECONOMIC INSTRUMENTS FOR THE ENVIRONMENT PROTECTION

In 1920, Pigou was defining the externality like that situation where the decisions of an economic agent will affect directly another economic agent and if the market will not force it to endure the negative effects of his actions the state will intervine with fiscal and budgetary instruments in order to force the economic agent to internalise the negative effects in costs and this will lead to a usage value of the environmental resources equal to it's social value (Solow,1974).

Coase (1960) is stating that the negociation between the polluters can lead to a decrease of the negative effects if the transaction costs are insignificant. Their effort has to

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be carefully thought in the way that each polluter should endure the same marginal cost for deceasing the polluting emissions. This can be obtain by the state intervention through different ways: regulation, pigou taxes, negotiable permits, subventions and others.

In order to use efficiently the economic instruments, there are some conditions to take into account (table no. 1). These conditions are different from one country to another, the analysis putting into light the problems to which the decision makers are confrunted at national and global level in the context of globalisation.

Table 1

Different methods to efficiently use the economic instruments in the environmetal policy

Knowledge	- the way in which the economic activity is affecting the environment; - the way in which the environment is affecting the activity; - the way to formulate and put in practice the environmetal programs
Judicial structure	- the garanty of the existance of the property rights – secure and **executoriu** - atributing the judicial competences for utilizing the economical instruments.
Concurential markets	- the existance of an reasonable number of buyers and sellers ; - the price should be established in accordance with the rarity of the resources.
Administrative capacity	- the capacity to realize and put in practice incitative economic programs; - the capacity to control the reality of the programs; - the capacity to make possible respecting the regulations and the laws;
Practicability of policy	- receptivity regarding the environmetal improvment and protection

STUDY REGARDING THE USAGE OF THE NEGOTIABLE PERMITS AND OF THE ENVIRONMENTAL TAXES IN CORRECTING THE MARKET FAILURES

The theory of the negotiable permits is starting from the ideea of creating a transaction market of these permits in the context of obtaining an efficient coordination and a costs economy that will outrun the normal economy obtained if the taxation system would have been used. Dales (1968) makes the first theoretical reference in the favor of negotiating the property rights between differnt economical agents suggesting the creation of an system of exchangeable rights .

The negotiable permits are responding to an simple principle: fixing a predefine total level of emissions or of the concentration of the emissions in one area. If we intend to improve the environment quality we have to reduce the emission of the polluting substances, the clasic method consisting in fixing a norm for each pollution source representing the pollution rights until a limit date, limit that is fixed and identic for all the sources. In practice this instrument consists in:

- establishing a norm that is identicaly applied to each pollution source following a global objective that will satisfy the polluters;
- if the polluters have the possibility to achieve the objective they will take particular decisions according to the importance so ach of them will determine the quantity of certificates needed.

From a practic point of view there are more options: if the emisson are over the limit of the permits that an agent owns, he will take measures to reduce the emissions, or to buy other permits when other agents have been trying to redece pollution and have an surplus of permits that will be eventualy sold.

For example, if on the market are two economic agents A and B – both pollutiong the environment, annually emitting, each, a 200.000 tons CO_2 and the state is fixing a limit of 195.000 tons of CO_2 as an emission right, each will try to take measures to fit in to the conditions settled by the public authority. At the end of the year they will either buy emission certificates equal to 5.000, each, or will reduce their emissions if the costs for doing so are lower than the ones for buying emission rights.

Table 2

The agents decision between reducing emissions or buying suplementary permits

Public authority	Agent A	Agent B
The price for an emission certificate is 10 euro/ton	The price to reduce the emissions is 5 euro/ton	The price to reduce the emissions is 12 euro/ton
	Will reduce the emissions because if cheaper to reduce than to buy, the cost for reducing is 25.000 euro face to 50.000 euro for buying suplementary emission rights.	The reducing price is (60.000 euro) greater than price to buy emission rights (50.000 euro) and so, the agent will buy.

The efficienty of the negotiable permits market is depending upon the public authority attitude, depending if they are forbiting, tolerating of incouraging pollution (Krupnick, A., Dallas, B & al, 2000).

The economic efficienty of the negotiable permits and of the taxes is, in theory, equivalent if the markets are caracterized through perfect competition and total and instant information. In practice the results are not identic because the market is not perfect there are imperfections and the informational asimetry, the transaction costs and the strategical comportment.

The state intervention in order to correct the environmental externalities will take into account the inflation (that will lead to an actualization of the environmental taxes and of the emission permits, that will be adjusted through the market mechanism – the demand and the offer), the economic growth, the evolution of the mondial economy and the presence of the property rights that can lead to an abuse is there are firms that have all the property rights in their possesion.

Taking in to consideration the redistribution the situation is seen differently from the polluters point of view.

Table 3

Bearing the environmental taxes and permits by the polluters

Environmental taxes	Permits
The polluters are bearing the reduction costs, paying to the state an amount according to the pollution emissions	- if they are sold, the polluters will pay to buy them; - if they are freely distributed, the polluter will not pay anything to the state for pollution, until that level is equal to the level of the permits received from the state.

In order to analized the distributive results of the taxes and permits freely distributed we are proposing the following: two enterprises that are polluting in a perfect market, the external marginal costs will be constant by report with the pollution and the reducing marginal costs of pollution is different, being influenced by the tehnologies used to not pollute.

If there are no reducting marginal costs of the pollution, the emission will reach the level of OK for the first enterprise and level OG for the second one (see figure no.1) and the impact upon the two enterprises and public authority is shown in table no.4

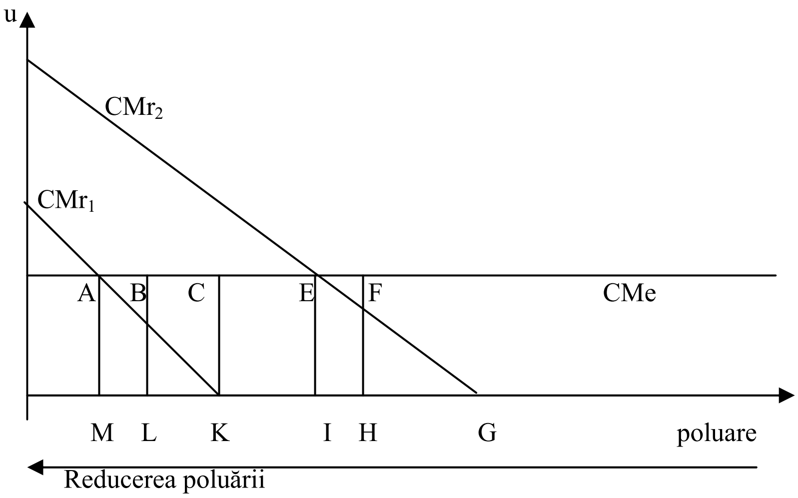

Figure 1. The impact of the negotiable permit upon the polluters and state

Source: Bürgenmeier B, Horayama Y., Wallart, N (1997) Theorie et pratique des taxes environnementales, ED. Economica, Paris

Table 4

Losses and gains in the case of the environmental tax

Public authorities	Agent A	Agent B
It levies an environmental tax equal to OA and realises incashments equal to ABMO + AFHO	Supports the reducing cost of pollution and the tax (it pays the value of ABKO)	Supports the reducing cost of pollution and the tax (it pays the value of AFGO)

If the state will freely distribute the permits and this distribution is done according to the level of the emission from a previos period, the permits will be proportionaly shared. The implications of fact are present in the following table.

Table 5

The implications of the negotiable permits distribution

Puclic authority	Agent A	Agent B
Does not obtain revenues	Wins if the equilibrium price of the permits is higher than the reducing marginal cost of the pollution	Losses from the reduction of the pollution – the loss will be equal to EFGI

In the case of th pollution permits freely distributed who ever pollute more will endure penalties – individual fines and in the case of taxes, each polluter will pay according to the personal emissions.

The state intervention in order to correct "the market failure" and the environmental externalities has to take into account the economic environment incertitude and the economic growth. These should have as effect an actualization of the level of the environmental taxes because the adjustment of the negotiable permits is done by the market through demand and supply.

The pollution permits are the solution for the climat changes and of the green house gases. Admistrating this problem at global level it is done through international cooperations in diverse conventions. Thus, during the Kyoto Protocol was established that the most efficient way to reduce the green house gases is through the negotiable permits, the European Union states have commited themselves to reduce the green house gases emission with 8% by report to the year 1990, during 2008-2012. The failure to include the cost of the climatic changes in the market prices will produce high economic and social costs that, according to the Stern Report can reach between 5 and up to 20% from the global gross domestic product, being supported mostely by the poor countries unable to adapt themselves. Until 2030 is it anticipated that the global gross domestic product will be almost duble face to the one of 2005, but the increase in the goss domestic product of the polluter will be higher from the states in course of developing than from the develop states. The investments in an economy with a low carbon level will solicit almost 0,5% from the global gross domestic product in the period 2013-2030. This will reduce the global gross domestic product increase with only 0,19% until 2030, a fraction from the total increasing rate estimated at 2,8%.The Kyoto Protocol has introduced a novelty: carbon credits for recompensating the investments realized in ecologic projects abrod.

Other studies (simulations with PACE model) show that the decreasing objective with 20% of the green house emissions, at the European Union level according to the international agreements without taking into consideration the impact upon the greatest sectors energy consumers, could lead to an increase of the emission above the normal level, in other regions of the world. This increase could by equal to 2,5% from the E.U. – 27 emissions and would have as result reducing the general effects fo the environmetal policies if there was not the possibility to accede credits based upon projects.

CONCLUSIONS

Realizing the negotiable permits market is influencing the states options because it is determining them to impose constrictions in order to reduce and limit pollution. The states that are buying negociable permits can establish restrictive measures while the states that are selling the permits, usually the developing countries, will have the possobility to relax their pollution limits. This sytem will influence the cooperation relationships between countries in the fight against reducing the trans-border externalities and will finaly lead to an optimum between the economic efficienty and environment. The states option to use the environmental taxes will influence the objectives that each one of them is aiming at – reduce or eliminate the emissions, volume of the state revenues or a combination between them.

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CONSUMPTION OF VEGETABLES IN ROMANIA

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KEY WORDS: vegetables, consumption

ABSTRACT

The present paper presents a detailed analyse of the consumption of vegetables, in Romania. The consumption is analysed in time, for different species of vegetables and for different categories of households.

The results show that the consumption of vegetables increased in the last years. It is higher than the level of consumption recommended by the World Health Organisation and than the average of the European Union level. Romania is one of the larger consumers of vegetables among European Union countries.

Another conclusion is that differences result between the quantities purchased, which are lower, and the quantities effectively consumed, which are higher, meaning that not all the amount of vegetables is ensured from the market, but by self production in family farms.

INTRODUCTION

Vegetables and fruits account for an important place in people food consumption, because they ensure the needed vitamins and minerals of the daily diet. The recommendation of World Health Organisation[3] is 400 g of vegetables and fruits per day, per person, meaning 150 kg per year.

In the present paper the consumption of vegetables in Romania is detailed analysed in time, for different species of vegetables and for different categories of households.

The sources of domestic data were the reports of the National Institute of Statistics of Romania, and the sources of data referring to the European Union come from the data base of Food and Agricultural Organisation.

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[3] Fruit and Vegetable promotion initiative, A meeting Report, 25-27. 08.2003, World Health Organisation

MATERIAL AND METHODS

The specialists[4] recommend a rational consumption of vegetables along the whole year, with a minimum level of 130 kg and a maximum level of 185 kilograms per person per year. The structure of physiological consumption is presented in Table 1.

Table 1

The structure of normal physiological consumption of vegetables

- Kg/person/year -

Specification	Quantity	
	Minimum	Maximum
Tomatoes	35	60
Cabbage and cauliflower	25	30
Onion and garlic	20	25
Cucumbers	10	15
Pepper	8	10
Aubergine	5	10
Roots	10	15
Beans	5	10
Herbs	6	10
Other vegetables	6	10
Total consumption	130	185

Source: Mănescu, B., Ştefan, Marcela, Îndrumar de tehnologie horticolă, Academy of Economic Studies Publishing House, Bucharest, 1998

Table 2

The average yearly consumption of vegetables and processed vegetables, in Romania, 2005- 2006

- Kg/person/year -

Specification	2005	2006
Total vegetables, of which:	81.228	83.844
Cabbage and cauliflower	7.812	8.568
Tomatoes	9.9	12.084
Peppers	3.432	4.344
Green beans	2.064	1.824
Carrots and other roots	7.92	7.932
Onion	9.972	9.768
Tomatoes processed	3.648	3.36
Processed vegetables – canes	2.1	2.016

Source: calculation based on data from « Coordonate ale nivelului de trai în România. Veniturile şi consumul populaţiei în anul 2006 », National Institute of Statistics, 2007

[4] Mănescu, B., Ştefan, Marcela, *Îndrumar de tehnologie horticolă*, Academy of Economic Studies Publishing House, Bucharest, 1998

Table 3

Purchased quantities of fresh and processed vegetables, by professional statute, in 2006
- Kg/year/person -

Specification	Total	Employees	Farmers	Unemployed	Pen-sioners	Company owners
Total vegetables	51.48	58.38	29.00	39.16	54.62	40.88
Cabbage and cauliflower	11.98	11.54	10.78	8.05	13.95	10.36
Tomatoes	9.70	11.53	4.63	6.63	10.22	8.32
Peppers	4.70	5.54	2.68	3.91	4.75	3.32
Green beans	0.74	0.94	0.10	0.43	0.81	0.54
Carrots and other roots	4.23	5.31	0.93	3.04	4.44	2.89
Onion	5.18	5.79	2.54	4.8	5.60	3.94
Tomatoes processed	1.2	1.27	0.88	1.18	1.24	1.02
Processed vegetables – canes	0.52	0.68	0.13	0.44	0.51	0.40

Source: calculation based on data from «Coordonate ale nivelului de trai în România. Veniturile şi consumul populaţiei în anul 2006», National Institute of Statistics, 2007

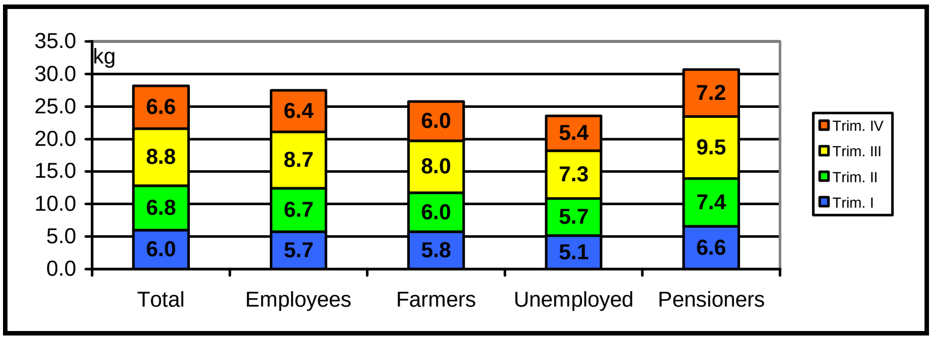

Figure 1. Monthly consumption by different categories of households (Kg/month/person)
Source: Veniturile şi consumul populaţiei în anul 2007, National Institute of Statistics, 2008

Compared to the consumption of vegetables, the purchasing of these products is lower. In 2007, the quantity of fresh and processed vegetables purchased is 18.3 kg. The quantity consumed effectively is 28.2 kg, meaning that the difference of 9.9 kg is not acquired on the market, but on different sources coming from self production or family and relatives' supplying.

Self consumption may account for 75% in family farms. Previous research[5] undertaken around Bucharest area shows that a family may ensure the consumption of vegetables from self production on an area cultivated with vegetables of 2500 mp.

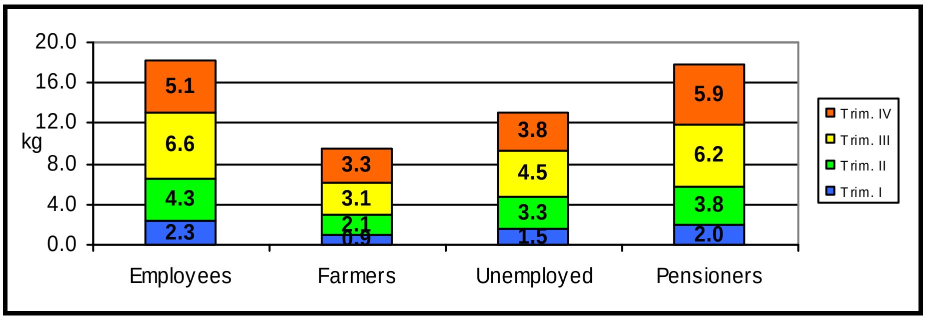

Figure 2. Purchased quantities of fresh and processed vegetables, by categories of households (Kg/month/person)
Source: Veniturile şi consumul populației în anul 2007, National Institute of Statistics, 2008

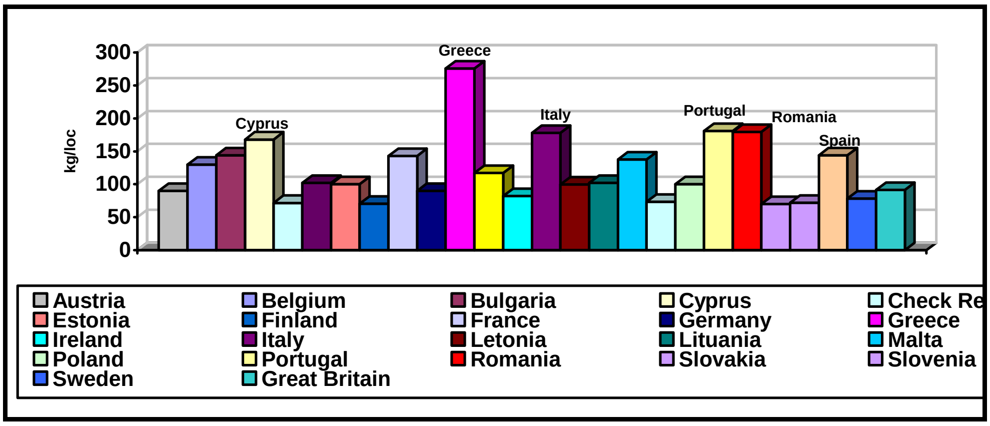

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Figure 3. Consumption of vegetables per person, in EU, in 2006 (kg/person)
Source: Food and Agriculture Organisation

RESULTS AND DISCUSSIONS

Analysing the data from Tables 1 and 2, differences between recommended level and real level of consumption may be identified. The consumption of vegetables is below the recommended one. In 2006, the consumption of tomatoes was only 12 kg/person/year, compared to the minimum level of 35 kg/person/year. The consumption of cabbage and cauliflower was 8.5 kg/person/year, compared to the minimum level of 25 kg/person/year.

[5] Preda, Iuliana, Proiectarea structurii de productie in exploatatiile agricole din zona de aprovizionare a capitalei, PhD thesis, Academy of Economic Studies, Bucharest, 2002

The consumption of pepper was half of the recommended one – 4.3 kg/person/year faced to 8 kg/person/year. The consumption of carrots and other roots was 7.9 kg/person/year closed to the minimum level of 10 kg/person/year. In 2006, the consumption of vegetables was 83 kg/person/year, higher compared to the level of 81 kg/person/year in 2005. Analysing the structure of consumption, the most consumed vegetables are: tomatoes, onion, cabbage and cauliflower, carrots and other roots.

The consumption of vegetables may be analysed by type of product, drawing conclusions of which are the directions of future development of the sector. The quantities of vegetables purchased in 2006, per year, per person, are: 51 kg of total vegetables, 11.9 kg of cabbage and cauliflower, 9.7 kg of tomatoes, 5.18 kg of onion, 4.7 kg of peppers, 4.23 kg of carrots and other roots etc (Table 3).

The average purchased quantity of cabbage and cauliflower is 11.98 kg/year/person. It has high levels for pensioners – 13.95 kg – and employees – 11.54 kg. The average purchased quantity of tomatoes is 9.7 kg. It has high levels for employees – 11.53 kg and pensioners – 10.22 kg. The average purchased quantity of peppers is 4.7. It has high levels for employees – 5.54 kg – and pensioners – 4.75 kg. The average purchased quantity of green beans is 0.74 kg. It has higher levels for employees and pensioners: 0.94 kg and 0.81 kg and lower levels for farmers – 0.1 kg.

The average purchased quantity of carrots and other roots is 4.23 kg. It has higher level for employees – 5.31 kg – and lower level for farmers – 0.93 kg. The average purchased quantity of onion is 5.18 kg. It has higher level for employees and pensioners and lower level for farmers. The average purchased quantity of vegetables' canes is 1.2 kg for processed tomatoes and 0.52 kg for processed vegetables. It has higher levels for employees and pensioners and lower for unemployed, company owners and farmers.

The level of consumption may vary depending on profession. It is higher for those persons who have well paid jobs and higher income (Figure 1). The pensioners consume the most – 30.7 kg/person/month and the unemployed persons consume the least – 23.5 kg. Vegetables are consumed mostly in the 3rd trimester of the year. The total consumption of vegetables per month is 28.2 kg.

Analysing the consumption of vegetables in European Union countries (Figure 3), the conclusion that may be drawn is that the average consumption of vegetables in European Union is 125 kg per person per year. It varies between 275.7 kg in Greece and 70 kg in Slovakia. High levels of consumption of vegetables are in Greece, Italy, Cyprus, Portugal, Romania and Spain. Low levels of consumption of vegetables are in Check Republic, Finland, the Netherlands, Slovakia, Slovenia and Sweden. Romania is one of the larger consumers of vegetables among European Union countries.

CONCLUSIONS

The results show that the consumption of vegetables increased in the last years. It is higher than the level of consumption recommended by the World Health Organisation and than the average of the European Union level. Romania is one of the larger consumers of vegetables among European Union countries.

Another conclusion is that differences result between the quantities purchased, which are lower, and the quantities effectively consumed, which are higher. The gaps are even larger in the case of farmers. The explanation is that not all the amount of vegetables is ensured from the market, but by self production in family farms, in the case of farmers and by relatives from country side, in the case of other professional categories.

Employees, pensioners and unemployed people buy larger quantities of vegetables than farmers and company owners. The first reason is that farmers produce part of the products in their own farms. The second reason is that company owners, who have higher income, have a pattern of consumption based on products with high added value – meat and meat products, dairies, etc. and less on products with lower prices, like vegetables.

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THE ESTIMATION OF VEGETABLES' EFFICIENCY. CASE STUDY OF A FARM OF ILFOV AREA

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KEY WORDS: vegetables, efficiency

ABSTRACT

The present paper presents a case study of a farmer who owns 2.6 hectares of arable land in the area closed to Bucharest. The land is cultivated with different vegetables, for which economical performance is calculated.

The results show that the vegetables crops are efficient from the economical point of view, because the rates of profit have values between 8% and 50%. Tomatoes, pepper, salad, cauliflower and cabbage are the most efficient vegetables. The crops cultivated in green houses are more efficient than those cultivated in open field.

INTRODUCTION

Vegetables' sector has a special place in agricultural system, because these products are important in people food consumption. They are the source of vitamins and minerals.

In this paper it is calculated the efficiency of vegetables rose by a farmer from the village Nuci, district Ilfov. The results are compared to the data provided by the National Institute of Statistics of Romania in those regarding the yields for vegetables.

