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FRUIT GROWING & TECHNOLOGY

Pest insect-associated fungi in Romanian orchards

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Keywords: entomopathogenic fungi, *Beauveria*, biological control

ABSTRACT

The present study was conducted to determine the natural occurrence of entomogenous fungi in insect populations of fruit-tree growing interest. The most abundant entomopathogenic species was *Beauveria bassiana* (Bals.) Vuill, whose isolates constituted 56% of the total of isolated fungi, Pathogenic fungi, opportunistic pathogens and secondary colonizers were also found.

INTRODUCTION

Fungi comprise a large heterogeneous and ubiquitous group of heterotrophic eukaryotic organisms, facultative or obligate pathogens on one or more developmental stages of insects commonly found in aquatic, terrestrial and subterranean habitats. The occurrence and distribution of insect pathogenic fungi in agricultural field soils have been extensively investigated; fungal epizootics in insect populations are also well documented. There are also studies regarding the occurrence in adjacent hedgerows non-affected by agricultural activities.

MATERIALS AND METHODS

The fungi occurrence was examined in 131 insects and soil samples collected from the year 2004-2007, in different orchards, representing 10 locations in different regions of Romania. The fungi were isolated by using *Galeria bait method* (Zimmermann, 1986) to determine the natural occurrence of soil-borne entomopathogens and *direct isolation method on selective media* in the case of insect samples. Because insect-pathogenic fungi usually need moisture to enable sporulation, field collected insects that died in the laboratory were maintained in moist chambers (Petri dishes with filter paper soaked with water) and incubated at 25^0C. The fungal isolates were cultured on potato-dextrose-agar (PDA), incubated at 24^0 C and kept until mycelium and sporulation occurred. Standard identification techniques for entomogenous fungi were employed. Determination of frequency of occurrence of isolates was carried out a method presented by Okigbo and Nwakammah (2005)**.** Fungal viability was determined by serial dilution plating onto PDA; after 48 hours incubation period at 24^0 C the colony forming units were counted.

RESULTS AND DISCUSSION

Of the insect-associated fungi, the dominant sp was *B. bassiana*, a very common entomopathogenic fungus recorded as occurring on more than hundred insect and mite species and known as a key regulatory factor in insect pest population, currently used as a bioinsecticide. In our study, it was isolated from

pests of plum, apricot, apple and pear-trees, representing 8 insect species belonging to the ord. Lepidoptera, Homoptera, Hymenoptera and Coleoptera. *B. bassiana* was isolated from larvae and adults on foliage (fig. 1) and *Galleria* larvae baited in soils. From soil sampled in an orchard of apple trees infested with fall webworm larvae it was identified *Metarhizium anisopliae* in conidial stage. There are numerous authors who confirm the commune occurrence of *B. bassiana* and *M. anisopliae* in soil (Kurzawinska, 1997).

From soil it was also isolated *Fusarium oxysporum,* an abundant and active saprophyte in soil and organic matter, with some specific forms that are plant pathogenic, causing *Fusarium wilt* disease in more than a hundred species of plants. Its saprophytic ability enables it to survive in the soil between crop cycles in infected plant debris. The fungus can survive either as mycelium, or as any of its three different spore types (Agrios, 1988). *F. oxysporum* isolated in our study from soil samples is mentioned in other studies as entomopathogenic for the fall webworm larvae (Pelagatti et al., 1988).

It was also isolated opportunist fungi and secondary colonizers, that are essentially saprophytic, but in same ecological conditions may become weakly pathogenic and can cause epizooty in susceptible insects. It was isolated the following microscopic fungus belonging to the microflora of the soil: *Trichotecium roseum, Penicillium lividum, Alternaria tenuis, Aspergillus* sp. Of the soil-borne fungus, *Trichoderma viride,* was the most abundant in the samples evaluated. It was also identified *Penicillium* sp., a large genus containing both parasitic (producing rots of fleshy plant parts) and saprophytic species.

The fungi isolated and identified in the course of this mycological study, with the indication of their hosts and frequencies of isolation are presented in table 1.

CONCLUSIONS

Under natural conditions many fungus cause serious epizootics among natural populations of orchard pests, because many insect pests are particularly susceptible to infection by naturally occurring insect-pathogenic fungi. In our climatic and ecological conditions the entomopathogenic fungi *B. bassiana* and *Manisopliae* can be important natural control of pests in orchards and, , pathogens collected from this survey will serve as a source of potential biological control agents.