MATERIAL AND METHODS

The present case of study refers to a farmer who produces vegetables in the village Nuci, district Ilfov. He owns 2.6 hectares of arable land, cultivated with different vegetables, as seen in Table 1.

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Table 1

Crops' structure in the period 2005-2007

Specification	2005		2006		2007	
	ha	%	ha	%	ha	%
Total vegetables		1.62		2.57		1.98
Total crops in green-houses:	0.42	100	0.42	100	0.33	100
Tomatoes	0.06	14	0.06	14	0.06	18
Peppers	0.15	36	0.15	36	0.15	46
Salad	0.21	50	0.21	50	0.12	36
Total crops in open field:	1.2	100	2.15	100	1.65	100
Cabbage	0	0.0	0.15	7.0	0.35	21.2
Pumpkins	0.2	16.7	0.2	9.3	0.3	18.2
Melons	0.3	25.0	0.2	9.3	0.3	18.2
Water melons	0.3	25.0	0.8	37.2	0.7	42.4
Cauliflower	0.4	33.3	0.6	27.9	0	0
Red cabbage	0	0.0	0.2	9.3	0	0

The total and average productions of vegetables are presented in Table 2, for the period 2005-2007. The average productions of tomatoes, peppers and pumpkins decreased in 2007. The average productions of salad, cabbage and melons remain still. In maintaining the same areas cultivated, the total productions of tomatoes, peppers and water melons decreased, and the productions of cabbage, pumpkins and melons increased.

Table 2

The average and total production of vegetables in the period 2005-2007

Specification	2005		2006		2007	
	Kg/ha	tonnes	Kg/ha	tonnes	Kg/ha	tonnes
Tomatoes in green houses	100000	6	110000	6.6	90000	5.4
Pepper in green houses	146000	21.9	146000	21.9	120000	18
Salad in green houses (wires)	100000	21000	100000	21000	100000	12000
Cabbage	-	-	70000	10.5	70000	24.5
Pumpkins	50000	10	50000	10	40000	12
Melons	50000	15	40000	8	50000	15
Water melons	50000	15	60000	48	50000	35
Cauliflower	30000	12	33000	19.8	-	-
Red cabbage	-	-	65000	13	-	-

The main costs of producing vegetables are those referred to input acquisition out of the farm. In 2007, the levels of these costs, by species of vegetables, are presented in Table 3.

Table 3

Costs of inputs acquired out of the farm

Specification	Quantity (kg, litre, wire)	Price per unit (lei/kg, litre, wire)	Value (lei)
Chemicals (kg)	600	3	1800
Gas&diesel (l)	198	3.7	732.6
Seeds (wires), of which:	-	-	7720
- Tomatoes	4000	0.2	800
- Pepper	14000	0.19	2660
- Salad	12000	0.05	600
- Cabbage	20000	0.03	600
- Pumpkins	3500	0.2	700
- Water melons	7000	0.2	1400
- Melons	2400	0.4	960
Total costs of inputs	-	-	10252.6

Other resources needed for obtaining the output consist in different machineries and utilities, and labour. There are two persons hired permanently and one daily worker.

The income, the quantities of products sold and the prices per unit are presented in Table 4.

Table 4

The quantities of products sold, the prices per unit and income, 2005-2007

Specification	2005			2006			2007		
	kg	price/kg	value	Kg	price/kg	value	Kg	price/kg	Value
Tomatoes – green houses	6000	1	6000	6600	1	6600	5400	1.2	6480
Pepper – green houses	22000	1.2	26400	22000	1	22000	18000	1.3	23400
Salad – green houses	20000*	0.5**	10000	20000*	0.5**	10000	12000*	0.4**	4800
Cabbage	-	-	-	10000	0.2	2000	23000	1	23000
Pumpkins	10000	1	10000	10000	1	10000	12000	1.2	14400
Melons	15000	1.2	18000	8000	1.5	12000	15000	1.2	18000
Water melons	15000	0.3	4500	48000	0.4	19200	35000	0.5	17500
Cauliflower	12000	1	12000	20000	1	20000	-	-	-
Red cabbage	-	-	-	13000	0.6	7800	-	-	-
Total income after selling the output	**-**	**-**	**86900**	**-**	**-**	**109600**	**-**	**-**	**107580**

* wire

** lei/wire

RESULTS AND DISCUSSION

From the total area of 1.98 ha cultivated in 2007, 0.33 ha are cultivated with tomatoes, pepper and salad in green houses and 1.65 ha are cultivated in field. The largest areas are cultivated with water melons and cabbage, in the same year. The farmer renounced to cauliflower and red cabbage in 2007, and the area with salad reduced from 0.21 ha in 2005 to 0.12 ha in 2007 (Table 1).

The expenses with acquiring seed account for 75% of the total costs with inputs. It can be notice the high price for seeds of melons (0.4 lei/wire), tomatoes (0.2 lei/wire), pumpkins (0.2 lei/wire), water melons (0.2 lei/wire) – Table 3.

The income gained by selling the merchandise increased in 2006 compared to 2005 from 86900 lei to 109600 lei, because the price for melons and water melons increased, the production of water melons and cauliflower increased and also because of introducing cabbage and red cabbage in the structure of production. In 2007, the income decreased to 107580 lei, because of reducing the prices for salad and melons and of reducing the production of tomatoes, pepper, salad and water melons. It can be noticed that when the production is low, the prices are high. For instance, in 2007, the production of tomatoes was 5400 kg (the yield was 90 t/ha), compared to 6600 kg in 2006 (the yield was 110 t/ha). But the price was 1.2 lei in 2007, compared to 1 leu in 2006. The explanation is that the price establishes freely on the market, as a result of demand and supply. When the demand is high and the supply is low, the price is high. When the demand is low and the supply is high, the price is low.

Synthesizing the data regarding the costs and prices, the efficiency of producing vegetables may be measured (Table 5). All products are efficient, except water melons in 2005 and cabbage in 2006. The efficiency increased in 2007 for cabbage, pumpkins and decreased for the other products: pepper, salad, melons and water melons. Still, the levels of profit are high, in some cases the rate of profit is almost 50%, for example for tomatoes.

Table 5

The evolution of costs, prices and profits for sold output of vegetables

Specification	Unit	2005	2006	2007
Tomatoes – green houses				
- quantity sold	Tonnes	6	6.6	5.4
- cost per tonne	Lei/tonne	500	500	600
- price per tonne	Lei/tonne	1000	1000	1200
- profit or loss	Lei/tonne	500	500	600
- rate of profit	%	50	50	50
Pepper – green houses				
- quantity sold	Tonnes	22	22	18
- cost per tonne	Lei/tonne	600	600	1000
- price per tonne	Lei/tonne	1200	1000	1300
- profit or loss	Lei/tonne	600	400	300
- rate of profit	%	50	40	23
Salad – green houses				
- quantity sold	Thou. pieces	20	20	12
- cost per tonne	Lei/piece	300	300	300
- price per tonne	Lei/piece	500	500	400

- profit or loss	Lei/piece	200	200	100
- rate of profit	%	40	40	33
Cabbage				
- quantity sold	Tonnes	-	10	23
- cost per tonne	Lei/tonne	-	200	400
- price per tonne	Lei/tonne	-	200	1000
- profit or loss	Lei/tonne	-	0	600
- rate of profit	%	-	0	60
Pumpkins				
- quantity sold	Tonnes	10	10	12
- cost per tonne	Lei/tonne	800	800	900
- price per tonne	Lei/tonne	1000	1000	1200
- profit or loss	Lei/tonne	200	200	300
- rate of profit	%	20	20	25
Melons				
- quantity sold	Tonnes	15	8	15
- cost per tonne	Lei/tonne	1000	1100	1100
- price per tonne	Lei/tonne	1200	1500	1200
- profit or loss	Lei/tonne	200	400	100
- rate of profit	%	16	26	8
Water melons				
- quantity sold	Tonnes	15	48	35
- cost per tonne	Lei/tonne	300	300	400
- price per tonne	Lei/tonne	300	400	500
- profit or loss	Lei/tonne	0	100	100
- rate of profit	%	0	25	20
Cauliflower				
- quantity sold	Tonnes	12	20	-
- cost per tonne	Lei/tonne	600	500	-
- price per tonne	Lei/tonne	1000	1000	-
- profit or loss	Lei/tonne	400	500	-
- rate of profit	%	40	50	-
Red cabbage				
- quantity sold	Tonnes	-	13	-
- cost per tonne	Lei/tonne	-	400	-
- price per tonne	Lei/tonne	-	600	-
- profit or loss	Lei/tonne	-	200	-
- rate of profit	%	-	33	-

CONCLUSIONS

The farmer practices a complex structure of production, cultivating different species of vegetables: tomatoes, pepper, salad, cabbage, melons, water melons, cauliflower and red cabbage.

The yields obtained in green houses are higher than the average yield obtained usually for vegetables in open field. Cabbage, melons and cauliflower cultivated in open field have high yields as well, compared to the average yields for vegetables in Romania.

For example, the average yield for cabbage in 2006 was 24.2 t/ha[5], compared to 70 t/ha obtained by the farmer. The average yield for melons in 2006 was 18.5 t/ha, compared to 40-60 t/ha obtained by the farmer.

Analysing the data provided by the farmer and the calculations made for estimating the efficiency, it can be noticed that the efficiency of vegetables is higher for vegetables cultivated in protected areas: tomatoes – 50%, pepper – 23-50%, and salad – 33-40%, than the efficiency of vegetables cultivated in open field, which have the rate of profit between 8% and 26%, except cauliflower that has the rate of profit 50%. The reason is that the vegetables obtained early in the spring and late in the fall in green houses have higher prices because the supply is lower than the demand on the market. They enable gaining larger amount of money than in the season.

Among the vegetables cultivated in open field, cabbage, cauliflower and red cabbage have the highest efficiency: 60% in 2007, 40% in 2005, and 33% in 2006 respectively.

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ENVIRONMENTAL RISKS EVALUATION ON MICROECONOMIC LEVEL

Trică Carmen Lenuta, Negrei Costel, Vuță Mariana[1]

KEY WORDS: Environmental risk, pollution environmental, quantification, degradation process, environmental management

ABSTRACT

The environmental pollution, through it implications on quality life, becomes a global phenomena witch require a special attention from decision factors (managers, business man). Moreover, we must understand that any adjoumnet of our implication will deepen the environmental degradation process, thus the sustainable development principle to becomes a simple syntagm.

The decrees pollution effects on environmental maybe made through applied a performant management of environmental risks for any level, in this paper to microeconomic level. The paper regarding implementation of a complex system used methods and tehnics in social-economic domain from environmental risk quantification.

ASSESSMENT OF ENVIRONMENTAL RISKS AT MACROECONOMIC LEVEL

The issue of environmental pollution due to its nature and effects on the quality of life proves to be a priority for the political, economic and social decision-makers.

Environmental risk management facilitates a systematic and disciplined approach of the environmental decision-making process. The value and the strength of the management approach of risks stand in the fact that it combines various assessment and consultation techniques to render more consistent the decision-making process at macroeconomic level.

Environmental risk management represents a tool aimed at feeding-in reliable information to be used for preventing occurrence of certain events with detrimental consequences on the natural capital, thus leading to an overall improvement of the activity.

In the course of undertaking the set of maintenance processes and operations necessary, certain events with detrimental consequences on the natural capital are likely to occur. For example, the management of the risks generated by the maintenance of technological equipments is aimed at identification of the environmental issues, assessment of the risks and proposal of an action plan for controlling any potential risks.

Risk assessment and prioritization require first a quantification of the risks. The simplest way to quantify risks is by using the following system

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Table 1

Likelihood and impact scale

Impact	Impact level	Likelihood	Value of likelihood	Risk level	Risk scale
Insignificant	1	Insignificant	1	Insignificant	1
Low	2	Low	2	Low	1<R<4
Medium	3	Medium	3	Medium	4>R<9
High	4	High	4	High	9<R<16
Very high	5	Very high	5	Very high	16<R<25

The easiest risk quantification method is the one of the expected values (EV), that requires determination of the product of multiplying the likelihood that certain events would occur and their impact

EV(a) = L(a) X I(a)

where

EV(a) = expected value of the event (a)

L(a) = likelihood that a certain event (a) would occur

I (a) = impact of such event (a) occurring

Figure no. 1, considering the normal distribution in time of the losses due to occurrence of undesired events, presents the action of the risk management towards loss mitigation.

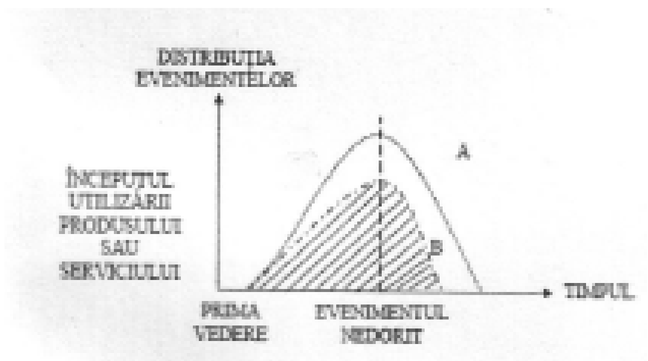

Figure 1. Effects of risk management

In case of an undesired event whose occurrence was not forecasted, the losses thus resulting have a normal distribution (curve A), while the losses controlled by the risk management are significantly reduced (curve B), both in the prospective period (before occurrence) and especially in the reactive period (after occurrence).

This could be due to a knowledge action and to the reaction to the event, as per the model presented in figure no. 2, that, on one hand, anticipates the negative effects of such an event occurring, and, on the other hand, mitigates in a prompt and professional manner its consequences.

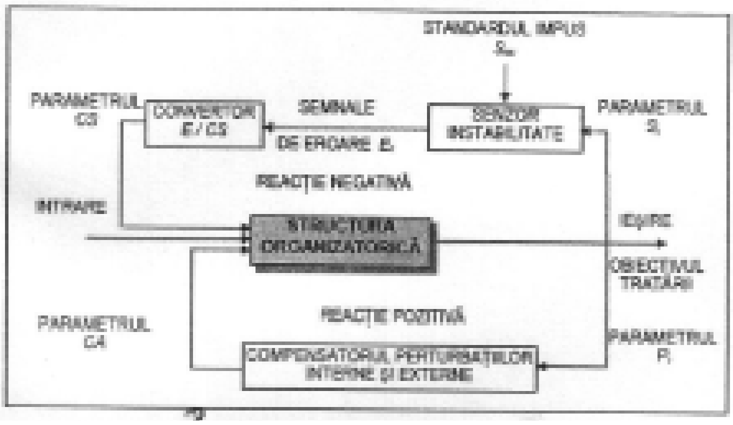

Figure 2. Cybernetic model of risk management

The size of the losses depends on the negative reaction, whereas post-event mitigation is rather dependant on the speed of the compensatory actions taken, that is to say, on the efficiency of the positive reaction.

Based on the cost-quality ration, compensatory strategies are being developed whose effectiveness is inverse proportional with the area of the losses (the shaded area).

In terms of costs (Figure no. 3) we notice: the costs incurred due to uncontrolled occurrence of the undesired event (curve A) are smaller before occurrence and grow exponentially after occurrence; the costs due to implementing the risk management (curve B), are higher in the fist period of implementation (investment costs) and remain almost flat after implementation (operation and maintenance costs) and the costs due to occurrence of the undesired event when risk management is put in place (curve C) that do not grow too much once the undesired event has occurred (such an increase is controlled by the management efficiency).

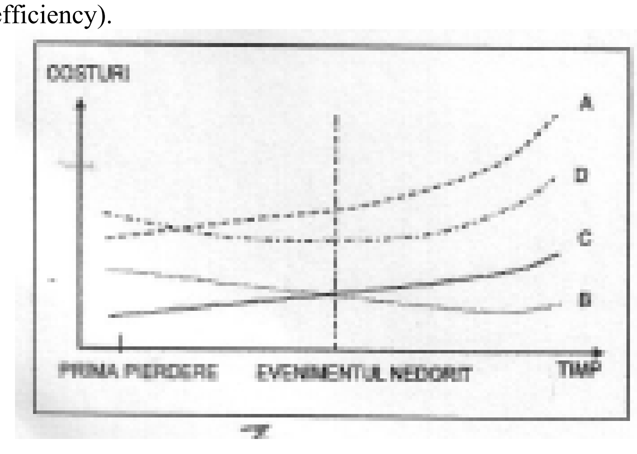

Figure 3. Cost distribution

Although the curves in the figure are qualitative, we notice that should no risk management be implemented, the cost required to compensate for the losses are exceeding by far the costs of implementing and operating risk management (curve D).

Although the first advantage of the risk management remains the additional opportunity it brings-about to the general management in the proximity of the moment when the undesired event occurs, both in terms of reducing and eliminating the human errors, and of preventing any potential system breakdown.

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THE ROLE OF THE PERENNIAL PLANTS CONCERNING THE PROTECTION OF THE PLACES AFFECTED BY THE ASH RESULTED FROM THE POWER STATIONS

C. Cotigă, L. Olaru[1]

KEY WORDS: ash, layer, thermo-electric

SUMMARY

The thermo-electric power station from Oltenia produces altogether approximately six million tones of ash every year. If these were to be spread across the whole surface of the district Dolj, a five-centimeter-layer of ash would form.

The ash resulted from the combustion of the lignite is transported through metallic pipes above the surface of the earth in the special tanks where.

MATERIAL AND METHOD

The experiments are located at the Experimental Field Işalniţa Craiova. Because of their morpho-biologycal characteristics, perennial plants have the ability of fixing the ash.

RESULTS AND DISCUSSIONS

Considering the effect of the sow mixture *Medicago sativa* and *Lolium multiflorum* on the obtained production (table 1) we can say that the ratio *Medicago sativa* 80% + *Lolium multiflorum* 20% is the optimal quantitative solution offering as well the highest level of covering the layer.

[1] University of Craiova, Faculty of Agriculture

Table 1

The effect of the sow mixture ratio of *Medicago sativa* and *Lolium multiflorum* on the obtained production

The sow ratio (%)		The production of dry substance			Average	Relative production %	Differences	Meanings
Medicago sativa	*Lolium multiflorum*	1-st year	2-nd year	3-rd year				
100	-	10,9	12,4	10,3	11,2	100	Mt.	-
80	20	12,8	14,5	10,6	12,6	113	1,4	*
60	40	11,6	12,4	10,3	11,4	108	0,2	-
40	60	9,8	10,7	8,9	9,8	88	-1,4	0
20	80	9,4	10,6	8,4	9,5	85	-1,7	0

DL 5% 0,7 t/ha d.s.
DL 1% 1,8 t/ha d.s.
DL 0,1% 2,4 t/ha d.s.

Analyzing the results obtained and presented in table number 2, we can say that, depending of the time to put on practice ammonium nitrate the crop oscillated from 6,6 t/ha dry substance in 50% variant to sowing 50% spring to 9,3 t/ha dry substance in 100% variant in spring.

Table 2

The effect time to put on practice ammonium nitrate on *Lolium multiflorum* production

Variants	Production of d.s. t/ha	%	Diff.	Signification
50% to sowing + 50% early spring	6,8	100	Mt	-
33% to sowing + 67% early spring	8,5	125	1,7	*
100% early spring	9,3	137	2,5	**

DL 5% 1,3 t/ha d.s.
1% 2,4 t/ha d.s.
0,1% 3,2 t/ha d.s.

Table 3

The effect of the sow mixture ratio of *Medicago sativa* and *Dactylis glomerata* on the obtained production

The sow ratio (%)		The production of dry substance			Average	Relative production %	Differences	Meanings
Medicago sativa	*Dactylis glomerata*	1-st year	2-nd year	3-rd year				
100	-	10,6	12,3	9,4	10,8	100	Mt.	-
80	20	12,1	15,8	11,3	13,1	121	2,3	***
60	40	10,2	12,5	8,6	10,4	96	-0,4	-
40	60	8,5	10,4	7,7	8,9	82	-1,9	00
20	80	7,6	9,1	6,0	7,6	70	-3,2	000

DL 5% 0,7 t/ha d.s.
DL 1% 1,6 t/ha d.s.
DL 0,1% 2,2 t/ha d.s.

The conclusion is that *Medicago sativa* is the main specie in the research area.

CONCLUSIONS

The perennial plants represent an essential method of growing the fodder production in the experimental area.

The morpho-biologycal characteristics of the participating species are considered the new set pasture covers the layers for a longer period of time.

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RESEARCHES CONCERNING THE PRODUCTIVITY AND BIODIVERSITY OF THE PASTURES USED IN ECOLOGICAL SYSTEM ON THE ASH LAYERS

C. Cotigă[1]

KEY WORDS: layer, pasture, ash, productivity

SUMMARY

The impoverishment of the agricultural ecosystems is due not onlz to the industrial objectives ot to the arc and cole mining industrz up to date, but also to the deposit of waste and ash from the coal-fired power-station.

MATERIAL AND METHOD

The experiments are located at the Experimental Field Işalniţa Craiova and some of the targets were: the functional system of the annual nitrogen dose ans decreasing the production per scythe.

RESULTS AND DISCUSSIONS

Considering the effect form of ammonium nitrate on the obtained production (table 1), we can say that it does not contribute at significative growth of productions.

Table 1

The effect form of ammonium nitrate on *Lolium hybridum* production

Variants	Production of d.s. t/ha	%	Diff.	Signification
Ammonium nitrate	8,5	100	Mt	-
Urea	8,7	102	0,2	-

DL 5% 0,7 t/ha d.s.
DL 1% 1,3 t/ha d.s.
DL 0,1% 2,2 t/ha d.s.

Considering the effect of phosphor and potassium fertilization on the obtained production (table 2).

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Table 2

The fertilization effect with phosphor and potassium on *Lolium hybridum* production

Fertiliyer doses with P and K	Production of d.s. t/ha	%	Diff.	Signification
P_0	4,1	100	Mt	-
P_{50}	9,7	125	1,7	***
P_{100}	9,8	239	5,7	***
P_{100} K_{100}	9,9	241	5,8	***

DL 5% 1,7 t/ha d.s.
1% 2,9 t/ha d.s.
0,1% 4,8 t/ha d.s.

We can say that the fertilization level with P_{50} represent optima variant to obtain an economical production (9,7 t/ha dry substance).

When there are three species participating at selting a pasture (table 3), the mixture *Medicago sativa* 80% + *Dactyilis glomerata* 16% + *Lolium hybridum* 4% is appreciated as meaningful. In the case the crop level was 3 t/ha d.s. higher compared to the case: Medicago sativa 100%.

Table 3

The effect of the sow mixture ratio of *Medicago sativa* and *Dactylis glomerata* on the obtained production

The sow ratio (%)			The production of dry substance			Average	Relative production %	Differences	Meanings
Medicago sativa	*Dactylis glomerata*	*Lolium hybridum*	1st year	2nd year	3rd year				
100	-	-	10,5	12,3	8,2	10,3	100	Mt.	-
80	20	-	11,3	13,5	10,8	11,9	115	1,6	*
80	18	2	11,7	14,2	11,1	12,3	119	2,0	*
80	16	4	12,4	15,8	11,6	13,3	129	3,0	**
80	14	6	11,8	13,7	11,0	12,2	118	1,9	*
80	12	8	10,7	12,8	10,1	11,2	109	0,9	-
80	10	10	10,2	11,9	9,3	10,5	102	0,2	-

DL 5% 1,5 t/ha d.s.
DL 1% 2,4 t/ha d.s.
DL 0,1% 3,8 t/ha d.s.

In 30+30+20+20 fractional system, the vegetable weight in the production of the entire temporary pasture is well represented per scythes during all the research years (table 4).

Table 4

The effect of the annual fractional nitrogen dose on the vegetable wheight in the production of temporary pasture (%)

Annual fractional nitrogen dose (%)	1st year				2nd year			
	1st scythe	2nd scythe	3rd scythe	4th scythe	1st scythe	2nd scythe	3rd scythe	4th scythe
30+30+20+20	15	35	44	61	16	36	40	63
25+25+25+25	17	36	41	52	18	34	39	50
30+25+25+20	12	30	38	47	11	27	32	45
25+30+25+20	10	31	39	44	12	30	34	41

The dynamics of the crop per year and per scythes (table 5) is well represented if the annual nitrogen dose and the fractional system are (respected) followed.

Table 5

The dynamic of the production per scythes

Experimental years	1st scythe	2nd scythe	3rd scythe	4th scythe
I	27	31	23	19
II	26	33	21	20
III	26	33	21	20

CONCLUSIONS

Temporay pastures set on the ash layers manage in a high percent to stop the sweep phenomena.

Respecting the technological elements, but firs of all the fertilization and exploitation system, pastures represent on important source of fodder on the affected areas bzt the thermocentral ash.

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EFFECTS OF CADMIUM EXCESS ON FREE AMINOACIDS AND SOLUBLE SUGARS CONTENT IN WHEAT LEAVES

Babeanu Cristina, Andreea Alina Badita[1]

KEY WORDS: heavy metals, cadmium, free aminoacids

ABSTRACT

The objective of the study was to investigate the variation of reduced sugars and free aminoacid content during wheat'development time in presence of different amounts of cadmium excess. Two varieties of wheat were studied (Triticum aestivum L.cv. Boema and cv Exotic) in order to select plants which are tolerant to cadmium stress. Obtained results show cadmium induced changes in investigated biochemical indices and illustrate that cadmium uptake was positively correlated with aminoacids content and negatively correlated with reduced sugars content. Measurement of investigated biochemical indices, especially aminoacids content, might be used as biomarkers to asses the phytotoxicity for wheat grown on cadmium contaminated media.

INTRODUCTION

Heavy metals are the most widespread pollutants in the surface soil layer. They come from polluting industries, intensive agriculture and sludge dumping. Among them cadmium (Cd) appears to be one of the most dangerous element to all kinds of organisms (1). Although considered to be a nonessential element for metabolic processes, it is easily absorbed by plants and even in small amounts it causes toxicity symptoms. The toxic effect of Cd on plants was extensively reviewed (2,3,4). The symptoms of Cd toxicity are: growth retardation, chlorosis and necrosis of leaves, red-brown coloration of leaf margins or veins. Cadmium changes root morphology, root and leaf anatomy, damages cell structures. It disturbs water balance, mineral nutrition, photosynthesis, respiration and plant development in general (5). Some plant species have developed heavy metal adaptation which enables them to survive and reproduce in such unfavorable conditions. Heavy metal tolerance may results from different strategies including the formation of complexes with phytochelatins, cysteine-rich peptides (6). The effect of different Cd concentrations on wheat metabolism has been extensively studied in our laboratory (7,8). The objective of the study was to investigate the variation of reduced sugars and free aminoacid content during wheat'development time in presence of different amounts of cadmium excess in correlation with protein content. Two varieties of wheat were studied (*Triticum aestivum* L.cv. Boema and cv Exotic) in order to select plants which are tolerant to cadmium stress.

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MATERIAL AND METHOD

Two varieties of wheat were studied (*Triticum aestivum* L.cv. Boema and cv.Exotic) in order to select plants which are tolerant to cadmium stress. Wheat (*Triticum aestivum* L. cv. Boema and cv.Exotic) seeds were obtained from *Research and Agricultural Development Station from Simnic*. Wheat seeds were sown in plastic pots containing 2 kg soil supplied with cadmium (as $CdCl_2$) at three concentrations 0 (V1), 100µM (V2) and 200 µM (V3). The soil use for experiments is characterised by an acid pH (pH=5,7), by a low content of humus (1,8%), nitrogen (IN%=0,81) and potassium (128 ppm) and by a significant supply of mobile phosphorus (54ppm).

Biochemical analyses were realized on fresh leaves cut at different growing stages: phase I: emergence, phase II Beginning of Tillering, phase III Tillers Formed. Free amino-acids spectra were determined by paper chromatography. Quantitative measurement were made with a densitometer type 65 Karl Zeiss. Concentration of each amino-acid fraction was expressed in densitometric units. Reducing sugars and total soluble proteine were extracted in distilled water (1:10 w/V) and assayed according to Miller (9) and Layne (10) respectively.

RESULTS AND DISCUSSION

The analyzed biochemical indices show a dependency with the investigated phase and the applied dose. The obtained data concerning the content of soluble sugars are presented in figure 1. For both studied varieties it can be observed an increase of the soluble sugar content according to the applied dose in phase I and phase II. The results obtained show an intensification of the photosynthesis and carbohydrates biosynthesis processes during the analyzed phases for each studied variety, excepted V3 in third phase.

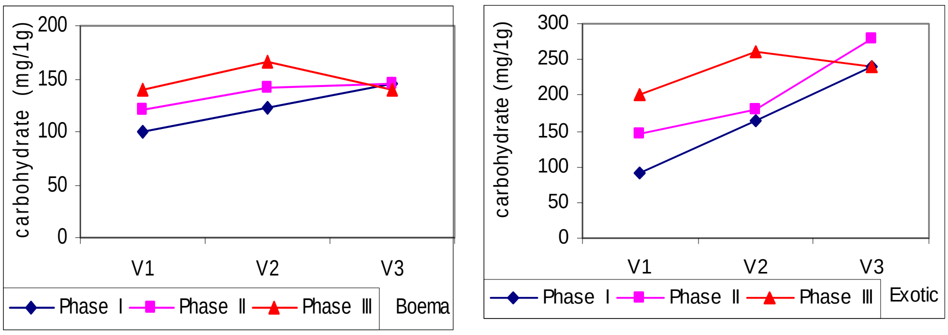

Figure 1. Soluble sugar content in wheat leaves in studied varieties

Analysis of the aminoacids pattern (Figure 2) has shown the same number of fractions either in the untreated control or the treated variants (seven fractions) in each studied varieties. One can notice an increase in each amionoacid fraction at each studied variant in comparison to the control. During the same vegetation stage, the aminoacid containt increases along with the applied dose.

The free aminoacids' increase in content during vegetation stages correlated with the increase of the soluble protein content, suggesting an intensification of the biosynthesis process. Aminoacids along structural unities from the proteins' biosynthesis have the role of blocking metal cation decreasing its toxic effect.

The increase of total aminoacids content from the third phase is negatively linked to the protein content's decrease and indicates an intensification of the catabolism (figure 3). This observation is sustained by the protease activity's increase from the third vegetative phase.

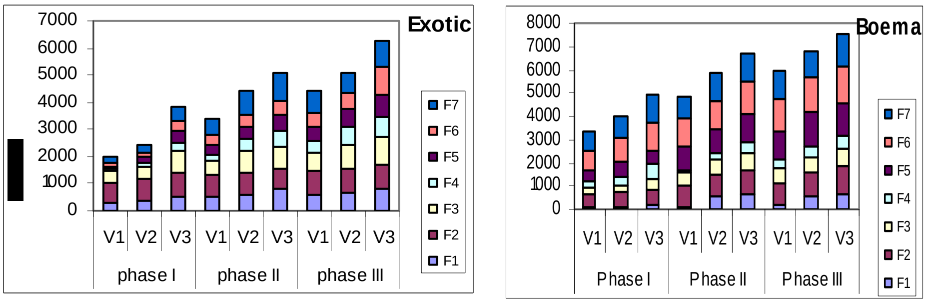

Figure 2. Aminoacids pattern in wheat leaves in studied varieties

It can be noticed on all studied varieties an increase in the content of soluble proteins when increasing the dose of applied metal. At the same applied quantity, the protein content increases during plants' development.

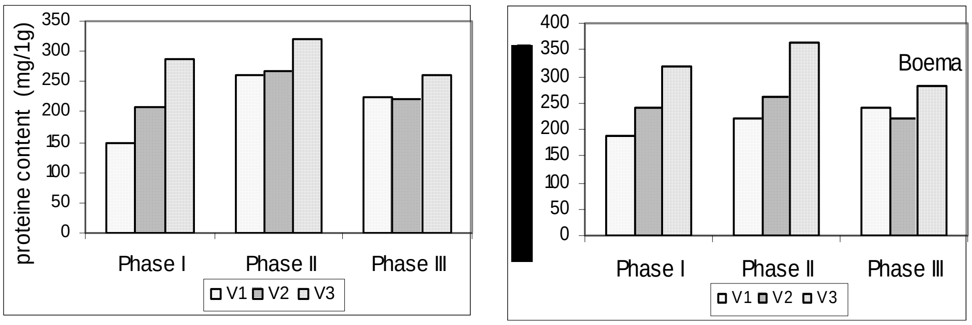

Figure 3. Proteine content in wheat leaves in studied varieties

The tested metal influenced methabolic processes during the growth and development stage of plants but the applied quantities have a stimulating rathen than inhibating effect on the process

CONCLUSIONS

Obtained results show cadmium induced changes in investigated biochemical indices. The increase of aminoacids and soluble sugars content plays a role in the cellular protection against metal toxicity, but it cannot be excluded that in some cases the increase might represent a toxic effect. The results obtained show that studied varieties can tolerate cadmium in the applied quantities through modulating methabolic processes, in the sense of decreasing the effects of the stress-factor

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IDENTIFICATION AND THE DETERMINATION OF LAWN SURFACE USING MODERN TOPOGRAPHY APPROACHES

Bârliba Luminița Livia[1], Eleş G.[2], Chiscop Nicoleta[3], Chiscop C.[3]

KEY WORDS: *GPS, total station, cadastral work orthophotoplan, area calculation*

ABSTRACT

After the EU integration, the necessity of rural development appears, along with a new functional frame for agricultural and lawn terrain. The paper studies the influence and the topographic methods used in agriculture, for lawn implicitly, as a field for terrain inventory, necessary for rural development and not only. The paper has at its basis the knowing of topographic equipment and topographic survey methods for parcels. In addition, a description of methods used in data processing is present along with the field measuring data.

INTRODUCTION

The land with its wealth is a fundamental economic value in satisfying elementary necessities; therewith these are the most significant part of national patrimony and a serious source of income at the state budget through taxes. Knowing quantitative and qualitative these assets or real estates, is the purpose of cadastre and topography. These works are done by inventory, land measurements and by drawing out plans and maps, the certain field situation of all assets. Considering these purposes, along with other specific disciplines, complex works regarding geo-topo-photogrammetric field of research, describing, classification and land evaluation are done.

The future expectations of topography, cadastre, and territory arrangement represent important tasks that need a more complex activity led and organized by well-trained specialists having high professional and scientific education.

The outcoming results, cadastral documentations, periodically updated, serve permanently to the Land Register where basic data along with tabular rights are written.

According to the actual land legislation, the Romanian territorial asset is made by all existing terrains, regardless the destination. They are holding on basis of propriety title being part of private or public assets.

Knowing the territorial assets as landholders, using categories and territorial administrative units, is made by specific cadastre works along the whole country territory.

In modern democracy, the basic cell of the society is represented by private property, as a result of hard and perseverant labour, where society members improved their life conditions.

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The propriety right is very important not only for the holder but also for the whole society. Considering this social function, it is logic and necessary that the holders of propriety right to be stimulate in a rational exploitation of his good by obtaining efficient economical achievements, preserving it carefully, and using it in his personal interest and in the interest of the community.

On this context, the paper presents the influence on which topography is involved in lawns and agricultural fields of activities.

MATERIALS AND METHOD

The paper purpose consists in showing modern methods of lawn parcelling and field identification along with a succinct surface computing methods.

In order to realize this steps, the topographer needs to have a solid material base, that include performing equipment which allows the operator access on various land shapes, having direct or less visibility, on high vegetation areas or large slopes.

In addition, one of the most important conditions is the necessary documentation for the interest areas consisting in cadastral plans, topographical and not al least orthophotoplans of areas where the work must be done.

Concerning the equipment tooled up this can be a GPS station as in figure 1.

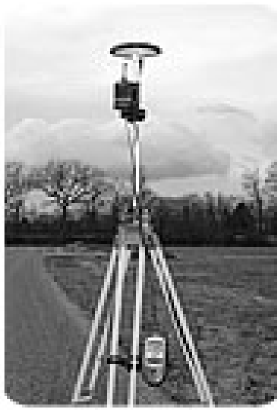


Figure 1. GPS station designed for topographic works

GPS techniques (Global Positioning System) represents the most recent way of measuring and processing data being extremely useful in geodesic and topographic network and also in cadastral works.

A GPS technique is based on a 24 satellite constellation moving around six knowing orbits around Earth at high altitude. The orbits altitude has such range that the interference with soil waves is avoided. The GPS has a high precision technology, which allows the operator to determine precisely the objects' position on the Earth.

The basic principles are very simple however; the system on its own is using high tech equipments. For better understanding the system, it is necessary to divide the system in 5 basic components as shown in figure 2.

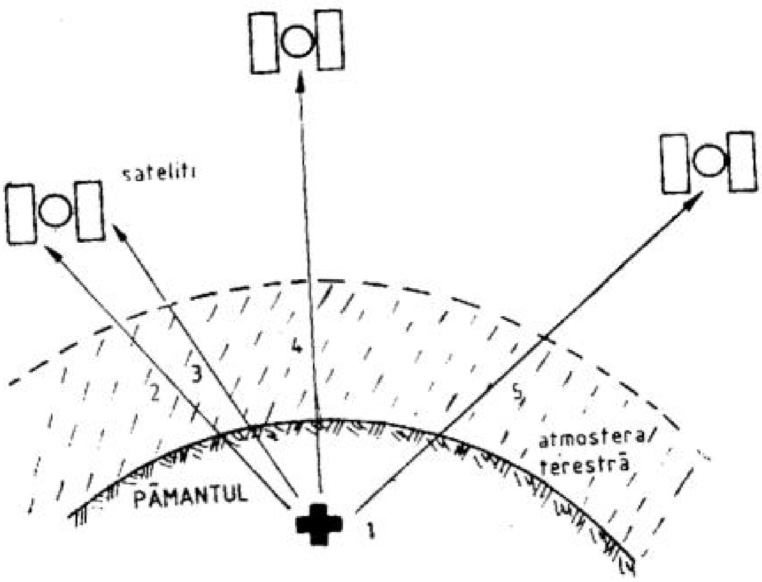


Figure 2. The GPS system components

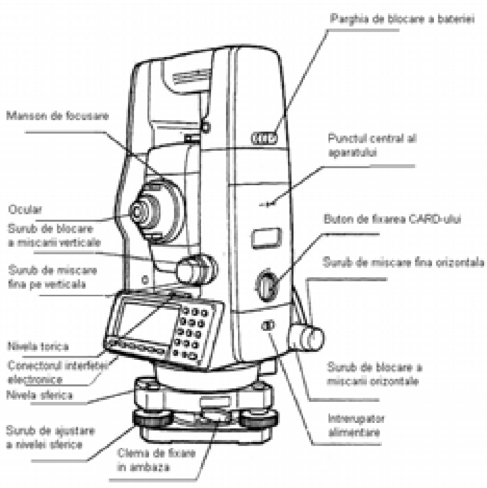
The first basic component is triangulation (GPS position through the help of satellites); the second component is distance measuring by considering the time during the radio wave is going through; a third component as the necessary high precision equipment for time measuring; a fourth component that is the precise satellite position and the last one being the information concerning the air layer that GPS signal is going through in order to compensate the errors produced by the atmosphere and ionosphere.

The basic of GPS system consist in using the satellites as references points in order to determine the triangulation the points' position on the Earth. These point positions will be determine considering the distances from the reference satellite, by multiplying the velocity and time. Because the light velocity is already known, the only component that we have to compute is the time interval that a signal needs to arrive at GPS antenna. Assuming that the satellite and the Earth receiver (antenna) use the same codes we can determine the time necessary by comparing the time difference between the two codes. Considering a maximum precision in synchronization between the satellite and Earth receiver, the precision range of time difference is the same. For obtaining an optimal precision determination, it is necessary to receive GPS signals from at least four satellites in the same time.

For small areas, where the visibility unto points of knowing coordinates from the geodesic network, to determine the lawns boundary, the total stations can be used successfully.

Practically today, this is the geodesic equipment used on a wide scale in the geodesic and topographic activities. Its evolution mainly concerning the electronic part lead to the name of total stations, because beside measuring the characteristic elements of a tachymeter, it offers a list of data processing and geodesic applications straight in the field with the possibility of data storage into internal memory.

For a proper use of the total station, a serious study of the user's manual is recommended. In this situation, only the basic principles will be presented, as general considerate for all available total stations. Entire equipment is made by the instrument itself, one or more prisms and tripod. The main components of a total station are presented in figure 3.



Picture 3. General description of a total station

For executing short distance measure that are not requesting a prior use of aperture glass fibre tapes and metal tapes along with laser beam distomates can be used (figure 4).

Figure 4. Instruments for measuring distances

Topographical survey includes the necessary operations to obtain on paper or topographical support the horizontal projection of land surface at a desired scale.

The planimetric survey can by made by several methods:

a) *Graphic methods* – These methods are realized are based in direct field determination the horizontal projection of the surface at a selected scale and finally obtaining the plan without subsequent calculus. The plan is obtained on basic measure but also expeditive approaches.

b) *Numerical methods* - These methods are based in determining the projection by using polar or rectangular coordinates. On this purpose the field measurements consist in angles and distances which define the points position, later on during the office operation the rectangular or polar coordinates are obtain. By using these coordinates, the plan is achieved. Using this method the plan precision is much higher.

The main numerical methods of planimetric survey are:

- Triangulation method; where points coordinate named as sustaining points are computed and joint together frame triangles. The plan metric point position is base on trigonometric solution of a triangle having a reduced field measure elements, later computed, and transformed in coordinated on based on the relation between triangle angles and sides.

- Poligonometry method; which is a method use to thick the sustaining points, by scanning a layout between the sustaining points and measures the (interior and exterior) angles, the layout details and lineament length.

- Traverse method; use as main method of detail survey consisting in measuring the horizontal distance and angles between successive polygonal lines made by conjunction of characteristic points which delimits the surface.

- The intersection method is the method where points position is achieve by sight intersection between the unknown point coordinate and points of knowing coordinate. Using these method the field operation are short as time, because only the angles are necessary to be measure

- The perpendiculars method or echeric coordinate method; this method is done by descending perpendiculars on a knowing line from prior measures, is use also for survey surfaces with large sinuosity.

Photogram metric methods – Are those methods which are use for making plans and maps, special photos of land make from airplanes and named photogram. The method is recommended for large surfaces and scale between 1:100 and 1:100.000, but mostly for 1:2000 and 1:25000.

Combined methods – Are mostly designate for photogram metric survey (photo plans, that means only plan metric), which later on are completed with survey using other topographic methods.

RESULTS AND DISCUSSION

The field data processing will be used to finalize a cadastral documentation representing the finality of topographical activities. The stored data into the internal memory of total stations will be transferred into computer memory by using the adequate software of the total station.

To achieve the situation plans the data transferred into the computer memory will be processed by computerized software such AUTOCAD.

On the first stage the situation plan will be realized by using the polyline base on the boundary points coordinate and area (figure 5), having different shapes according to the land shape. Subsequently, these boundary will be overexposed on the ortophotoplan of the effectuate area for verification (figure 6 sample).

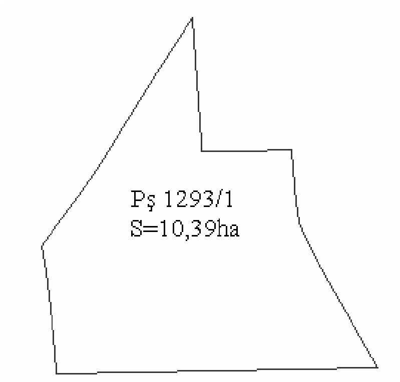


Figure 5. The boundary plan of parcel Figure 6. Overexposing on the ortophotoplan

CONCLUSIONS

Considering the aspects from the paper, some advantages of using high technologies on agricultural field and not only can by drawn out.

Today, the tridimensional determination means an essential desiderate in engineering topography applied in industry. The three points coordinate, obtained as solitary solution, the unitary way of treating planimetry, the way of unitary treating for planimetry and altimetry suppose to use specific methods which include all kind of angular and linear observations.

The final goal consists in defining the characteristic point for a object in order to define its shape. Whether the contact determination methods are in a wide variety, they are base on natural and elementary knowledge of optical and geometry.

On the same time, using these methods is related with the high precision demands for the whole scale of existing measuring systems and a complex apparatus.

In any topo-cadastral work, the essential element is the sustaining network, which is the starting point of the work.

The following were defined:

- Possibilities of making the measurements, instruments choose, number of necessary observation, the fields measurement;
- Methods of data processing.

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STUDIES CONCERNING SWARDS IDENTIFICATION IN CRICIOVA VILLAGE, TIMIŞ COUNTRY

Bârliba Luminiţa Livia[1], Eleş G.[2], Chiscop Nicoleta[3], Chiscop C.[3]

KEY WORDS: *ProMark 3 GPS, cadastral work, orthophotoplan*

ABSTRACT

The purpose of the paper is to realize a single survey work of swards from Criciova Timiş Counnty, in order to identify the properties and register them into the land record.

In order to identify the parcel limits, which is the object of this paper, we proceed in using the GPS ProMark 3 station static module in the station point from the Class II national geodesic network "La Cuciuba" and the "stop and go" module of the station for every parcel corner, later one after downloading activate the possibility of making plans on the whole swards territory of the locality.

INTRODUCTION

The harmonious development of human sites, whether they are urban or rural, and also the development of all branches of national economy are strong related with the execution of cadastre works and territory arrangement.

Local Council that manages the swards on the territorial-administrative area will establish on behalf of the majors the responsibility of the swards arrangements and swards exploitation approved by the Local Councils. The management of these surfaces is made by consulting the farmers, and the specialists from the Agricultural and Rural Development Department and Agricultural Consulting Department of County Center.

The lands mentioned as swards, being in the Local Council or farmers associations property are used exclusively for pasture, crops in order to obtain the green mass, seed, protection curtain, zoo pastoral construction, land improvement work to grow up the production potential of swards. The swards also as cadastral point of view must be well delimited marked in the land register as property evidence according to the European Standards of the states member.

These achievements of topography, cadastre, and territory arrangement are important tasks that impose a complex activity, lead and organize by well trained professional staff.

The property right is very important not only for the holder but also for the whole society. Considering this social function, it is logic and necessary that the holder of property right to be stimulates in a rational exploitation of his good by obtaining efficient

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economical achievements, preserving it carefully, and using it in his personal interest and also in the interest of the community.

Property represents a social report between two persons in strong connection with appropriation of material goods and production means.

Since the 1865 Romanian Civil Code, define the property right considering the juridical attributes that made up its juridical contents. “Property is the right of somebody to enjoy and dispose of a thing exclusively and absolutely according to the law limits” (art480 Civil Code).

MATERIALS AND METHOD

The purpose of the paper is to execute a topographical survey and site identification work of swards in order to be registered into the land register of Criciova locality, Timiş County.