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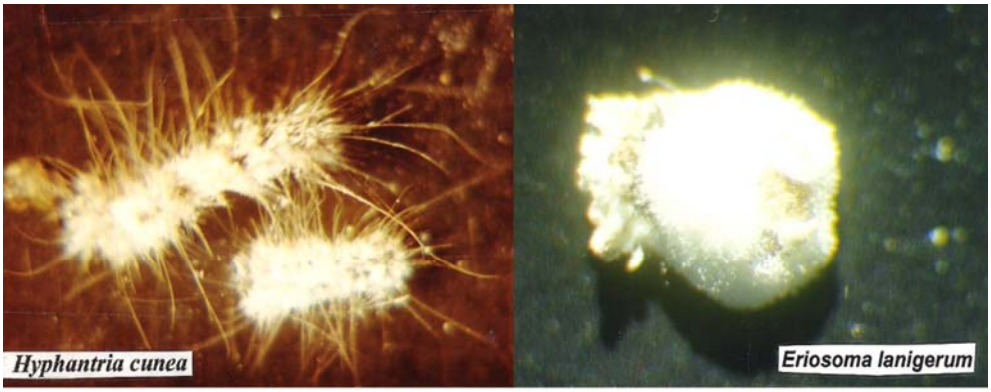
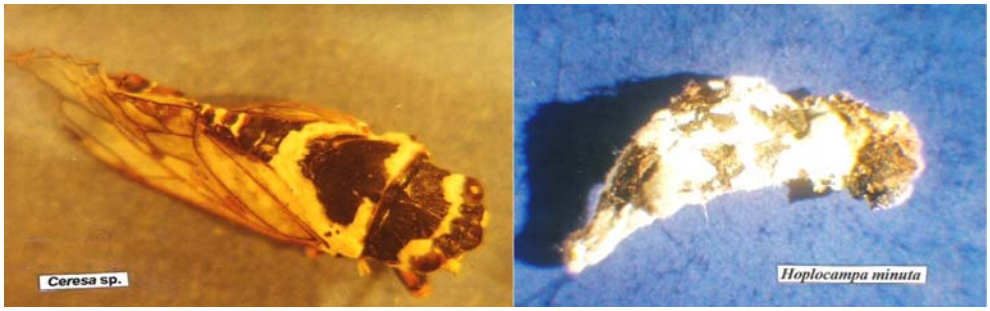
Table 1. Fungi isolated in Romanian orchards

Sampling		Substratum of fungus isolates	Fungus species	Occurrence freq. (%)
site	**date**			
Moara Vlasiei (SAI)	Aug/2004	*Hyphantria cunea*	*Beauveria bassiana*	67,8
		Soil	*Trichotecium roseum*	12,0
			Mucor sp.	19,4
			Beauveria bassiana	86.3
			Fusarium oxysporum	39,7
Armasesti (Ialomita)		*Eriosoma lanigerum*	*Beauveria bassiana*	11,2
Bilcesti (Arges)		*Eurythoma schreinerii*	*Beauveria bassiana*	78,3
		Soil	*Beauveria bassiana*	81,6
			Trichoderma viride	91,1
			Aspergillus niger	46.1
Bucuresti- Baneasa	Jul/2005	*Psylla pyri*	*Beauveria bassiana*	88,5
Bucuresti- Baneasa	Sept/2005	*Ceresa* sp.	*Beauveria bassiana*	2,7
		Soil	*Fusarium oxysporum*	75,6
			Penicillium lividum	33.5
			Trichoderma viride	78,7
			Beauveria bassiana	81,1
Malu Rosu (Ialomita)	Oct/2005	*Hoplocampa minuta*	*Beauveria bassiana*	32,9
Draganesti (Prahova)		*Rhynchites bachus*	*Beauveria bassiana*	11,6
Maracineni (Arges)		*Otiorrhynchus sulcatus*	*Beauveria bassiana*	83,5
Hârsova (Constanta)	Nov/2005	Soil	*Metarhizium anisopliae*	3,7
Dridu (Ialomita)	Sep/2006	*Galerucella luteola*	*Beauveria bassiana*	76,7
			non-sporulating mycelium	51,0
		Soil	*Beauveria bassiana*	59,9
			Alternaria tenius	22,8
			Trichoderma viride	75,3
Dabuleni (Dolj)	Jul/2007	*Hyphantria cunea*	*Beauveria bassiana*	71,2
		Soil	*Beauveria bassiana*	39,5
			Penicillium sp.	71,1