Criciova Parish is situated in the West side of the country and on administrative point of view it belongs to Timiş County. It is situated in the South-East side, on the right side of the river bank Timiş (fig.1).

The mountain river Nadrag is crossing Criciova. The parish is situated at around 16 Km from Lugoj and 80 km. from Timişoara. The total land surface of Criciova is 5051 ha. of which 3021 ha swards and agricultural lands and the rest of 2030 ha consist in woods with glades towards the top of mountains.

Figure 1. The site of Criciova Parish

From juridical point of view the swards belonging to the outside part of human habitat zone of Criciova is in the property of Local Council of the parish and belongs to the Local Commission of the parish.

The beneficiary of the work is The City Council of Criciova, Timiş County.

The parcel is situated in the North side of parish and is having a length of 650m on the North-South direction and approx 2900m on the East-West direction being situated in the close neighborhood of Criciova (fig.2).

Figure 2. Framing plan at 1:10 000 scale

In order to identify the parcel limits that represent the object of the paper we proceed at a topographical survey of the area by using the GPS station ProMark3 “stop and go”, extremely helpful in marking the points along the boundary of the parcel by applying the basis of GPS technologies.

Therefore, one module, the static one, was placed in a point of knowing coordinate at the limit of Lugoj city, more concretely in the state geodesic network point “La Cuciuba” where readings are effectuate beginning with 09.00 hour until 17.00 hour.

The second module “stop and go” was deployed into the locality, on the land area where measurements are to be effectuate.

The operations that were made in a station point consist in:

a) Prior beginning the work session the geotopographical points functionality must be ensuring by:

- points recognition;
- ensuring the access and the visibility towards the point;

b) After finishing the recognition operations, marking and ensuring point the GPS work session program is made and basic measurements are starting over:

- installing the GPS aperture:
- aperture transport at the station point;
- installing the tripod;
- installing the antenna on the tripod;
- installing the tripod – the antenna on the point;
- installing the receiver (putting on the batteries);
- installing the antenna on the receiver;
- input the initial data into receiver;
- receiver initializing;
- starting the GPS work session;
- creating the measurements files, with the topographical description;
- finishing the GPS work session at the time mentioned into the program.

We must mention the fact that as in classic network even in the GPS network the principle of passing from a superior to an inferior network order is maintain. In geodesic application three different surface of the Earth are involved. The physic or natural Earth surface is approximate by a geometrical or mathematical surface named ellipsoid and by an echipotential surface named geoid. The classic measurements are determine on the **Krasowski** ellipsoid and the GPS measurements are determine on WGS 84 ellipsoid, which is a geocentric reference ellipsoid and echipotential define by the following parameters: the long semi axe (**a**), the gravitational Earth constant (**GM**), the zonal normalized gravitational coefficient of second degree (**C20**) and the angular velocity of the Earth (ω). Therefore, the international GPS network was create in a unitary system (**WGS 84**), made by permanent stations of high precision coordinate.

The stations of high precision coordinate along our country territory being part of the Class I GPS network are named as GPS permanent stations. Figure 3 shows the GPS points coordinates bought for subsequently measurements of the day.

Figure 3. Permanent stations used in swards identification

RESULTS AND DISCUSSION

Initially data processing was executed with the **GNSS Solutions™** and **Geogenius 2.1.** software, concerning the data acquisition process and data processing.

The request precision in data processing is 5cm +/- 2ppm.

The points from thicken the geodesic network were determine in three and four vectors from the permanent station from Romania.

After data were processed using **GNSS Solutions™** and **Geogenius 2.1** software the following deviations were achieve:

- standard deviation of base determination:

dx=1.7 mm,dy=5.3 mm.

- standard deviation of points determination:

dx=2.8 mm,dy=6.0 mm.

The coordinate system computation from WGS 84 coordinate system into Stereografic'70 was made by **TopoSys 4.4.**, software finally obtaining the coordinates of the point along the parcel boundary (fig. 4).

Figure 4. Cadastral plan obtained after GPS survey scale 1:5 000

The points coordinated were verified by overexposure on othofotoplan and the admitted tolerance was achieved (fig.5).

Figure 5. Overexposure on othofotoplan

In order to execute the topographic works it is necessary a number of 4-6 known coordinates points to surround the working area and situated at distance of 3 to 10 km. These points must to ensure the correspondence between the WGS84 system and Stereo 70 system, in order to compute the points coordinate from WGS 84 to Stereo 70. The field measurements are static executed and if we have a minimum of three GPS receivers that ensure the best conditions concerning the relative positioning as follow:

- minimum four identical satellites, receive simultaneously in three or more available points;
- the **PDOP** value, as precision measuring value for the satellites geometry must be under 5;
- observation time minim one hour for the points of the network;
- observation time must be minimum 15 minutes for fotogrammetric landmarks.

In AutoCAD software the points were joint according to the terrain draft and the following documentation was achieved:

- the draft of the network with station point description;
- point description;
- situation plan with identification;

- points coordinated inventory in coordinates projecting system Stereo 70;
- extract of Cadastral plane of Criciova parish;

The documentation has been achieved in 3D coordinate system in digital format on optical support and also plotted on appropriate paper format.

CONCLUSIONS

The GPS topographic determination for cadastral works can be done when we already have a national GPS network, but also in the case when we do not have such a network. We will referred on the second case when, due to the fact that the National GPS geodesic network is still under construction.

The necessities of making cadastral plans impose us to realize in field conditions the growing of the geodesic network, imposing especially to create the fotogrammetric networks. On bough cases the GPS technologies is advantageous. This advantageous consist in:

- the visibility between the network points and fotogrammetric marks are not necessary;
- the geodesic landmark is not necessary;
- all fotogrammeric marks has the same precision;
- the outstanding technical efficiency.

Today, GPS is in such stage of evolution that we can speak about a geodesic revolution.

The outstanding performance for the commercial receivers and the high precision make this system to be in top when we are talking about the wide variety of geodesic works.

The Global Positioning System named *NAVSTAR* is a radio satellite system which is used to accomplish military purpose and also civil purpose.

The Global Positioning System allows obtaining navigation information 24 hours during the whole day.

GPS allows establishing the position, direction and velocity for the transport vehicle as a precise time coordination, thanks to sending the exact mean time and cosmos satellite position.

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OIL SLURRY – POTENTIAL SOURCE OF SOIL POLLUTION

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KEY WORDS: soil pollution, oil residues, hydrocarbons, environmental impact

SUMMARY

The development of oil industry, especially the extractive, is sometimes accompanied by the emergence of phenomena, the unforeseen, with effects more or less harmful to the environment and human life. One of these phenomena is the pollution of soil with oil residues.

Such residues amended the physicochemical and biological characteristics of the soil by waterproofing, preventing the movement of air in the atmosphere in soil and conversely, what stops the activity of micro aerobe, take birth reduction processes, radicular system asphyxiation, which leads ultimately lower soil productivity.

In this respect, have been conducted chemical analyses (chlorides, sulfates, dissolved organic carbon, total dissolved solids, indicating phenol, polycyclic aromatic hydrocarbons and volatile aromatic) in the oil Gherceşti store up to the impact of the oil residues soil inside the enterprise and the bordering areas.

INTRODUCTION

Applying a system of sustainable waste management involves major changes of current practices. The implementation of the European Union policy in Romania regarding waste domain is National Plan for Waste Management, prepared for an effective protection of the environment.

The analyzed objective belongs to Petrom S.A. Craiova, being located outside the city Gherceşti. In order to carry out the present study we taking under consideration the employment plan in the area and plan situation, physicochemical laboratory tests, and legislation in the field.

MATERIAL AND METHODS

This study has been executed inside the Deposit residue oil Gherceşti, where according to the site were collected a series of samples from three locations (Table no. 1), on different depths, namely: 0-15, 0-30 cm: surface soil samples taken from the vicinity of the deposit (south-west and north-west) and from the access area.

Tests conducted on surface soil samples were focused on the following indicators: pH, chlorine, sulfates, cadmium, nickel, copper and total oil hydrocarbons - HTP (IR), a

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part of them being determined using the spectrophotometer with atomic absorption and HPLC.

Table 1

Identifying codes of surface soil samples

Investigation type	Sample code	Localization	Code samples taken	Depths [m]
Surface soil	L1	In the access area of deposit (south)	SS1	0,15 m
			SS2	0,30 m
Surface soil	L2	To the right part of the deposit (south-west)	SS1	0,15 m
			SS2	0,30 m
Surface soil	L3	To the left part of the deposit (north-west)	SS1	0,15 m
			SS2	0,30 m

RESULTS AND DISCUSSIONS

Analytical results obtained on superficial soil samples taken from the site of examined objective “Deposit residue oil Gherceşti” are presented in Table no. 2.

Table 2

Average values of the mainly chemical indicators determined in the soil sample

No	Indicator	UM	L1		L2		L3		The assessment criteria – Ord. 756/1997		
			SS1	SS2	SS1	SS2	SS1	SS2			
			0,15 m	0,30 m	0,15 m	0,30 m	0,15 m	0,30 m	Normal value	Thres hold alert */**	Thres hold of interv ention */**
1	pH	unit. pH	8.42	-	8.87		8.26				
2	Chlorine	mg/kg d.s.	600.8	579.4	169.3	144.9	470.1	449.8			
3	Sulphates	mg/kg d.s.	3759	3556	4556	4511	3056	2986		2000/ 5000	1000/ 50000
4	Cadmium	mg/kg d.s.							1	3/5	5/10
5	Nickel	mg/kg d.s.							20	75/ 200	150/ 500
6	Copper	mg/kg d.s.							20	100/ 250	200/ 500
7	HTP (IR)	mg/kg d.s.	342		95		54		<100	200/ 1000	500/ 2000
8	Phenol index	mg/kg d.s.		<0.01		<0.01		<0.01	<0.02	5/10	10/40
9	Mineral oil (C10-C40) C10-C14 C14-C20 C20-C26 C26-C34 C34-C40	Mg/kg d.s. % % % % %		325 10 60 30 <5 <5							

* / ** sensitive uses types / less sensitive uses types

The results of determination, obtained as a result of analysis of superficial soil samples, were compared with the reference values according to national norms, respectively Minister Order no. 756/03.11.1997 for approval Regulation on the assessment of environmental pollution.

The results of laboratory analysis may be mentioned through the following aspects:

• pH - although not normat by regulators, the pH value is neutral;

• Chlorides - are not normate, L1 location for the concentration values are higher than the corresponding locations L2 and L3; determined values are greater for the 15 cm depth over the corresponding the 30 cm depth;

• Sulphates - for all samples of surface soil, determined concentrations were values greater than 1.53 to 2.28 times in relation with the alert threshold value (2000 mg / kg su) for the sensitive uses, inducing a significant potential pollution; amounts determined are higher for samples taken from soil depth of 15 cm to those taken from 30 cm;

• HTP (IR) - for the probe taken from the L1 location (in the area of access into the store, its south side) at a depth of 15 cm, exceeds the amount determined by 1.71 times (342 mg / kg d.s. versus 200 mg / kg d.s.) the value of the alert threshold for sensitive uses, inducing a potentially significant pollution, for the sample taken from locations L2 and L3 values determined falls within the normal value;

• Index phenol - the samples taken for the concentration values, falls within the normal limit imposed for types of sensitive folosințe (<0.02 mg / kg d.s.), being below the detection method;

• Mineral oil (C10 - C40) - although not normate, found in samples taken from 30 cm depth with values between 325 mg / kg d.s. (soil sample taken from the area of access, inside the store, to the south side of it) and 31 mg / kg d.s.

Following the tests carried out on samples of the selected superficial soil, it may mention the existence of a certain degree of pollution potentially significant with oil products in the area of access to the southern side of the store, the determined concentration being of 1, 71 times higher than the alert threshold for sensitive uses, this may be due to poor management of oil slurry in the oil sump vecinity. Also, begining with year 2003, in the southern part of the site existed two oil slurry deposit which not comply, one belonging to the Craiova Lease, and the other to the CONPET SA.

The sulfates concentrations determined in samples of the selected surface soil, have exceeded of 1.53 to 2.28 times the value of the alert threshold for all types of sensitive use. Sulfates presence demonstrates the existence of the historical influence of improper activities carried out, on soil composition, namely the sulfates accumulation over time in soil structure.

The chlorides from soil surface are in higher concentrations than those of 30 cm, being the evidence of leakage of deposit salt water on the surface of the land from the pipe of exhaust liquid fraction onto the park Ghercești neighbouring tanks.

In conclusion, the analytical determination for the superficial soil samples have confirmed the existence of a history pollution and a current pollution, potentially significant, with petroleum products and specific activity pollutants : and chlorides and sulfates.

In Order no. 95/12.02.2005 regarding the acceptance criteria and procedures preliminary acceptance of waste storage and the national list of waste accepted in each class of waste storage, for this type of waste "oil slurry coming especially from cleaning the tanks of oil" (Codes: 05 01 03), placed in the class of hazardous waste, stated explicitly "waste that is known or for which there is already a feasible solution for recovery". In these circumstances, oil slurry from oil residue should be regarded as waste stored temporarily in order to recovery and final disposal.

CONCLUSIONS

1. Waste oil from the analyzed store have a high content of mineral oils, which can be recovered through a processing solution well chosen.

2. The contents of the polycyclic aromatic hydrocarbons (PAH) and the monocyclycs (BTEX) vary by uneven distribution of waste in the store.

3. The PCBs values determined were below the detection limit.

4. Loss from calcination presents great value, over the admitted concentration for dangerous waste residues, effect of the existence of liquid fraction which contains clay minerals suspension (coming from slurry drilling, but also from the residues of clay and sandy involved by the ore oil and water resulted from the extraction), and hydrocarbon emulsions.

5. The effects of the activities relating to "Ghercești oil residue deposit" on the environment are negative, harmful to the medium and long duration of exposure.

6. The analytical determination for superficial soil samples have confirmed the existence of a potentially significant history pollution and current pollution, with petroleum products and specific activity pollutants : chlorides and sulfates.

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SOME ASPECTS CONCERNING LANDSLIDES ON AGRICULTURAL LANDS IN CORRELATION WITH THE ENVIRONMENTAL PROTECTION

Sevastel Mircea[1]

KEY WORDS: natural hazards, landslides, risk, environment, mudflows

ABSTRACT

As degradation processes of the complex and natural soil-land ecosystem, associated or independent of the water erosion, landslides have a relatively wide spread in the hilly areas of Romania, especially on agricultural steepness lands. As natural hazards or catastrophes, such as floods, earthquakes as well as landslides, these phenomena may produce important material damages or, even more, injured or deaths. But, in comparison with floods and earthquakes, the landslides may be, in some cases, easier to be predicted and/or efficiently controlled.

The paper presents some aspects concerning the causes, modalities of producing as well as the effects on environment of the landslides from the hilly areas. In the meantime, there are presented in the paper some general solutions for preventing and mitigating of the landslides effects.

INTRODUCTION

As a natural degradation process of soils and lands, associated or independent of water erosion, in Romania landslides are relatively widespread on agricultural steepness lands. Together with other natural hazards, such as floods and earthquakes, that may produce important economical or human damages, the landslides may be, in some cases, easier to anticipate and/or efficiently controlled.

As it is well known, landslides represent spontaneously natural sliding processes of the earth along the slope, to the slope basis, as a result of losing of initial equilibrium of the earth. In comparison with water erosion process, where water represents the determinant factor, the landslides have as a primarily consequence the gravitational forces, the water having in this case a secondary role, as a motor agent. Among the factors that ”allow” to the gravitational forces to be higher than the stability of the earth, there are the following: water content of the earth, the increasing of the land slopes as a result of water erosion or inadequate practices (diggings, roads, buildings and over loads etc.), alternation of the freezing-unfreezing processes, tectonically movement, volcanoes eruptions etc.

Because of several breaking out factors, naturals or anthropogenetics, landslides do not make any distinction between area and social status, they occuring both in the developed or poor areas, urban or rural areas. The increasing of the intensity and frequency of the precipitations, associated with the rapidly growing of the population and expanding or the urban areas, all of these aspects contribute to the la increasing of the danger of

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landslides producing, especially in the poor countries, mainly because of overexploitation or inadequate land use of the steepness agricultural lands.

MATERIAL AND METHOD

First, a short description and classification of the landslides is needed in order to establish the main causes of their producing. In the meantime, from practical point of view, the setup up of a unitary classification system is needed in order to establish the prevention and control methods of landslides.

There are known in the literature several criteria of landslides classification, most of them being as follows: the causes of producing, the basis type of movement, the general character of movement, age, the development of landslides area in correlation to the geological structure of the earth on slope, the deep and position of the slide toe, the modeling characteristics of the earth bulk, the affected area and position of the landslides on the slope (after ISPIF Bucharest, 1973).

According to the main findings from the literature, a survey was carried out in one of the most affected area in Romania by surface and gully erosion, as well as by landslides, that being the Sub-Carpathian Curvature region, Slanic River Basin, which is a tributary of the Buzau River (figure 1).

An analyse regarding the findings from the literature and those from the field was then performed in order to find the main causes of landslides producing, their impact on environment and human live, as well as the most suitable control measures.

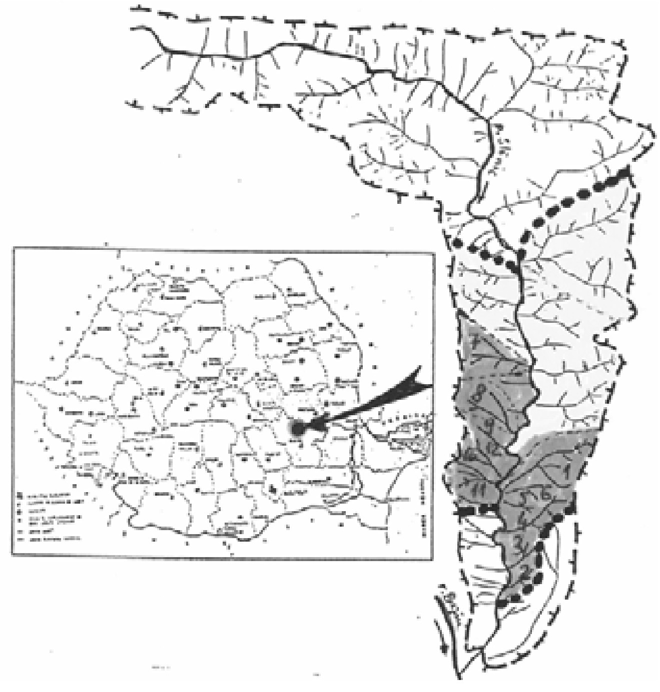


Figure 1. Sketch of the case-study area. Sub-Carpathians Curvature region, Buzau County

RESULTS AND DISSCUSIONS

According to the IUGS–UNECO working group, there are frequently used 5 classes of landslides inventory, mainly based on their causes and the type of movement of the earth mass, as follows:

a) blocks falls;
b) dumpings;
c) rotational landslides;
d) lateral landslides;
e) mudflows.

Out of all the above-mentioned types of landslides, the rotational ones are the most spreaded in the world on the agricultural lands and produce the biggest damages to the environment. A typical view of such a rotational landslide is presented below in the figure no 2.

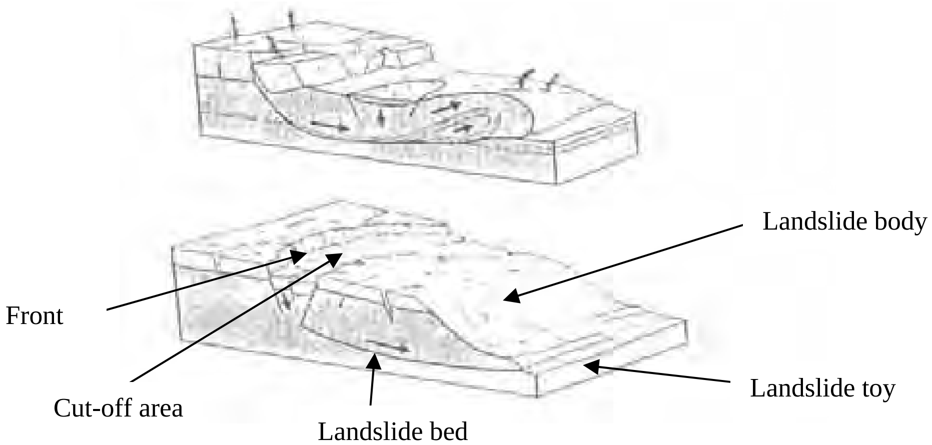


Figure 2. The mechanism of a rotor-translational landslide and its characteristic elements (*Source: http://landslides.usgs.gov/*)

In correlation with the gully erosion, especially in the periods with high amounts and long-term precipitations, there are producing landslides on slopes and/or gullies and riverbanks, which contribute to the partial or even total strangulation of the waterway. There are presented in the figure no 3 some types of landslides and block falls or rollings.

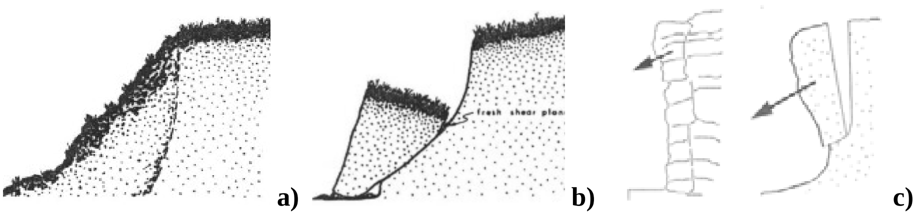


Figure 3. Different types of landslides and block falls produced in the gullies banks because of the modification of erosion basis (*Source: http://landslides.usgs.gov/*)

The mudflows are earth instability processes being specific to the earth bulk that have a very high content in water. They accur mainly on sandy texture of the soil-earth system during the high precipitation seasons, when, the entire permeable layer of earth become saturated. The mudflows generally occur with a velocity of about 4.5 m/s, function on the lands slope, but, there are known in the literature several cases where the velocity exceeds even 10 m/s (Source: *California Geological Survey, USGS*).

A recent case of catastrophic mudflows has occurred on February, 17, 2006, in Guinsaugon village, from the South of Leyte Island, located to the south of Manila, Philipine (figure 4). The catastrophic mudflow occurred because of very high precipitations fallen during a two weeks time, when the steepness versant of a mointains slided over the village. About 375 hosesholds and an elementary school were covered by about 10 m high layer of mud, the village being almost 90% destroyed. About 200 people died and other 1500 were disepeared under the mud layer. (*Source: AFP, February, 18, 2006*). It should be also mentioned that in November 1991, about 6000 people died in Leyte because of floods and landslides occurred due to a catastrophic tropical storm, and other 133 people died in December 2003, because to the landslides (*Source: AFP, February, 18, 2006*).

Figure 4. Location of the catastrophic mudflow occurred in Philippines (*Source: AFP)*

Concerning the case study area of Slanic River Basin - Buzau County, in that area soil loss get locally to about 30-45 tons/ha/year. The agricultural lands on the slopes cover about 35% from the total surface of the County. The gully erosion represents here about 1000 km, which actually covers an area of about 1000 hectares. Actually, it can be said in that region all the torrential valleys are affected in different degrees by the gully erosion. More specifically, the study was carried out on 11 most representative torrential sub-catchments of the region (Table 1). With regard to the land use and vegetation from the studied watersheds, there are mainly agricultural lands, covered by arable crops, grasslands, vineyards and orchards. The forests are presented especially along the gully riverbanks, contributing in this way to their better stabilization. The study has covered a period of more than 25 years of data recordings, taken in two different stages of gully and landslides development, i.e. the years 1962 and 1989, as well as up to date.

Table 1

Some morphological characteristics of the studied watersheds in Slanic River basin

No crt.	Watershed	Total gully watershed area (ha)	Valley slope (%)	Average slope of thalwegs (%)
1	Baiasca	377.50	12,3	9.1
2	Oarzei	90.00	9,5	8.3
3	Irimesti	86.25	10,6	4.6
4	Caldaresti	198.73	21,6	8.0
5	Vladului	98.73	15,3	9.8
6	Plutesului	120.50	14,7	8.6
7	Galbeaza	101.70	20,1	11.7
8	Balaurul	288.12	15,8	5.4
9	Mereului	86.25	12,5	8.7
10	Tatarului	51.25	10,3	11.4
11	Funduri	92.85	14,7	10.5

The landslide from the Funduri Valley watershed (figure 4), which has been associated with the severe gully erosion, has a surface of about 0.2 hectares and a volume of about 6000 cubic meters. It was occurred in year 1973 and now is relatively stabilized, mainly because of the check dams realized along the gully bed. Only a small portion of about 25% of its total volume was washed out in time by the water flow, the reminding part being now relatively stabilized by using biological measures, only.

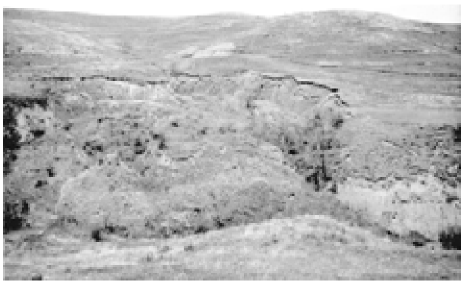

a)

b)

Figure 4. Landslide associated to gully erosion - Funduri Valley (comparison 1973 -1999)

A similar situation can be found, too, in the case of a common landslide of the gullies sides, initial being afforested with acacia, but cuted off now. Even here half of its total volume of earth was washed out in time by the water flow, the reminding part being now relatively stabilized by using biological measures, only. In general, on long term, the gully sides are going to be natural stabilized in the studied area by the afforestation with acacia. Building up the check dams on the gullies beds, as well as the afforestation of the gullies banks, are the main ways to contribute to the landslides control, which are associated to the gully erosion.

Figure 5. Landslide on the gully sides, Baiasca Valley-Slanic/Buzau (photo: S. Mircea, 1997)

CONCLUSIONS

Landslides have negative effects both on environment and on human live, as well as on-site and off-site of their producing. Their effects can be very well establisheds by using a new European conceptual model based on causes-effects analysis, called Driving forces-Pressures-State-Impact-Responces (DPSIR). This model is widely used especially for the Environmental Impact Assessment.

In the studied area it was found that more than half of the landslides occurred on the agricultural lands are closely associated with gully erosion. It must be said that the majority of the landslides occur due to the simultaneously effect of more factors, but, essentially, they are associated to the periods characterized by high quantitative and long-term precipitations as well as to the snow melting periods.

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RESEARCHES REGARDING SEWAGE SLUDGE DOSES INFLUENCE OVER MAIZE PLANTS IN THE FLOWERING STAGE

Mujea G.[1], Marilena Diaconu[1], Ana Iordanescu[1], Ionescu N.[2]

KEY WORDS: habitus, macro-elements, heavy metals , podzolic soil

ABSTRACT

The residual organic sludge obtained in the current phase is subject to anaerobic digesting and dewatering. Its experimentation in the field led to new positive tendencies which recommend it as being needed for a sustainable agriculture and for a sustainable development of the urban systems for wastewater treatment. Thus, maize plants had direct benefits of using this sludge, which amended its features due to the following qualities: increases and maintains the soil's pH, has an important contribution of valuable organic matter with fast opportunity for mineralization, has an increased level of macro-elements (Nt, Pt, Kt, CaO) and a relatively very low content of heavy metals: Pb, Cd, Zn, Cu, Ni. At flowering maize plants grew and developed in a significantly better manner and had an ever increasing content of macro-elements in the maize leaves by means of using progressive doses of sewage sludge between 10 and 50 tones per hectare.

INTRODUCTION

The sewage sludge resulted from urban wastewater treatment plants represent a material which includes in its composition both elements that are favorable, of the fertilizers type, but also some not wanted elements: compounds of heavy metals, organic substances little degradable or not-degradable, traces of pesticides etc. Chemical analyses that are permanently performed (Larry 1981, Barrideau 1982) demonstrate absolutely favorable opportunities for using this sludge for agricultural field farms. In fact, sewage sludge represents an important reserve both in terms of organic matter and nutritive elements that bring major benefits to agricultural soils (Gurckert 1980), including to the podzol. From an ecological point of view, the sludge usage in agriculture and real amelioration of soil (according to ISPE studies) brings a range of evident advantages. If nutrients and organic compounds return to the soil by means of sewage sludge spreading, the chemical fertilizers need is espected to decrease. A conservation of the primary resources is thus achieved and the basis for a sustainable development cycle for urban wastewater treatment systems is thus laid. For a better understanding of aspects related to usage of sludge from urban wastewater treatment plants several researches have been initiated (L'Hermite 1983, Bruce 1992, Loue 1993), many of these being studied in controlled conditions, as those in research facilities greenhouses, special laboratories etc. However, the most decisive answers remain those obtained in field conditions, meaning

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that these are most closed to what is going to be become the potential user – the agricultural farm (named also as large crop or field crop). In such an experiment with doses of sludge there was monitored the behaviour of maize plants in terms of specific morpho-physiological parameters and heavy metals absorbtion and accumulation in a moment of maximal importance for the maize plant life cycle, e.g. flowering period.

MATERIAL AND METHODS

The field experiment with large doses of sewage sludge was initiated in 2004. The basic features of the experiment contained: achieving a crop rotation on duration of 4 years with the following structure: 1. maize; 2. winter wheat; 3. soyabean; 4. winter wheat and sludge complexion with chemical fertilizers. Data in the present paper make reference to maize cultivation in the first year of research. In its normal cultivation technology there were performed interventions upon 2 factors: sludge doses with gradations: 0 $t.ha^{-1}$, 5 $t.ha^{-1}$, 10 $t.ha^{-1}$, 25 $t.ha^{-1}$ and 50 $t.ha^{-1}$ and chemical fertilizers: N_0P_0, $N_{50}P_{50}$ and $N_{120}P_{80}$. The used sludge or residual organic sludge was processes and treated by means of anaerobic biotechnology process – named also anaerobic digestion followed up by dewatering. Its chemical composition and the features of the podzol are presented in tables 1 and 2. Chemical analyses were performed according to latest EU requirements.

Table 1

Content of fertilizing elements of cultivation soil and sewage sludge

Specific environment	pH	C.org. %	Nt, %	Pt, %	Kt, %	CaO, %
Cultivation soil	5,05	2,14	0,192	0,06	0,55	0
Sewage sludge	7,07	30,11	2,24	1,25	0,35	1,90

Table 1 indicate that cultivation soil has deficiencies expressed by its presented medium values with the only exception for potassium content, which exceeds the one in the sludge. In comparison with the soil, the sludge contains indeed fertilizing elements at extremely favorable levels (Nicholson 1996) for ensuring a proper feeding environment for maize plants.

Table 2

Heavy metals content of sewage sludge and cultivation soil

Specific environment		Pb, mg/kg	Cd, mg/kg	Zn, mg/kg	Cu, mg/kg	Ni, mg/kg	Mn, mg/kg
Sewage sludge	Values	80	4,3	1367	130	27	345
	MAL*	300	10	2000	500	100	-
Cultivation soil	Values	17	0,34	111	23	22	828
	MAL	50	3	300	100	50	-

MAL* - maximal admissible limits (legal)

Data in table 2 demonstrate that both heavy metals content in sewage sludge and the one in the cultivation soil on which the bio-solid was spread – denomination accepted for the digested and dewatered sludge, as in the one used in this research – is within the accepted limits, which allows and recommends its usage in maize cultivation. Therefore there can be foreseen favorable results expressed both by forming of some plants with morphological characteristics of type : size (cm), leaf area (LA, dm^2 leaf), leaf area index (LAI, m^2 leaf/1 m^2 soil), and reduced and very reduced heavy metals contents in maize leaves. The evolution of heavy metals content in maize leaves is presented as being medium, according to used sludge doses.

RESULTS AND DISCUSSIONS

Maize plants habitus. On flowering – appearance of panicle, maize plants habitus is expressed at maximal values, and from a physiological point of view the activity is the most intense one. Determinations were performed on the plants regarding: height, LA and LAI. LA was determined based on the formula: LA=3/4 x L.l, where L= length of limb and l= width in the widest portion. LAI was determined by means of multiplying LA with field densities and reporting them as m^2 leaf (as LA) to 1 m^2 of soil. This denotes in fact the field coverage degree by maize plants.

Table 3

Evolution of main morphological indexes of maize in flowering phase according to the used organic- mineral fertilization

Sludge doses	Chemical doses	Size	LA	LAI
0 $t.ha^{-1}$	N_0P_0	170	29	1,20
	$N_{50}P_{50}$	187*	39**	1,47
	$N_{120}P_{80}$	187*	43**	1,70
5 $t.ha^{-1}$	N_0P_0	173	37*	1,47
	$N_{50}P_{50}$	187*	46***	1,80
	$N_{120}P_{80}$	193**	50***	1,97*
10 $t.ha^{-1}$	N_0P_0	193**	40**	1,63
	$N_{50}P_{50}$	197**	55***	2,23**
	$N_{120}P_{80}$	197**	58***	2,43**
25 $t.ha^{-1}$	N_0P_0	197**	45***	1,70
	$N_{50}P_{50}$	200**	59***	2,37**
	$N_{120}P_{80}$	203**	62***	2,43**
50 $t.ha^{-1}$	N_0P_0	190*	49***	1,93*
	$N_{50}P_{50}$	203**	68***	2,83***
	$N_{120}P_{80}$	210***	65***	2,77***
	DL 5 % =	15 cm	6,8 dm^2	0,61 m^2
	DL 1 % =	21 cm	9,9 dm^2	0,88 m^2
	DL 0,1 % =	32 cm	14,6 dm^2	1,28 m^2
Average	experiment	192,4 cm	49,5 dm^2	2,00 m^2

The first very obvious element associated with sludge and chemical fertilizers usage is represented by the maize plants size. Table 3 data indicates univocally that the bigger the amount of organic- mineral fertilizers used, the taller the plants were. Thus, if in the blank sample the height of the plants had an average value of 170 cm, in the other variants the height was bigger, with 210 cm with maximal doses. The difference is of 40 cm and fully demonstrates the beneficial effects of the performed feeding treatments (Antal 1999, Marschner 1995). In terms of feeding resources valorization, maize is one of the main field plants. The separate influence of the 2 factors is the following: sludge- due to the used doses, the maize plants height increased with 20 cm, and for chemical fertilizers with 23 cm, leading to a combined value of 43 cm. In thus situation, the interaction between the two types of fertilizers is a negative one: -3 cm, occurring as a result of increased levels of sludge and chemical fertilizers. LA in this phase had a total increase of 20 dm^2, and LAI denotes a soil coverage degree between 1.20 m^2 (blank sample) and 2.83 m^2. The difference in this case is of 1.63 m^2 and demonstrates the increased intensification degree due to the large doses of sludge: 50 $t.ha^{-1}$ combined with chemical fertilizers (Ciavatta 1994, Samec 1998, Sequi 1999).

The macro-elements content in maize leaves. The sludge used in the experiment contained a large range of fertilizing elements. Due to this increased nutritive value of sludge, with addition of chemical fertilizers, their combination led to an absorbtion, translocation and usage of macro- fertilizers by maize plants in fact of specific values. Thus, nitrogen (N), phosphorus (P) and potassium (K) are considered to be major nutrients, while calcium (Ca), magnesium (Mg), and sulphur (S) are considered to be secondary nutrients.

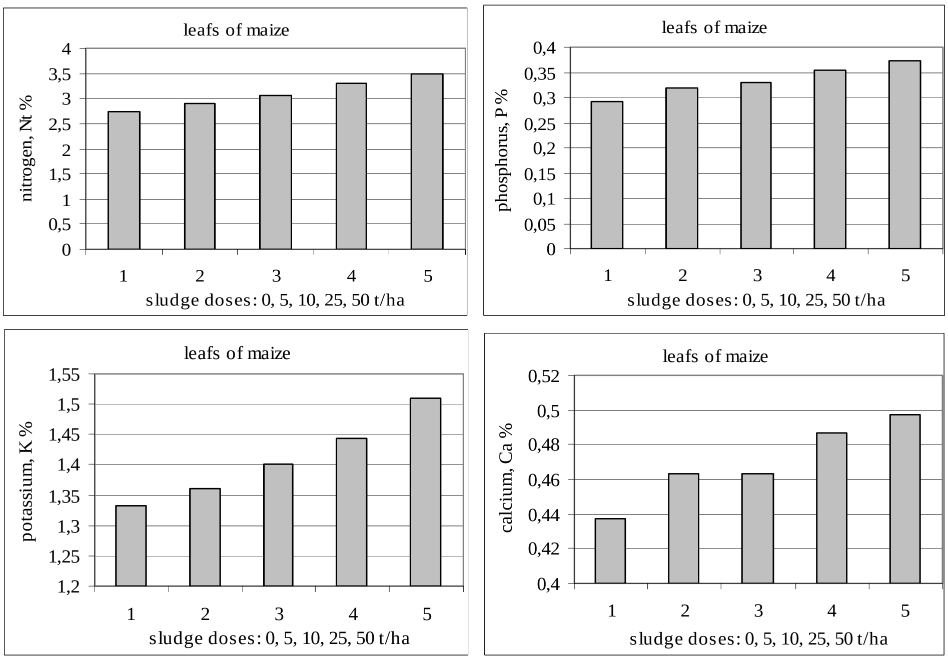

Figure 1. Evolution of fertilizing elements content in maize leaves at flowering time, according to used sludge doses

Results obtained during experiments make reference to N, P, K and Ca- figure no.1. Based on the obtained average data according to sludge doses, the content of all 4 fertilizing elements had a progressive and important increase. In case of nitrogen, the blank sample had a nitrogen content in leaves of 2.5 %. Sludge doses increased progressively the nitrogen content from approximately 2.9 % to 3.5 %. This increase of Nt in maize leaves was very important and demonstrates the beneficial effect of sludge usage upon plants' needs (Hadas 1997, Pang 2000). Phosphorus had a moderate incremental evolution, e.g. between 0.29 % in the blank sample and 0.37 % in the sample with 50 $t.ha^{-1}$ sewage sludge dose. Potassium had a very important increase, starting from 1.33 % in the blank sample without fertilizing ingredients to 1.51 % in the samples with large doses of sludge. Calcium content was improved from 0.44 % to approximately 0.50 %. The presented graphs demonstrate the very favorable effect of sludge usage for increasing the macro- elements content in maize leaves in flowering period. Taking into account these major quality gains, it is foreseen that the following maize crops to have the same characteristics.

Heavy metals content in maize leaves. In figure no. 2 there are presented the evolution of 4 heavy metals content in maize leaves as follows: cadmium, zinc, copper and nickel. It is worthy to mention that analyses performed did not detect presence of lead in maize plants leaves in this vegetation stage.

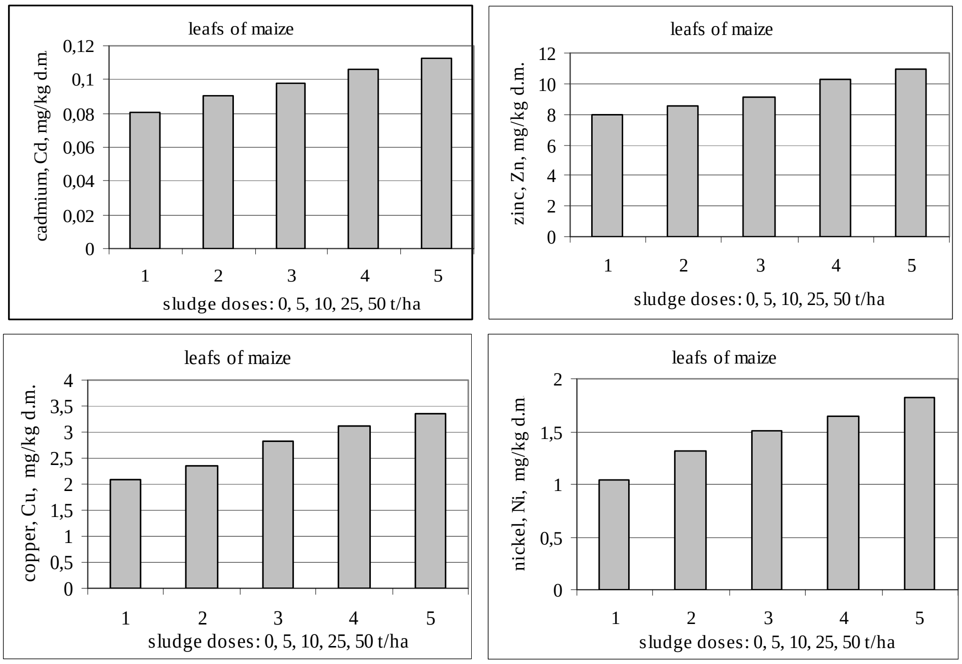

Figure 2. Evolution of heavy metals content in maize leaves at flowering time according to used sludge doses

Regarding lead (Pb), both sludge and cultivation soil contain it, yet in much reduced quantities, under the maximal admissible limits. Lead activity in related in particular to soil's biological activity, having a negative influence: reduction of CO_2 elimination intensity and of micro- organisms number. Analyses performed did not indicate any lead traces in maize leaves. Cadmium (Cd), a metal as toxic, has the particularity of mobility (Christensen 1987), being easily ceded by the cultivation soil with translocation by the plants. Data obtained demonstrate non- hazardous accumulations in maize plants' leaves e.g. between 0.08 mg/kg d.m. (dry matter) and 0.116 mg/kg d.m. This increase of cadmium content in maize plants' leaves confirm the mobility of the metal through plants. Other 2 heavy metals, zinc (Zn) and copper (Cu), although had increased values within the experiment, at these concentrations, on the entire registry, they functioned rather as micro-elements. Thus, for zinc values were recorded between 8 and 11 mg/kg d.m., while for copper between 2.1 and 3.4 mg/kg d.m. Very sensible increments were recorded for Nickel (Ni), and its effect, less known, did not reach a harmful state.

CONCLUSIONS

Experimentation of using sewage sludge subject to anaerobic digesting and dewatering in field plants cultivation on podzol soils demonstrate the need for ensuring organo- mineral fertilization. Since the podzol in insufficiently supplied naturally, it can be improved and even amended with sewage sludge.

The heavy metals content in the sludge and cultivation soil was recorded at levels much lower than the maximal admissible limits. This allows for the recommendation of sludge usage also within field farms.

Since the sewage sludge improves the maize plants nutrition regime, there were recorded statistical increments of the 3 elements monitored: plant's size, LA and LAI.

Macro-elements content in maize plants, of the type: Nt, Pt, Kt, CaO, had very important increments due to the context of increasing sludge doses used.

Heavy metals contents in maize plants leaves, of type: Cd, Zn, Cu and Ni, although had some sensible increments, the limits recorded were much reduced, and Pb was not detected.

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CORRELATION BETWEEN THE AIR QUALITY AND THE HUMAN HEALTH AT INDUSTRIAL CITY AREA

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KEY WORDS: air pollution, human health, industrial city area, Targoviste

ABSTRACT

The air pollution caused by urban environment will not only affect ecosystems but also do harm to people's health. There is an increase interest to create tools for the investigation, monitoring and evaluation of air pollution assessment. In this paper there were analysed the most important air pollutants in the Targoviste city area and their implication on human health in order to formulate a strategic plan for providing a better perspective for the community. The most important irritating pollutants of the analysed area are the powders in suspension. They case respiratory diseases mostly to children and the young population. The distribution of the green area has a decontaminating influence on the general air pollution of the city. There was suggested a strategic plan for providing a better perspective for the community

INTRODUCTION

Environmental pollution is a complicated issue. Air pollution has been a persistent problem that has grown significantly over the past two centuries. The national/international regulations impose strict standards for emissions from point sources for pollution agents such as: NO_x, VOCs, SO_x, CO, PM-10, Pb and HAPs.

The city environment is a great producer of air pollutants. These result from industry, traffic and various diffuse combustion sources. Air pollutants at ground level can be harmful to human health if their concentrations exceed certain acceptable levels. As pollutants accumulate in or near large urban areas, this typically exposes people to unhealthy pollutant concentrations. It is also the case of the cities from the Dambovita County in Romania. Targoviste is its largest and economically most important city, where two important ferrous plants are (Oproiu 2002). The ferrous plants generate metal powder and small amounts of dioxin.

The large industrial development of the city generates also a heavy ruttier traffic, which increased the atmospheric pollution. The other significant pollution sources in Targoviste are the mobile internal combustion engines and the burning processes during the cold season used for heating.

The atmospheric air circulation bring a supplementary amount of sedimentable powders and burned gases, most sulphur dioxide from the extractive and construction materials producing industry in Fieni, a town situated at 25 km north of Targoviste.

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The spatial and temporal variations in emissions of air pollutants associated with the variability in meteorological conditions can lead to elevated pollutant levels, which can cause adverse short-term and chronic human health impacts (Schwartz 1996, Emissions Standards Division, 1994, Danet 2005).

The scientists have the task of evaluating the risks associated with a certain level of the pollutant that may be emitted from a facility. For this a large number of factors need to be assessed before a determination of what threshold of concentration would be considered safe to human health and the environment. Such matters include downwind concentration gradients from dispersion and geoclimatic conditions or even epidemiological implications of the human societies.

To estimate the impact of pollution on the human health it is necessary to know the complex correlations established in each environment between the different pollutants.

The objectives of this study are (1) to analyse the evolution of the concentration levels of specific pollutants (airborne particulates and gases as NO, CO, SO_2) and powders in suspension – fraction PM10, and (2) to analyze the implications of these pollutants on the health of the inhabitants.

MATERIAL AND METHODS

Investigation area

Targoviste is a city situated in the central part of the Romanian plain, along the river Ialomita. Its climate is moderated temperate continental, the dominant wind direction is from the east to west and the annual average precipitation's is 541 l/m^2.

There are about 91281 inhabitants (56,21 % of the total population living in cities and 16,92 % of the total population of the County). The density of this population in Targoviste is 1910,5 inhabitants/km^2 (in comparison with 772,6 inhabitants/km^2 in other towns and 133,5 inhabitants/km^2 in the County).

There is a large industrial area with two metallurgic plants which are the heaviest pollution sources of the city (Fig.1).

Fig.1. Pollutant sources from the industrial area of the Targoviste City

Sampling and analytical methods

In accordance with the 265/2006 Law and the 195/2005 Regulation, the Authority of Environment Protection is responsible with the monitoring of the air quality in Romania. This national law establishes the most important pollutants for each area, the applied

Fig.2. The automatic monitoring station of the air quality from Targoviste

measurement methods, the limit values, the alert values, the criteria to place the monitoring station and the modalities to inform the public on the air quality.

In Romania there are 117 air quality monitoring stations. In the Dambovita County there are functional two automating stations at Targoviste (Fig. 2) and Fieni which inform the public about the pollution data registered during each hour. This stations measure also in real time some meteorological parameters (air temperature, wind speed and direction, solar radiation, rainfall, atmospheric pressure), pollutants (NO, SO_2, CO, troposphere O_3) and powders in suspension (the PM10 fraction - fraction with particles less than 10µm).

The toxic gases are analysed in accordance with the European standards. NO_2 and NO using chemiluminescence (SR EN 14211/2005), SO_2 using fluorescence in UV (SR EN 14212 / 2005), CO using spectroscopy in IR (SR EN 14626 / 2005) and powders in suspension – fraction PM10 using gravimetric method (as reference method) and the continuous using optical method (SR EN 12341/2002) (Colection of Romanian STAS Sampling and Analyse Methods).

There is also another monitoring station in Targoviste and also one in Doicesti with manual sampling. The samples are cropped here continuous during 24 hours and than analysed in the laboratory using the gravimetric method to determine the PM10 suspension fraction (SR EN 12341/2002). In this order the samples are collected on filters by aspiration pumps.

The data are expressed as [µg/m^3], gathered in a database and used in evaluation studies and reports.

There is analysed the maximal value, the minimal value, the medium value, the number of samples, the number of maximal admitted concentration (MAC) outrunning, the frequency of the MAC outrunning. The maximal admitted value for the powders in suspension - fration PM10 is according to MAPM Order 572/2002). There is analysed also the alarm limit (AL) and the % of the AL. Its maximal value is according to MAPM Order 592/2002.

The data interpretation is made according with the Order MAPM Order 592/2002.

RESULTS AND DISCUSSIONS

The evolution of the air quality in Targoviste.

The parameters ordered by the law to be most important to define the global air quality are SO_2, NO_x, CO, O_3, powders (fraction PM10 and PM2.5), C_6H_6 and Pb. For the Targoviste area important seams to be the toxic gases SO_2, NO_2, CO and the powders in suspension (fraction PM10).

The measurements of the powders and toxic gases were performed by the monitoring network of the air quality in the Dambovita County. There were analysed the outrunning of the MAC (maximal admitted concentration) according to the MAPM Order nr. 592/2002 and the AL (alarm limit) during the last 10 years.

Analysing the public data from the Local Environmental Protection Agency it is evident that the MAC was not frequently exceeded. There could be observed a decrease of the frequency of exceeding the MAC values for toxic gases during the analysed period. The values were most in the range of AL so that these can be considered a potential environmental risk. This situation is because the emission points of the metallurgic plants were equipped with chemical filters.

Not the same was the case for the powder in suspension - fraction PM10 where an increase of the frequency of the outrunning data was observed in the last 3 years. This can be caused also by the very dry summer during these last 3 years, where the air suspension quantity was increased not only by pollution but also by particles mobilization from the soil.

The highest pollution level for the air quality in the Targoviste City was with powders in suspension – fraction PM10. These are also the most important irritation pollutants. The principal sources are the metallurgic plants and the heavy ruttier traffic both of them being in development during the last 10 years n Targoviste.

Implications on the population health.

The health of the inhabitants of the Targoviste City is influenced by the following environmental factors:

- the concentration of the specific irritation producing pollutants in the city area,
- the distribution of these pollutants in different inhabited urban areas,
- the pollutants retention by the vegetation from the green area of the city.

The statistical data of the Public Health Agency of the Dambovita County show that the general mortality is caused mainly by cardio-vascular diseases, cancer, respiratory diseases and digestive system. The air pollution has a significant influence in causing of such diseases.

The airborne particulates and the gases are both irritation producing pollutants mostly on the respiratory system. Between the gases and the powders present in the atmosphere there is a synergic effect, with major implication on the human health even if the maximal admitted values are not exceeded. The synergic effect takes place even between SO_2 – airborne particulates and also between NO_2 – airborne particulates. The mentioned gases rarely exceed the MAC (maximal admitted concentration)(Local Environmental Protection Agency data) in the last ten years, but they were present at an alarming level.

The outrunning values of the powders in suspension, especially those with micronic and undermicronic dimensions affect mostly the respiratory system of the children. They can generate bronchitis, pneumonia, asthma and emphysema and also can

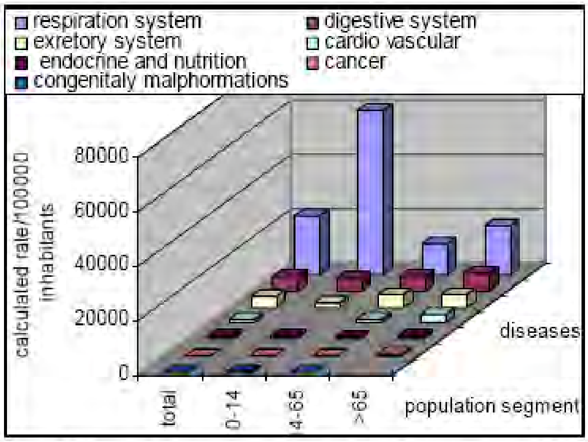

Fig.3. Specific diseases rate in the Dambovita County
(data from the Public Health Agency – Dambovita County)

produce irritation of the eyes and skin. The breathing powders can enter in the respiratory system until the lung where they can deposit generating broncho-pulmonary affections.

Individuals between 1-14 years old are most frequent affected by respiratory diseases causing the increase of mortality. The mortality of the adults is especially caused by diseases of the circulation system and by cancer, the most frequent cancer being the broncho-pulmonary one (respiratory specific mortality – 31.7/100000 inhabitants).

This phenomenon is possibly caused by the presence of irritation producing pollutants in the atmosphere of the living area. In Targoviste city were registered pollution levels of formaldehyde and airborne particulates over the AL and the health protection limits, the breathing ones representing 70%. The mortality of this population segment is caused also most by diseases of the respiratory system (Fig. 3).

Distribution of the green area

In Targoviste the green area is represented as in Table 1.

Table 1.

The distribution of the green area in the Targoviste City
(data from the Local Environmental Protection Agency)

Intercity area [ha]	Greea area [ha, %]	Parks and recreation area [ha]	Total green area [ha]	Green area/ inhabited area [m3/inhabitants]
1966	43, 5.12	57.7	100.7	11.26

This distribution of the green area has a decontaminating influence on the general air pollution of the city. The plants absorb a large amount of air pollutants. In this way the sedimentation of the dust and dispersion of the gases is accelerated with positive implications on the heath of the population.

The improvement of the populations` health is a major goal of the Local Administration. Its long-term strategy regarding the air pollution of the inhabited area of the cities in the Dambovita County includes:

CONCLUSIONS

Even if the air pollution of the cities in the Dambovita County is not very hard, the inhabitants of the Targoviste City are exposed to pollutants like the air particulates and gasses emitted from industrial sources and traffic. The most exposed areas are those around the metallurgic plants and from the center of the city. The pollution is increased when the wind blows from the north and brings dust from the industrial area of Fieni.

The improvement of the populations` health is a major goal of the Local Administration. Its long-term strategy regarding the air pollution of the inhabited area of the cities in the Dambovita County includes:

- The improvement of the air quality in the inhabited area according with the quality standards by reducing the impact of the traffic and the emissions of the small heating sources;
- The performing of an efficient monitoring of the industrial pollution sources and the instalation of depollution equipments at all major sources;
- The extension of the protection curtains and the green area in the cities.

ACKNOWLEDGEMENTS

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ESTIMATION METHOD OF ECOLOGICAL SYSTEMS

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KEY WORDS: estimation method, sustainability, principles, indicators

ABSTRACT

This method is use for estimating the biologically productive area necessary to support current consumption patterns, given prevailing technical and economic processes. By comparing human impact with the planet's limited bio productive area, this method tests a basic ecological condition for sustainability. This method has gained popularity for its pedagogical strength as is expresses the results of its analysis in spatial units can easily be communicated. In this paper, I review the method and the method and critically assess it from a sustainability perspective.

INTRODUCTION

This method builds on a variety of earlier analytical attempts to measure human load in order to estimate the dependence of human life or nature (see for example, Martinez-Alier, 1987 and Cohen, 1995).

The last ten to fifteen years have witnessed exciting new developments of tools that measure people's use of nature: life cycle assessments (Abel, 1990), energy analyses and energy-based lifestyle appraisals (Primentel, 1994; Hofstetter, 1991), environmental space calculations going back to ideas of Johann Opshoor and further developed by the Friends of the Earth (Buitenkamp, 1993), human appropriation of net primary production (Vitousek, 1986), documentation of regional and industrial metabolisms (Ayres and Simmonis, 1995), to name a few.

Most of these tools are accounting systems which document mass balance of renewable and non-renewable resources. Their results are expressed in terms of energy, mass or space, or a combination of these units. While their applications and representations vary, their aim is the same: to quantify human use of nature in order to motivate and implement a reduction of human impact.

The method has gained popularity for its didactic strength as it expresses the results of its analysis in spatial units that can easily be communicated and which allow for the comparison of human consumption directly to nature's limited productivity. Also, it is one of the few measures that aggregate a variety of human impacts in consistence with thermodynamic laws and ecological principles. Therefore, it becomes an attractive tool for communicating, teaching and planning for sustainability.

Tools for monitoring the progress towards sustainability are only useful if they build on an explicit definition of sustainability development. This has, for instance, been

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pointed out by Mitchell (1996) who also argues that a serious shortcoming of many indicator programmes is their lack of such principles. A critical evaluation of various indicator programmes from a sustainability perspective based on such principles would not only be helpful in elaborating more comprehensive indicator programmes, but would also make it easier to determine how they relate to each other. In this paper, we study the method from a sustainability perspective defined by four first order principles (Holmberg, 1996). We discuss:

1. Which aspects of sustainability are presently covered by the method;
2. Which further aspects of sustainability could be made accountable through method;
3. what areas of sustainability cannot be accountable through method, thereby needing complimentary auditing tools.

To provide a basis for the discussion, I first give a structure for sustainability. This structure is then used as the framework for the assessment of the method. I also discuss what qualities of the method are particularity effective for measuring and communicating progress, as defined by the first order principles for sustainability, thereby assisting people in the private and public domain in applying these principles.

A STRUCTURE FOR SUSTAINABILITY

Humans are dependent on the ecosphere, and cannot withstand a systematic shift of the physical situation within the ecosphere, e.g. systematic increase in concentration of CO_2, metals and chemicals or systematic decrease of productive soils, pH, fresh water, etc. Humans can destroy the functions in the ecosphere by:

- a systematic net increase in concentration of matter that is introduced into the ecosphere from outside the system;
- a systematic net increase in concentration of matter that is produced within the ecosphere;
- a systematic physical deterioration of the ecosphere's ability to utilize waste as building blocks for production, and to provide other essential functions.

Starting from these fundamental and different ways for a society to destroy the functions of the ecosphere, four principles for sustainability have been developed (Robert, 1992; Holmberg, 1996; Robert and Holmberg, 1997; Robert 1997). In order for a society to be sustainable, nature's functions and diversity are not systematically:

1. subject to increasing concentrations of substances extracted from the lithosphere;
2. subject to increasing concentrations of substances produced by society;
3. impoverished by over-harvesting or other forms of ecosystem manipulation.

Together, the three first principles give a framework for ecological sustainability. It implies a set of restrictions within which the sustainable societal activities must be incorporated. Based on that reasoning, a first order principle for the society's internal turnover of resources is formulated – he fourth principle:

4. resources are used fairly and efficiently in order to meet basic human need world wide.

CLASIFICATION OF THE RPINCIPLE

I. The social influence on the ecosphere due to accumulation of lithospheric material is covered by the first principle The balance of flows between the ecosphere and the lithosphere must be such that concentrations of substances from the lithosphere do not systematically increase in the whole ecosphere, or in parts of it. Besides the upstream influence on this balance through the amounts of mining and choices of mined minerals, the balance can be influenced by quality of final deposits, and the societal competence to technically safeguard the flows through recycling and other measures. What concentration can be accepted in the long run depends on properties such as ecotoxicity, here taken in a broad sense to include effects on the geophysical systems, and bioaccumulation. Because of the complexity and delay mechanisms in the ecosphere, it is often very difficult to foresee what concentration will lead to unacceptable consequences. A general rule is not to allow deviations from the natural state that are large in comparison to natural fluctuations. In particular, deviations should not be allowed to increase systematically. Therefore, what must at least be achieved is a stop to systematic increases in concentration. Depending on the characteristics of the substance and the recipient, the critical concentrations differ. In some recipients, the critical concentrations differ. In some recipients, an increasing concentration of some substances can have a positive effect before a further increase in concentration will be problematic. In other cases, the acceptable concentration has already been exceeded.

II. The social influence on the ecosphere due to accumulation of substances produced in society is covered by the second principle. It implies that the flows of societal produced molecules and nuclides to the ecosphere must not be so large that they can neither be integrated into the natural cycles within the ecosphere nor be deposited into the lithosphere. The balance of flows must be such that concentrations of substances produced in the whole ecosphere or in parts of it. Besides the upstream influence on this balance through production volumes and characteristics of what is produced, such as degradability of the produced substances, the balance can be influenced by the quality of final deposits, and the societal competence to safeguard the flows through technical measures such as recycling and incineration.

III. The societal influence on the ecosphere due to manipulation and harvesting of funds and flows within the ecosphere is covered by the third principle. It implies that the resource basis for (I) productivity in the ecosphere such as fertile areas, thickness and quality of soils, availability of fresh water and (II) biodiversity is not systematically deteriorated by over-harvesting, mismanagement or displacement.

IV. The internal societal metabolism and the production of services to the human sphere is covered by the fourth principle. It implies that if the societal ambition is to meet human needs everywhere today and in the future, while conforming to the restriction with regard to available resources give by the first three principles, then the use of resources must be efficient in meeting human needs.

ECOLOGICAL METHOD FROM THIS USTAINABILITY PERSPECTIVE

The main question that the method answers is how much biologically productive land would be required on a continuous basis to provide the necessary energy and material resources consumed by a population and to absorb the wasted discharged by the population.

A method analysis, therefore, is close to an assessment of human appropriation of net primary production. The principal difference from other studies is that the method expresses the results in spatial measurement units rather than energy or mass equivalents.

Method estimates are calculated to account for as many ecological impacts as possible without exaggerating humanity's current impact. For example, optimistic field figures are used and some impacts are not yet included in the calculations. In addition, the estimates do not double count areas that can give several services simultaneously, since this would exaggerate people's true use of nature. Underestimating human use of nature's productivity ensures that the method results do not depict the ecological situation as more severe than it is. This chosen strategy secures the widest possible acceptance of results.

Principles 1 and 2 deal with the deterioration of the ecosphere from accumulation and increased concentrations of substances that are either extracted from the Earth's crust (principle 1), or produced within the society (principle2). Accumulation occurs when such emission exceed the assimilation capacity of the ecosphere.

In order to answer the questions; "Which future aspects of sustainability could be made accountable through the method?" and "What areas of sustainability cannot be accounted through the method?", the following aspects have to be checked:

1. if the assimilation capacity of the flow is known;
2. if the assimilation capacity can be estimated indirectly;
3. if the assimilation capacity can be transformed into an area in an adequate way;
4. if double counting of area can be avoided.

In the following text , we first discuss emissions of carbon dioxide from fossil fuels, and then other substances related to principles 1 and 2, divided into naturally occurring substances (other than carbon dioxide), and compounds foreign to nature.

Principle 3 deals with harvesting and manipulation of the ecosphere, displacement, reshaping of structures, and guiding of processes and flows. In a sustainable society, harvesting and manipulation of the ecosphere must not deteriorate the long-term productivity or threaten the biodiversity.

Anthropogenic harvesting and manipulation of the ecosphere can be divided into different activities such as agriculture and forestry. To find out whether different activities are relevant and possible to include in the method, I have to check;

a) if the influence on long-term production capacity and biodiversity is known;
b) if the influence on long-term production capacity and biodiversity can be estimated indirectly, e.g. by considering different practices used in the activity such as different types of forestry that affect biodiversity to different extents;
c) If the influence can be transformed into an area in an adequate way;
d) If double counting of area can be avoided.

The fourth principle deals with how well the internal societal metabolism and the intra- and intergenerational justice in the distribution of the utilities make it possible to fulfil basic human needs. The equation:

$I = i \times m \times u \times P$, which expresses the impact on nature as a product of four factors that humans could change, can be used as a structure when discussing which aspects should be considered for principle 4.

Were:

I = impact in nature

$i = I/M$; impact/material and energy flow

$m = M/U$; material and energy flow/utility or service

$u = U/P$; utility or service/capita

P = population

The equation illustrates the dilemma facing humankind – the double challenge inherent in the concept of sustainable development: On the one hand, the develop and reach an acceptable service level from material and energy flows for a growing population (principle 4), and, in parallel, to able to decrease society's harmful physical influence on nature (principle 1, 2 and 3).

There are four aspects relating that at least have to be considered when discussing the fourth principle. The first factor, I, relates to the transmaterialization of the social metabolism. For example, it is diminished by the substitution of less harmful material flows for more harmful ones. The second factor, m, relates to the dematerialization of the societal metabolism, more service out of a certain exchange of materials with nature. This can be achieved through reducing the flow, slowing down the flow or through closing the flow.

The third factor, u, relates to the level of consumption in society. Within a given society, among societies, and also among generations, this factor can vary significantly. The challenge is to find ways in which this factor can be reduced without compromising, or even by increasing, people's quality of life. The fourth factor, P, relates to aspect that are important for reducing the size, or at least growth rate, of populations. This can be achieved through increased access to health care, special security, education and decision- making.

CONCLUSIONS

An essential part of sustainable development is to reduce the throughput of resources in relation to the added human value. All processes degrade the quality of energy, and more or less waste is generated. From a thermodynamic point of view, those "bills" must be paid for through processes run by energy from outside the ecosphere. The sun-driven biogeochemical cycles of nature are essential to maintain life on Earth. Therefore, most of those bills must, in the end, be paid for by productive areas receiving sunlight. Consequently, the method relating various throughputs of resources to the respective fertile areas required, offers an attractive possibility of auditing sustainable development.

I have identified there types of aspects that should be handled in different ways by the method.

1. additive aspects that should be added to the method value.

2. non-additive aspects that should be adjusted to avoid double counting when included in the4 method value. These aspects should also be displayed separately and without adding them to the additive aspects.

3. aspects that should not be included in the method but should be monitored separately.

One conclusion from this study is that it is fruitful to relate the results from method calculations to a comprehensive framework of sustainability. It will help the user of the method to see what parts of sustainability are included in the method analysis. Also, it points to the aspects which the method is particularly efficient at assessing. Furthermore, a comprehensive framework makes it possible to identify what parts of sustainability, and therefore should be considered in some other way. The method is particularly effective for documenting human use or abuse of the potentially renewable functions and service of nature. Aspects that need to be monitored with other indicators and measures are activities that should be phased out completely, or almost completely, to obtain sustainability, and certain qualitative aspects of sustainability that are not easy or relevant to transfer to spatial measures.

Therefore, the method is a complementary tool to the principles for sustainability: as a yard stick for measuring the ecological bottom-line of the renewable use of the biosphere – a precondition for securing people's quality of life.

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SOIL POLLUTION WITH HARD METALS IN THE AREA OF THE TURCENI STEAM POWER PLANT

Popa Roxana-Gabriela, Calinoiu Maria[1]

KEY WORDS: hard metals, soil, pollution

ABSTRACT

This paper presents aspescts regarding the steam power plant Turceni and polluting agents resulted from the activity. The polluants are CO_2, CO, SO_2, NO_x and suspension particles (ash). The noxas caused by the burning process are: sulphur oxides, nitrogen oxides, ash, chlorine and fluorine The variations of the hard metalsCd, Cu, Zn and Pb concentrations in the soil in the area of the Turceni Steam Power Plant are presented in figures.

TURCENI STEAM POWER PLANT LOCATION IN THE ENVIRONMENT

The Turceni Energetic Complex is headquartered in Turceni, Gorj County. The steam power plant is located on the right terrace of Jiu river, in parallel with the district road Filiasi – Strehaia, 4 km from Turceni. The plant is located downstream the concrete steel bridge on the Jiu river, connecting the Turceni and Brosteni communes. The plant is located near the double electrified railway Filiasi – Rovinari (figure 1).

Fig. 1. The Turceni Steam Power Plant

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From the geographic point of view, the plant is located in the Jiu meadow, south from the Jilt brook, near its confluence with Jiu 1.5 km-E from Turcenii de Sus. From the geomorphologic point of view, the territory of the influence area of th Turceni steam power plant belongs to the Getic Piemont.

POLLUTING AGENTS RESULTED FROM THE ACTIVITY OF THE TURCENI STEAM POWER PLANT

Steam power plants are endowed with steam boilers, very hot water boilers and hot water boilers and are an environment polluting agent. By burning fuels in the boilers furnaces, burning gases are eliminated, evacuated in the atmosphere through the chimney. They include CO_2, CO, SO_2, NO_x and suspension particles (ash). The noxas caused by the burning process are: sulphur oxides, nitrogen oxides, ash, chlorine and fluorine.

a). From the sulphur combustion sulphur dioxide (SO_2 results) – 95% and the rest sulphur trioxide (SO_3) – 5%. In the atmosphere, the sulphur dioxide partially turns into sulphur trioxide.

The sulphur trioxide together with water steam forms sulphuric acid (H_2SO_4). In the case of concentrations over 1% in the air it becomes very dangerous, being able to cause a rapid death. The bad action of the sulphur dioxide can be also seen on plants, as it destroys the chlorophyll and leaves get yellow. Sulphur oxides and sulphuric acid cause metals corrosion.

b). The nitrogen dioxide and water steams form hydrogen nitrate (HNO_3). Nitrogen oxides are nitrogen monoxide (NO), over 95% and nitrogen dioxide (NO_2), for the rest. Nitrogen oxides and hydrogen nitrate are very dangerous for the human body. They attack the breathing system and transform hemoglobin into methahemoglobin, which causes paralysis.

Even in concentrations smaller than 0,5 mg in the air, inhaled for longer periods cause the weakness of the organism, making it sensitive to the action of microbes. Together with sulphur oxides, they act together causing acid rains, with serious consequences upon fauna and flora.

c). During burning, carbon oxides also develop. The Carbon monoxide (CO) is a very toxic substance, often appearing in the case of incomplete, uncontrolled burns. The carbon monoxide stops the oxygenation process, irreversibly transforming hemoglobin into carboxihemoglobin. The carbon dioxide (CO_2) has a destructive action upon the ozone layer.

d). Chlorine and fluorine are lower action polluting agents.

e). Flying ash has bad effects, due to their hard metal content of lead and cadmium.

ESTABLISHING HARD METALS IN THE SOIL IN THE AREA OF TURCENI STEAM POWER PLANT

Samples have been collected from the soil in different points:

a) 200 m N from the Steam Power Plant, from the right side near the bridge;

b) 800 m V from the Steam Power Plant, left towards Ionesti;

c) 500 m E from the Steam Power Plant, towards Cursaru near Peco;

d) 700 m S from the Steam Power Plant, after Cursaru on the right.

In all the cases the soil samples were collected at two depth levels: 0-10 cm and 10-20 cm. for comparison soil samples were collected in the summer of 2006 and 2007 and hard metals with Cu, Pb, Cd and Zn were established. Table 1 presents the values of the concentrations of the four hard metals in 2006, in comparison with 2007, in all the four analyzed directions, on the two depths.

Table 1

Hard metals concentrations for the soil samples collected in the area of the Turceni Steam Power Plant

Point of harvest	Depth sample soil	2006				2007			
		Cd	Cu	Zn	Pb	Cd	Cu	Zn	Pb
200 m N	0-10 cm	6,2	56,4	153,2	2,8	0	17,4	43,6	0
200 m N	10-20 cm	6,6	28	78,4	3,4	0,004	17,6	51,8	0
800 m V	0-10 cm	6,6	22,4	67,4	0	0	14,8	38	0
800 m V	10-20 cm	6,8	44,6	125,6	0	0	14	34	2,4
500 m E	0-10 cm	7,0	14,6	31,8	0	0	16,2	34,8	0
500 m E	10-20 cm	6,6	37,2	106,2	0	0	24	56,8	5
700 m S	0-10 cm	7,0	27,2	103,2	0	0	24,8	59	7,2
700 m S	10-20 cm	6,4	37,6	94,4	0	0	22,8	45,6	4,8

The variations of the hard metals concentrations in the soil in the area of the Turceni Steam Power Plant are presented in figures 2 (Cd), 3(Cu), 4(Zn) and 5(Pb).

In figure 2 we notice zero values on the depth of 10-20 cm, in 2007 and the depth 0-10 cm in 2007.

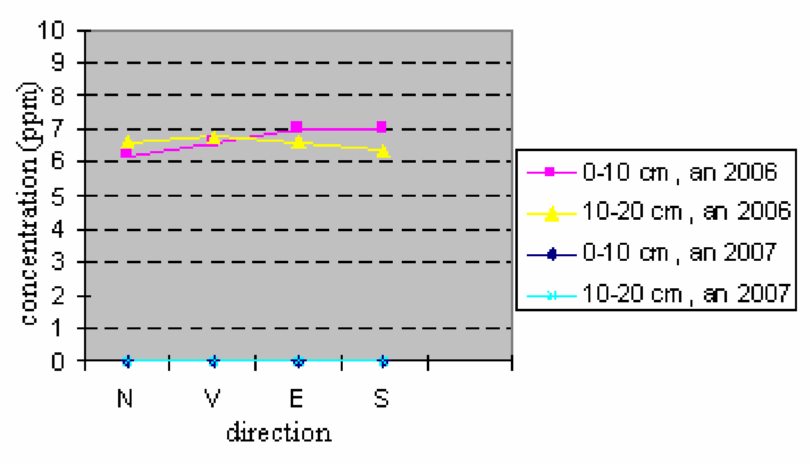

Fig. 2. Cd concentration variation in the soil

The highest concentration of Cd was registered in 2006, on the depth of 0-10 cm East and South.

In figure 3 we notice a very high concentration of Cu in North, in 2006, on the depth of 0-10 cm. The lowest value was in 2007 on the depth of 10-20 cm, West

In figure 4 we notice the highest concentration of Zn in the North at the depth of 0-10 cm, in 2006. The lowest concentration was in the East on the depth of 0-10 cm, in 2006. On the depth of 10-20 cm, the highest concentration was in the West in 2006 and the lowest in the West in 2007.

In figure 5 we notice that the highest concentration of Pb was in 2007 in the East on the depth of 0-10 cm. Zero values were in 2006, on the depth of 10-20 cm, in the East and South and in 2007, on the depth of 0-10 cm, in the West and East.

In figure 4 we notice the highest concentration of Zn in the North at the depth of 0-10 cm, in 2006. The lowest concentration was in the East on the depth of 0-10 cm, in 2006. On the depth of 10-20 cm, the highest concentration was in the West in 2006 and the lowest in the West in 2007.

In figure 5 we notice that the highest concentration of Pb was in 2007 in the East on the depth of 0-10 cm. Zero values were in 2006, on the depth of 10-20 cm, in the East and South and in 2007, on the depth of 0-10 cm, in the West and East.

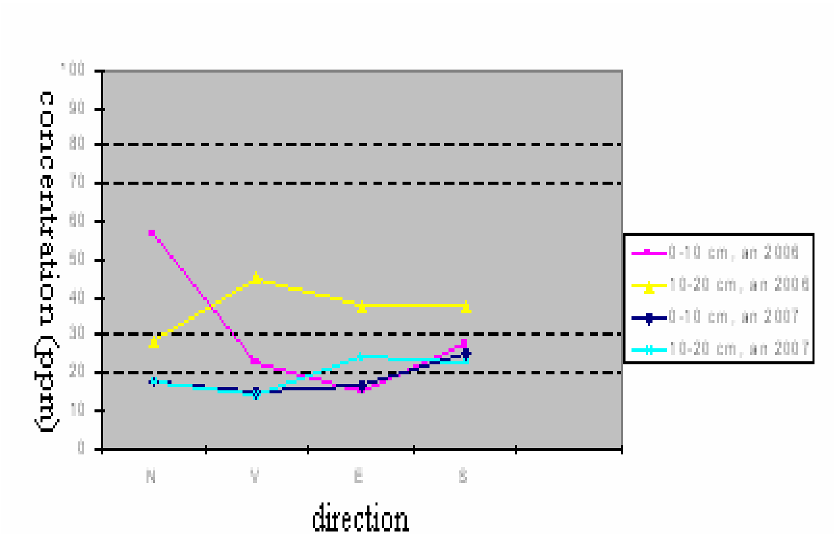

Fig. 3. Cu concentration variation in the soil

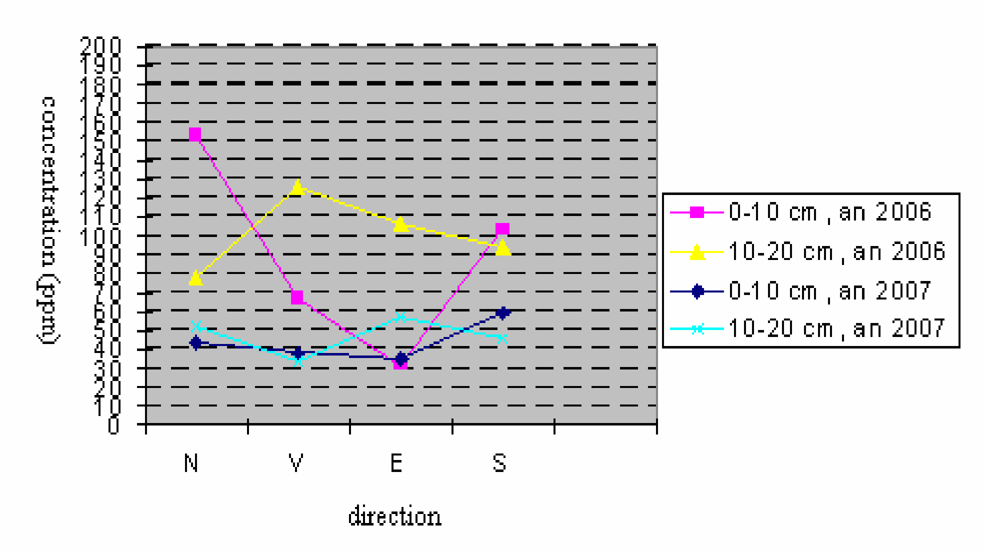

Fig. 4. Zn concentration variation in the soil

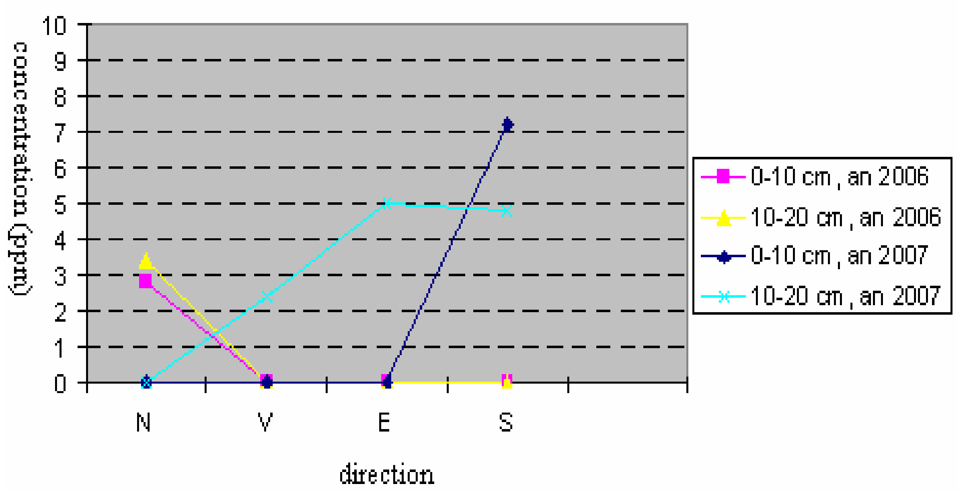

Fig. 5. Pb concentration variation in the soil

CONCLUSIONS

1. The steam power plant Turceni polluted with polluting agents resulted from her activity.
2. The polluants are CO_2, CO, SO_2, NO_x and suspension particles (ash).
3. The noxas caused by the burning process are: sulphur oxides, nitrogen oxides, ash, chlorine and fluorine
4. In figures are presented the variations of the hard metalsCd, Cu, Zn and Pb concentrations in the soil in the area of the Turceni Steam Power Plant.

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THE MANAGEMENT OF NATURAL AREA PROTECTED IN ROMANIA

Popa Roxana-Gabriela, Pecingină Irina-Ramona[1]

KEY WORDS: protected area, conservation, protection, management

ABSTRACT

A natural protected area is a terrestrial, aquatic or underground area, with a legally established perimeter with a special protection and conservation status, with species of plants and savage animals, biogeographic, landscape, geologic, paleontological, speleological elements and forms, with a special ecologic, scientific or cultural value. Protected areas are among the most efficient means for conserving biodiversity

INTRODUCTION

A natural protected area is a terrestrial, aquatic or underground area, with a legally established perimeter with a special protection and conservation status, with species of plants and savage animals, biogeographic, landscape, geologic, paleontological, speleological elements and forms, with a special ecologic, scientific or cultural value. (fig. 1)

Fig. 1. Image within a protected area at the level of Romania

The areas which have a natural and semi-natural status are the support of “life” and social and economic development. At European level, Romania has the most diversified and valuable natural patrimony, but the total surface of the protected area is still below the mean of the European Union – 7%, in comparison 15%.

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Protected areas, through their natural value and the low degree of human intervention on their territory, are the best examples and patterns for natural and semi-natural ecological systems.

THE ROLE OF THE WORLD CONSERVATION UNION IN PROTECTING NATURAL AREA

The establishment of protected areas and their management is a need, because protected areas are representatives of natural and semi-natural eco-systems that can be evaluated and monitored, expressing, to a certain extent, their status at a certain time. Natural and semi-natural eco-systems are the main components of natural capital that provides the resources and services which lay at the basis of social and economic development.

Our country has several categories of protected areas, different mainly in accordance with their protection, conservation and use status:

- Scientific reservations;
- National parks;
- Nature's monuments
- Natural reservations
- Natural parks
- Biosphere reservations
- International significant humid areas
- Natural sites of the universal patrimony
- Avifaunistic special protected areas.

Protected areas have been established where natural areas in the world are preserved, where man's intervention does not practically exist, but also areas where man's intervention is present, like in the case of altered landscapes with a special landscape and cultural significance. The forum regulating this difficult problem is the World Conservation Union which tries to influence, encourage and assist societies all over the world in the process of conserving the integrity and diversity of nature, monitoring whether every use of natural resources is right and sustainable (fig. 2).

Due to the activity carried by the World Conservation Union in this field (for nearly half a century) a system has resulted for defining and classifying protected areas. This system has been adopted by governments and explained through guidelines. The cancellation of the terminology differences can be made only by using the classification system of World Conservation Union based mainly on the objective management principle of the protected area. 6 categories for protected areas are therefore used, involving a gradation of human intervention, varying from a void human intervention (for categories I-a and I-b) to a higher human intervention (in the case of the 5th category). The 6th category is the only one added later, so that from the point of view of the human intervention they are intercalated between the 3rd and 4th categories. All categories are as important and relevant for the biosphere conservation (fig. 2).

Protected areas are among the most efficient means for conserving biodiversity. Significant resources have been invested for establishing protected areas all over the world, with the result of creating a national system of protected areas. At present, there are over 1 388 of protected areas in the world. The database of protected areas made by World Conservation Monitoring Centre is periodically updated, in three years to ensure the publishing of a new edition of the Protected Areas List of the United Nations.

The monitoring of the global network increase of protected areas, their distribution and their management objectives are vital, but it is as important to know the real state of a certain protected area and especially how efficient is the management of the protected area.

Fig. 2. The Protected Areas List of the United Nations

THE MANAGEMENT OF PROTECTED NATURAL AREAS IN ROMANIA

Three Reservations of the biosphere have been internationally declared for our country: Danube Delta (1991), Retezat (1979), Pietrosul Rodnei (1979) and 5 Ramsar sites: Danube Delta (1991), The Small Island of Braila (2001), Mures Meadow (2006), Dumbravita Fish Complex (2006), Techirghiol Lake (2006).

For protection, protected natural areas can be given *in custody.* Of 982 natural protected areas in Romania, 36 have been given in custody in 2006. The total of natural protected areas for which custody conventions have been concluded in 375, according to the database from the Environment Protection National Agency.

In table 1 and fig. 3 we notice the status of protected natural areas assigned into custody in 2006.

Table 1

Natural areas assigned into custody in 2006

Total of protected natural areas assigned into custody	No. of protected areas assigned into custody in 2006
375	36

Fig. 3. The number of authorizations issued for sampling the flora and fauna species on regions

The status of Management Plans of protected natural areas in custody is presented in fig. 4.

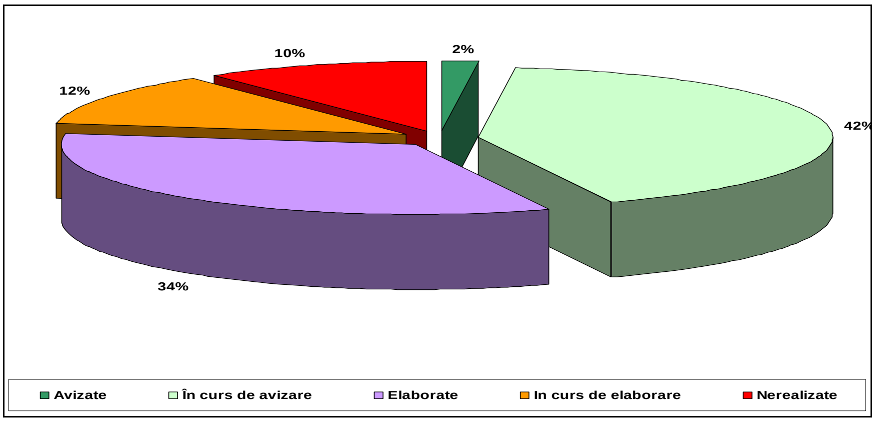

Fig.4. The status of Management Plans of protected natural areas in custody

In Romania there are 26 national and natural parks (13 national parks and 13 natural parks). These parks are included in the 2^{nd} and 5^{th} categories. The national park is a protected natural area managed for protecting ecosystems and for enjoyment (table 3 and fig. 6) and natural park is established for conserving the landscape (table 2 and fig. 5).

Table 2

Natural parks in Romania in 2007

Natural parks	Departament	Area (ha)
Apuseni	Alba, Bihor, Cluj	76022
Porțile de Fier	Caraş Severin, Mehedinți	128196
Grădiştea Muncelului - Cioclovina	Hunedoara	38116

Bucegi	Braşov, Dâmboviţa, Prahova	32598
Balta Mică a Brăilei	Brăila	20460
Vânători Neamţ	Neamţ	30841
Lunca Mureşului	Arad, Timiş	17428
Lunca joasă a Prutului inferior	Galaţi	1169
Comana	Giurgiu	24963
Geoparcul Dinozaurilor Ţara Haţegului	Hunedoara	100487
Munţii Maramureşului	Maramureş	133419
Geoparcul Platoul Mehedinţi	Mehedinţi	106492
Putna - Vrancea	Vrancea	38190
748381		

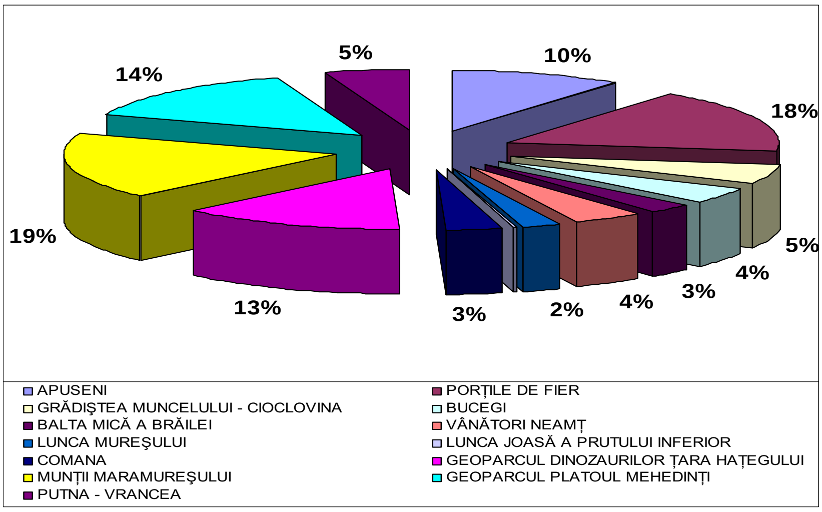

Fig. 5. Natural parks in Romania in 2007

Table 3

Natural parks in Romania in 2006

Natural parks	Departament	Area (ha)
Domogled - Valea Cernei	Caraş-Severin, Mehedinţi, Gorj	61190.03
Semenic - Cheile Caraşului	Caraş-Severin	36219.39
Cheile Nerei - Beuşniţa	Caraş-Severin	36706.99
Retezat	Hunedoara	38117.06
Piatra Craiului	Argeş, Braşov	14781.33
Cozia	Vâlcea	16720.65
Cheile Bicazului - Hăşmaş	Harghita, Neamţ	6933.23
Ceahlău	Neamţ	7739.05
Călimani	Bistriţa-Năsăud, Harghita, Mureş,	23915.37

	Suceava	
Rodna	Bistrița-Năsăud, Maramureş, Suceava	47207
Munții Măcinului	Tulcea	11114.15
Buila - Vânturarița	Vâlcea	4490.5
Defileul Jiului	Gorj, Hunedoara	13782
318917		

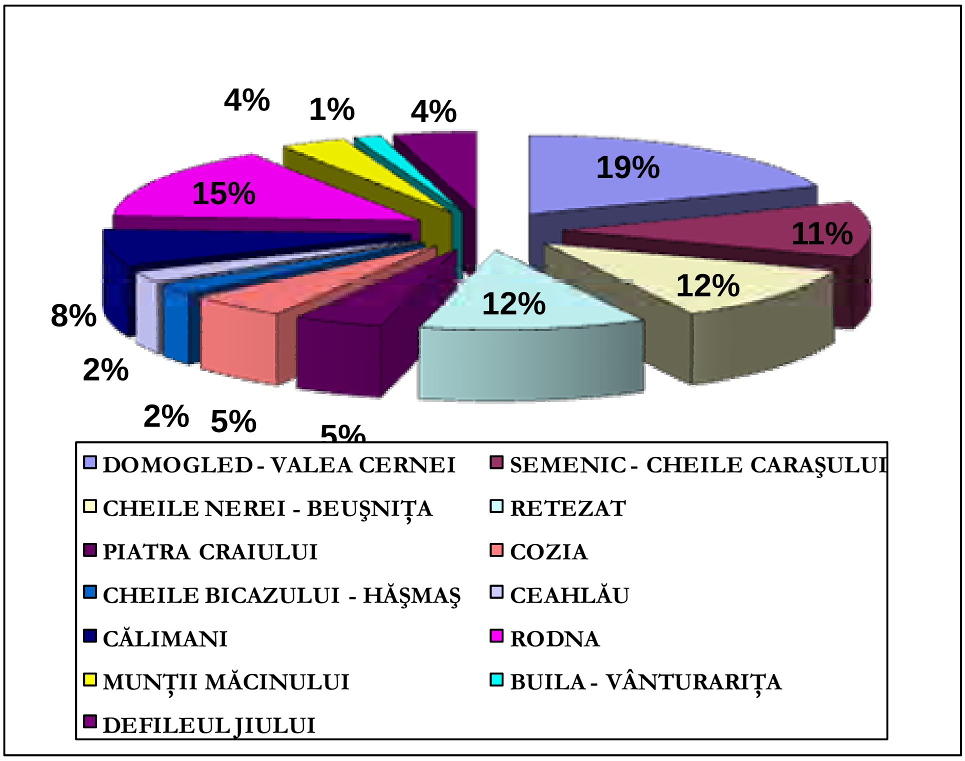

Fig. 6. Natural parks in Romania in 2006

CONCLUSIONS

a. a natural protected area is a terrestrial, aquatic or underground area, with a legally established perimeter with a special protection and conservation status.
b. the establishment of protected areas and their management is a need, because protected areas are representatives of natural and semi-natural eco-systems that can be evaluated and monitored

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CONSIDERATIONS CONCERNING A NEW ECONOMICAL AND ECOLOGICAL METHOD FOR ZEOLITE MOLECULAR SIEVES RECOVERY

Rosca Adrian[1], Rosca Daniela[1], Pricina Lucian[2]

KEY WORDS: equipment, recovery, vacuum, molecular sieves

ABSTRACT

The paper presents experimental equipment special designed and made for interdisciplinary research concerning a new economical and ecological recovery method for used zeolite molecular sieves. Due to the physical and chemical properties of the gases coming into contact with the adsorber synthetic zeolite surface, ZMS are usually used for selective adsorption of air components, for selective filtration of dangerous gases in air, for air drying used in food industry and environmental engineering. To reduce the air humidity and to reduce the concentration of hazard gaseous components in ZMS pores, the actual methods for ZMS recovery recommend the molecular sieves intensive heating at high temperature.

The paper presents experimental results concerning the possibility of used ZMS recovery using an economical and ecological method based on vacuum process and usual lower temperature.

INTRODUCTION

An experimental equipment to dry the pneumatic air used for food industry research was made and put in operation by Unconventional Equipment and Technologies for Food Industry in Faculty of Horticulture.

The experimental equipment is based on air drying system using molecular sieves A and X type.

These molecular sieves types are used too for selective adsorbtion of the molecular or complex components as CO_2 and NOx in petrochemical industry and automobile pollutant gases. [1, 2, 3]

The air drying method is possible due to the physical and chemical properties of the industrial air coming into contact with the synthetic zeolite absorber (the main components of air have molecular diameter comparable with the molecular sieve pores diameter).[3, 4]

The experimental equipment for this drying method operates in five main steps: air pressurization of the absorber vessel at the working pressure; humidity separation from air supplied under pressure; pressure equalizing in the both filtering stages; fast depressurization for purging humidity; re-pressurization at supplying.

After 200…250 hours of experimental equipment working, due to humidity increasing of the molecular sieve, the drying system is not able to provide a dried and the molecular sieves must be changed or recycled.

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[1] University of Craiova
[2] Romanian Ministry for Environment and Sustainable Development

MATERIAL AND METHOD

The experimental equipment for air drying using molecular sieves (figure 1) in main, is composed by compressed air preliminary filtration module *1*; compressed air drying module with zeolitical molecular sieves *2*; dried air storing module *3*.

The compressed air preliminary filtration module 1, in main, consists in a stainless steel cylindrical vessel with a double wall; in the inlet vessel a variable step helicoidally device *1.1* for increasing the centrifugal velocity of the compressed air. Before the exhaust part a mechanical filtration device consisting in Cu-Sn alloy porous cylindrical consisting in parts *1.2* and *1.3* was made.

The conical bottom of the stainless steel cylindrical vessel collects the water provided in the centrifugal separation. This water is purged by the electro pneumatic valve *4* which realizes the fast depressurization and purging of the adsorber vessel.

The air supply circuit is provided with an air flow meter *5.1* and pressure gauge *6.1* which indicate the air flow rate, respectively the pressure average before the drying process.

The compressed air preliminary module can realize a primary filtration in supply circuit up to 25 *μm*.

The compressed air drying module 2, in main, consists in a stainless steel cylindrical double wall vessel (H_c / D_c =10) which contains two filter device containing X – type and A – type zeolitic molecular sieves *2.1* and *2.2*.

Each filter is closed with two plane Cu-Sn alloy porous plates: the superior one *2.3* with 0,3 μm porosity, and the inferior one *2.4* with 5 μm porosity. The bottom of both filters is provided with conical Cu-Sn alloy porous plate *2.5* (α_{con} = 150°) with 0,3 μm porosity. Due to the different porosity of the inferior plane porous plate *2.4* and the conical porous plate *2.5*, the last one collects the humidity traces in the air. Each conical porous plate *2.5* is connected by a special pipe with 2/2 NO electro pneumatic valve *4* placed on the bottom of the cylindrical vessel of the air drying device system.

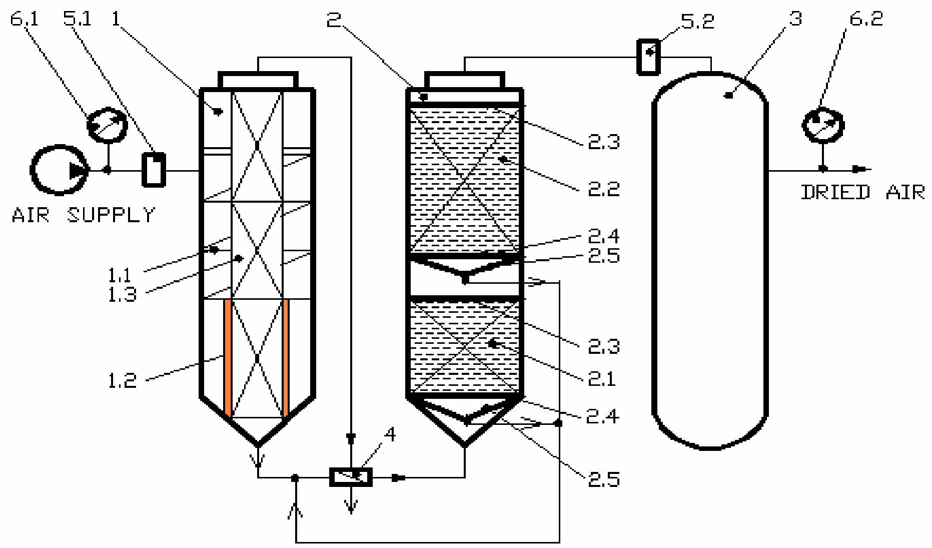

Figure 1. Experimental equipment for air drying using molecular sieves

The compressed air provided from the preliminary filtration module passes through the electro pneumatic valve when the open way is actuated. When the electro pneumatic valve is switched on the closed way, the pressure inside each conical porous plate is quickly purging (0,07 ÷ 0,12 sec) the humidity excess accumulated by the both filters. [3, 4]

The electro pneumatic valve operates in sonic range (Q = 7500 … 40000 l/min), values range which could realize the condensed water fast purging.

The dried air storing module, in main, consists in a stainless steel cylindrical vessel provided with a pressure gauge *6.2* and a flow meter for the dried air *5.2*.

All the vessels are designed and made according to ISCIR norms (State Inspection for Controlling Reservoirs, Pressure Vessels and Hoisting Units).

After 200…250 hours operating, due to the increasing the molecular sieves' humidity in the *experimental equipment for air drying using*, the molecular sieve must be changed with a new one or a recovery one. The new molecular sieve is very expensive, therefore the molecular sieve recovery is recommended.

During operating, the molecular sieve humidity might increase up to 15…20%, and the due to the porous saturation, the adsorption/drying process is not possible properly.

The molecular sieve recovery process consists in heating up to 350…450^{o}C, under 0,35…0,5bar vacuum. At this temperature range, during the heating/ drying process, in the molecular sieve a lot of micro crashes are observed (under electronic microscope). These micro crashes produce the increase of the porous dimension that determines the decreasing of the adsorption property. In the same time, the small molecular sieve particles are over heated and can not be used for adsorption/drying process.

In order to recovery at lower temperature heating and higher vacuum the molecular sieve used in interdisciplinary food research, an *experimental equipment* was set up making some adaptations of the experimental equipment for air drying using molecular sieves (figure 2). In main, in the *experimental equipment to recovery the molecular sieve*, the air supply is replaced by the *Vacuum Pump*, the drying module with zeolitical molecular sieves *2* is placed into a thermostatic *Heating Box HB*, and in the pipes circuit *Manual Valves* (*MV1*, *MV2*, *MV3*) and *Purging Valve PV* are mounted.

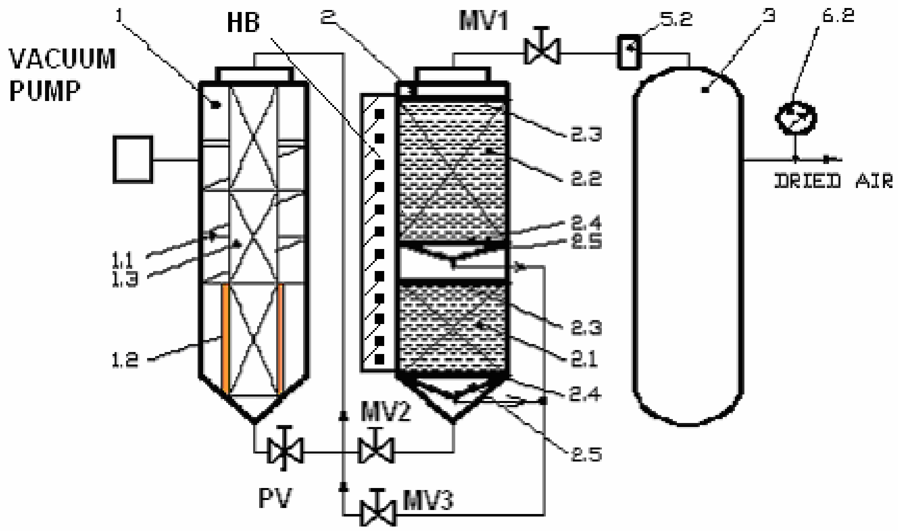

Figure 2. Experimental equipment to recovery the molecular sieve at lower temperature heating and higher vacuum

In the thermostatic *Heating Box HB,* the molecular sieve is heated gradually up to 130…150°C. In the same time, the *Vacuum Pump* realize the *preliminary filtration module 1*and *drying module with zeolitical molecular sieves 2* simultaneous depressuration up to 0,05…0,1bar. During this process, *MV1* is closed, *MV2* and *MV3* are opened, and *PV* is opened only when the condensed water in *1* is necessary to be purged. Due to the *Vacuum Pump* high flow rate, due to the pipes dimension and due to the helicoidally geometry into the *filtration module 1* vessel, the vacuumed gaseous components into *drying module 2* are quickly cooled and condensed in the *filtration module 1* vessel.

In order to observe the described experimental equipment performances, the relative density of 50cm^3 of new (never used) molecular sieve was experimentally determined (this density is considered as initial density for 1…3% initial humidity recommended for new molecular sieve). The same *molecular sieves* volume was get out from the *drying module 2*, before, respectively after the recovery process, and the relative density was determined in both steps of the recycling process. The weighting was performed with an analytical balance 0,1mg precision.

RESULTS AND DISCUSSIONS

The experimental research set up 4…6 hours the optimum duration of the molecular sieve recovery process, depending the humidity level before starting the recovery process. During this the recovery process there considered four temperature steps (120°C, 130°C, 140°C, 150°C) for heating process and a constant vacuum level about 0,05…0,1bar (absolute vacuum 0,99…0,995bar). The recovery process parameters are presented in table 1.

Process parameters for molecular sieve recovery

Table 1

Initial humidity, before the recovery process, [%]	Maximum heating temperature, [°C]			
	120	130	140	150
	Final humidity, after the recovery process, [%]			
16…17	6…8	4…6	3…5	1…3
20…21	9…11	8…10	5…7	2…4
24…25	10…12	9…11	6…8	3…5

CONCLUSIONS

The experimental results presented in this paper demonstrate the capability of the proposed experimental equipment and new economical and ecological method for zeolite molecular sieves recovery (up to 1…3% humidity) process using low temperature heating (120…150°C) and higher vacuum level (absolute vacuum 0,99…0,995bar).

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THE COLLECTING AND TREATMENT OF THE LANDFILL LEACHATE

Saracin Gilda-Diana[1]

KEY WORDS: leachate, collecting, treatment, revaluation, osmosis.

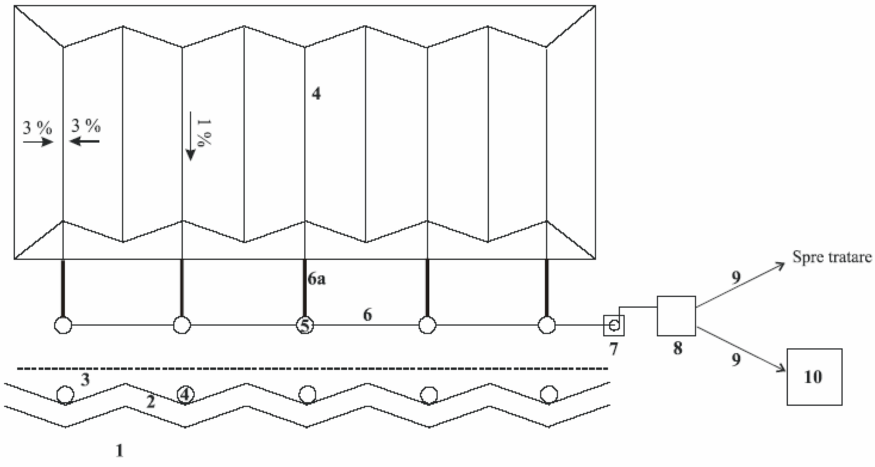
ABSTRACT

The achievement of the controlled landfill of domestic waste implies taking some safety and gathering measures of biogas and leachate, with the purpose of the protection of the atmosphere, of underground water and surrounding vegetation. The gathering of the leachate is done through draining network and through guarded kennels on the periphery of the landfill. The cleansing of the leachate resulted in the Mofleni landfill is achieved by means of the method regarding the reverse osmosis in two steps.

The quality features of the leachate suffers in time certain variations that represent the result of the evolution of biological processes that take place inside the landfill (waste). From the polluted loading point of view, the leachate reaches rather high values during the first 2-3 years of control of each cell, while later, a progressive diminution is recorded.

INTRODUCTION

The system of leachate collecting contains: the drainage layer for the leachate, the drainage pipes for the leachate, the collecting pipes of the leachate, the fireplaces, the pump stations, the stocking tank(s), the transport pipe of the leachate and the filling out installation in the case of treatment on another location .



The principle scheme of the system of leachate collecting

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1. the geological barrier
2. the built barrier
3. the drainage layer for the leachate
4. the drainage pipe for the leachate
5. fireplace for the leachate
6. the collecting pipe for the leachate

6a. the area in which the control system of the leachate discharge is being set
7. the pump stations for the leachate
8. tank for the leachate
9. the transport pipe for the leachate
10. the filling out installation for the leachate

The drainage pipe for the leachate set on the geo-textile with an attached protection layer

The collecting system of the leachate has the purpose of assuring the maintaining of the leachate in the landfill body at a minimum level. The collecting system of the leachate is projected and dimensioned according to: the generating prognosis of the leachate and the dealing technique of it (treatment in an installation of its own or evacuation towards another treatment installation).

The dimensioning of the elements that are part of the collecting system of the leachate is achieved according to the climatic features of the area, to the tightness system – projected drainage and to the type of the waste deposed and to the compaction degree of this one.

The leachate quantity is calculated for the operating phases during the functioning of the landfill, so that the critical useful values of dimensioning should be established.

For the discharge into the influent of an cleansing urban station, respectively in a natural receptor, the values of the indicators that are characteristic to the leachate have to fit in the limits established by the legislation regarding the protection of the water quality. In terms of the specific local conditions and the leachate features, its treatment can be achieved in two types of installations, namely:

- the treatment installation that belongs to the landfill;
- the cleansing station of the urban frayed water.

The recirculation of the leachate in the landfill body is forbidden, being possible only in the case of simultaneous fulfillment of the following situations, for landfills of not-dangerous waste:

1. the landfill needs to have a water proofing of the base in accordance with the stage of the technique;
2. the system of leachate collecting and treatment has to be dimensioned according to the real quantities of leachate predicted to result from the landfill;

3. there is the proof that certain areas of the landfill do not produce gas of landfill or that the gas production is too low because of the lack of water (the evolution curve of the gas production);
4. the allowed quantity of leachate to be re-circulated is forecasted by means of calculus;
5. a damping system with the control devices is planned and approved (measuring device of the leachate quantity, the deduction of the necessary time for damping).
6. the leachate is introduced in the landfill body just for the waste damping, not for the area irrigation;
7. the damping is achieved according to the authorization just for a definite period of time, at the end of the period being necessary the bringing of the proof that the damping is still necessary;
8. the collectors of the leachate from the area in which it is damped are washed once a six months;
9. if the damping didn't prove its efficiency in what concerns the gas production, then it should be interrupted.

If the leachate recirculation is indeed necessary, the motivation for this should be presented to the qualified authorities. Only after the written approval coming from the authorities, the leachate is allowed to be re-circulated in the landfill body.

MATERIAL AND METHOD

The cleansing of the leachate resulted from the Mofleni landfill is done through the method of reverse osmosis in two steps. The flow sheet in the leachate cleansing is the following: the leachate resulted from the landfill is collected in fuel trucks, V=55mc, and from here, through a submersible pump type FEKA 1800T is transported in the stocking basin, and it is during this period of time when the sulphuric acide is being added in order to lead the ph value at 6-6,5, reducing in this way the quantity of hydrocarbons from the leachate, being thus avoided a possible uncontrolled precipitation. After a phase of pre-filtration on three layers of sand, of the harsh particles, the rough leachate goes through two cellular filters installed downstream, assuring an optimum protection for the phase of reverse osmosis.The elements of the cellular filters have to be changed when the loss reaches a maximum value of 2,5 bars.

After pre-filtration, the leachate is pumped up by a high lift pump into a distribution line, at an entering line, at an entering pressure of 30-65 bars. The modular parts are connected in series at the distribution line. The pumps in line that are resistant to the high pressure of the modular unities transfer the leachate from the distribution line to the DT modules where the processes of reverse osmosis, stage I and II take place. The permeat resulted from the first stage of osmosis is again filtrated trough membranes and subdued for the second time to the process of reverse osmosis (stage II).

The treatment stage of the permeat is necessary when the quality of the cleaned water doesn't fulfill the discharge conditions. The permeat resulted from the first stage of osmosis is again filtrated through membranes being thus separated approximately 80-90% of the component dissolved in water that have passed from the first step of osmosis.

By means of the second stage, the values of the leachate can be under the standards for the drinking water, in what concerns the content of the salts and thus be used as water for the watering of the green areas inside the objective, for the watering of the concrete areas during the droughty periods of time. The high pressure pumps assure water feeding (the permeat resulted from the first stage of reverse osmosis) at DT modules from the second stage of reverse osmosis, at an operating pressure of 30-65 bars. The control values of the extract pressure controls the speed of water retreat. The extract resulted from the DT module, in the first stage of osmosis, is re-circulated in the landfill.

The quantity of the permeat resulted during the first stage is of approximately 80-90% from the feeding water volume. Its quality is continuously controlled through conductivity measuring. The concentration of the used water (the leachate) has as a purpose the minimizing of the volume of the extract that has to be evacuated. However, the concentration of the leachate is limited because of the dissolubility in the water of the reinforcement ions. The supply of the permeat will be done in a concrete basin with the volume V= 300 mc, with the purpose of using it in accordance with the technological necessities: the watering of the green areas during the droughty periods of time, re-circulation on the landfill, being reached more rapidly the degradation phase of the waste through the immediate effect of humidity growth.

The treatment installation has to assure the unfolding of the corresponding process for the reduction of the values of the concentrates at the following indicators; solid substances in suspension, the chemical consume of oxygen, ammonia azote, azotates, sulphides, chlorides, hard metals.

The main processes that are on the base of the treatment methods of leachate and also their applicability are synthesized in the following chart:

Treatment processes	Applicability (the classes of compounds that are alienated)
Biological degradation	Bio-degradable organic substances
Nitrification- denitrification	Ammonium and azote
Chemical oxidation	Hard degradable organic substances
Absorption	Organic compounds
Precipitation	Hard metals
Coagulation- clotting	Suspensions
Reverse osmosis	The concentration and reduction of the leachate volume
Evaporation, drying	Mineral salts and hard volatile compounds.
Stripping	Volatile substances

Treatment processes of the leachate

The treatment of the leachate is achieved by combining certain treatment processes in such a manner as to achieve the reaching of the quality indicators that could allow the evacuation of the effluent in the sewerage system or natural receptors.

The treatment methods must be chosen so that it could also be assured the correspondent elimination of the waste from the leachate treatment (such as: mud or the extract from the reverse osmosis).

RESULTS AND DISCUSSION

The technical data on which the projection of the cleansing station bases on are the following:

The feeding discharge**:** projected daily discharge: Q_{medium}= 48 m^3/day

The evacuation discharge:projected daily discharge: $Q_{medium\ ev.}$= 38 m^3 /day

The features of the worked used water (leachate):CBO_5 (max): 1945,7 mg/l,

Ph 7,29, Total azotes :933,3 mg/l.

CCO_{Cr} (max.):5619 mg/l, MTS:75 mg/l, N-NH_4 :631,77mg/l

Table 1

The quality of the treated water and the efficiency of the Epuration Station

No	Indicator	Unit of measure	Entrance epuration station	Exit epuration station	Values NTPA 001
1	pH	-	8,3	7,19	6,5-8,5
2	CCO-Cr	mg O_2/l	8140	66	125
3	CBO_5	mg O_2/l	2613	26	25
4	Filtrable residue	mg/l	14.400	82,34	2000
5	Electrical conductivity	µS/cm	31.000	70	
6	Calcium	mg/l	222,66	<3	300
7	Magnesium	mg/l	81	<5	100
8	sulphates	mg/l	115,22	44	600
9	Chlorides	mg/l	5680	14,2	500
10	CSR index	mg/l	113,19	0,39	
11	Saline residue	mg/l	16388	82,34	
12	Natrium	mg/l	2294	0,44	
13	Aluminium	mg/l	1,02	<0,01	5
14	Arsenic	mg/l	<0,001	<0,001	0,1
15	Cadmium	mg/l	<0,001	<0,001	0,2
16	Cyanides	mg/l	<0,002	<0,002	0,1
17	Cobalt	mg/l	<0,005	<0,005	1,0
18	Chrome	mg/l	<0,005	<0,005	0,1
19	Copper	mg/l	0,13	<0,003	0,1
20	Iron	mg/l	6,2	<0,004	5,0
21	Manganese	mg/l	1,3	<0,003	1,0
22	Mercury	mg/l	<0,001	<0,001	0,05
23	Nickel	mg/l	0,8	<0,004	0,5
24	Lead	mg/l	0,09	<0,01	0,2
25	Selenium	mg/l	<0,005	<0,005	0,1
26	Sulphates and suphurated hydrogen	mg/l	<0,02	<0,02	0,5
27	Vanadium	mg/l	<0,01	<0,01	
28	Zinc	mg/l	2,1	<0,001	0,5

The cleansing degree is beyond 99% and represents the decrease percentage, because of the cleansing, of the physical, chemical, biological polluted elements so that, the remained part to represent the limited value admitted and established through NTPA 001.

E= Ci-Ce/C1 x 100 (%) ,

where Ci represents the initial concentration of a certain polutted substance from the leachate.

Ce – the concentration of the same polutted substance after the leachate epuration.

The cleansing station was in such a manner designed so that the following possible extensions of the landfill to be projected/executed easily and functionally so that it should satisfy the needs of the Mofleni waste landfill through its period of functioning. In the case of the detection of polluted toxical substances, others beside the ones offered by the existing analysis from the actual location, in the technological scheme and the electrical pannels, it was preseen the possibility of adding in the future technical and technological means of replacing the polluted substances through addition of new technological lines to the already existing ones.

CONCLUSIONS AND RECOMANDATIONS

The new environment regulations from 1995 imply the necessity that each socio economic objective to follow, beside the main activity, the environmental problems, as well. In this way, the operator has stipulated the necessary fonds in order to acquire a modern station of leachate cleansing.

Taking into account the features of the leachate, it has been necessary the dimensioning and aquisition of a cleansing station that should function on the principle of reverse osmosis in two steps. The purpose is to improve the characteristics of the leachate so that after treatment it could be used for watering the green areas and the concrete platforms during the droughty periods of time or the recirculation on the landfill with the respect of the NTPA 001/2005 stipulations.

In what concerns the quantitative and qualitative monitorisation of the evacuated effluents, it is necessary the continuous monitorisation of the quality of cleaned water in order not to go beyond the maximum admitted concentrations stipulated by NTPA 002/2005 and the permanent following of the factors that influence the technological process: temperature, ph, the entrance debit in the cleansing station, the composition of the brute water. The organisation of the activity of the cleansing station has to be directed towards the obtaining of a possible maxim randament, with the purpose of achieving at least the proposed cleansing degree, at all the monitorised indicators.

The correct explotation of the cleansing installation, including the complex monitorisation of both the leachate and the evacuated effluent, under qualitative and quantitative, leads towards the prevention of the impact the objective activity has upon the environment, especially upon surface and underground water. The atmospherical precipitations are the meteorological element that have the most ununiformed repartition both in space and time, a context in which the deviation from the monthly and yearly media can be very high. Thus, the quantity of the resulted leachate will have variable values. From the presented data, it results that in the analysed area, the yearly quantity of precipitations is of 523m/year.

From the quality point of view, the content in polluted substances of the leachate depends on the nature of the depose waste and varies in time, in correlation with the evolution of the processes of fermentation, anaerob and aerob, of the waste.The quality features of the leachate suffer in time variations that are the result of the evolution of biological processes that take place inside the waste. From the point of view of polluted discharge, the leachate reaches relatively high values during the first 2-3 years of control of each cell, so that later to record a progressive diminishing. The bio-chemical processes of decompossing the organic substance have important effects on the quality features of the leachate. Starting with the moment of waste depossing, it starts the biological process of degradation in aerob style that takes place in the superior layer of the waste, characterized by the presence of air in the empty spaces and “enriched” with oxygen because of the water coming from rain. In this phase, with short duration, one cannot observe an important production of leachate.

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