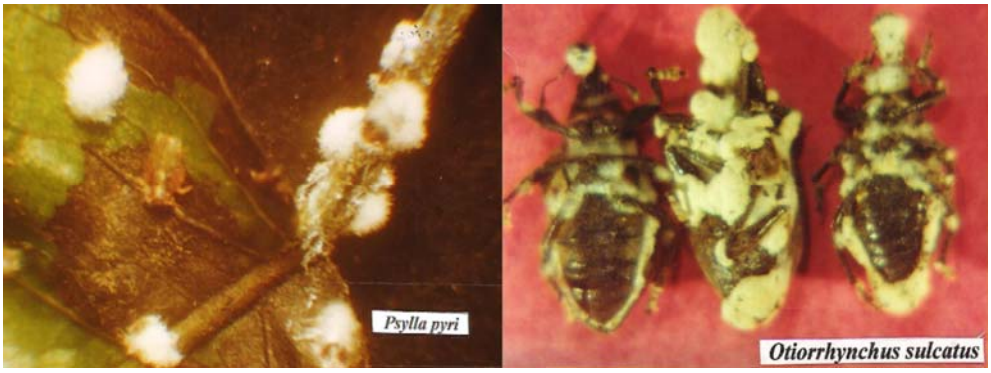


Hyphantria cunea *Eriosoma lanigerum*



Ceresa sp. *Hoplocampa minuta*

Eurythoma schreinerii *Rhynchites bachus*



Psylla pyri *Otiorrhynchus sulcatus*

Fig. 1 Insects covered by the *Beauveria bassiana* white cottony mould layer

New breeds and elites with perspective, with genetic resistance against the principal diseases and pests of the pear tree

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Keywords: *Pyrus serotina*, *Erwinia amylovora*, *Psylla sp*., *Venturia pirina*, hybridization, selection

ABSTRACT

One of the causes determining the regress of the pear culture in Romania was the sensibility of the present assortments' breeds to scurf, bacterial fire and meliferous fleas attack; attack; in order to counteract these shortcomings, in the year 1960 at D.P. Voineşti an improvement program was initiated, having as the principal objective the resistance against the principal diseases of the pear tree, through inter-specific sexuate hybridization, after the backcroos and the modified backcross methods. The first homologated breed, obtained after this method, was the Euras breed (1994), and followed by the breeds: Orizont, Corina (2003) and Tudor (2007). There is a series of selections in different testing stages, selections which have the proprieties required by the proposed selection objectives.

INTRODUCTION

As long as the pears are asked for by the consumers, the culture of this species must enter into the attention of the fruit producers. The regress of the pear production must be halted, acting on the causes determining it, among which the most important are: the sensibility to the *Psylla* sp., bacterial fire (*Erwinia amylovora*) and not last - the lack of keeping spaces, equipped with refrigerating installations. The researches performed at Voineşti, beginning with the year 1960, had in view the obtaining breeds of resistant against scurf (*Venturia pirina*), bacterial fire (*Erwinia amylovora*), meliferous fleas (*Psylla* sp.), besides the other agro-biological qualities, required for a commercial breed.

MATERIALS AND METHODS

The principal initial source for the resistance against scurf, bacterial fire, meliferous fleas, especially *Psylla pyricola* (Först), were the biotypes cultivated with ascendancy in *Pyrus serotina*, originating from North Korea**.** These biotypes were inter-breeded successively, in the backcross and in the modified backcross system, with breeds from the European assortment, with the purpose of improving the organoleptical qualities of the fruits, their appearance, and also their agro-technical qualities. The improvement works started in the year 1960, obtaining successively the series F1; F2; F3; - and to a lesser degree F4. The biological material obtained at each filiations, underwent a negative selection in the fortification field and a positive selection in the selection fields. The first selections having agronomical and biological qualities suitable for a commercial breed were identified in F3. The next study and experimentation stage was the testing of the selections in competition micro-cultures (the DUS and VAT test); this way were created, successively, more such cultures, with genotypes retained from the hybrids selection from F3 and F4.

Presently, the tests are performed in 4 micro-cultures, created for this purpose in the years 2001, 2003, 2007 and 2008, with 52, 60, 27 and respectively 12 genotypes, the most of them obtained by sexuate interspecific hybridizations. The observations and the determinations in the competition microcultures, consisted in: observing the fructification type, the phenology of the fruit bearing organs, establishing the tree strength after the trunk girth at 30 cm from the grafting point, the fruit production in kg/tree and t/ha, the degree of the resistance against scurf (*Venturia pirina*), bacterial fire (*Erwinia amylovora*), under the conditions of not treating with fungicides, the tolerance at *Psylla* sp, under the conditions of applying a single specific treatment for the development limitation of the population of this pest (it is to be mentioned that for the breeds sensible to this pest, 2-3 treatments are applied).

The technology applied in the experimental lots is that specific for the intensive pear tree orchards.

RESULTS AND DISCUSSIONS

Following the repeated selections in the selection field and the testing of the valuable biological material in the competition micro-cultures (The DUS and VAT test) the breeds: Euras, Orizont, Corina and Tudor where homologated – and in an advanced test phase are the genotypes 9/19-81 and 2/8-86; also promising results have been obtained at the genotypes being in the first test years.

In the year 1994, the breed 116/4.DA was homologated under the name Euras, a breed obtained after the following hybridization scheme: [(b.c.[*1] x Pyrus serotina x Olivier de Serres) x Decana Comisiei)] x Decana de Iarnă.

The tree has a medium strength, a small branching angle, a pyramidal crown, it bears fruits mainly on short branches, having no affinity to the quince tree as a graft bearer; it produces constantly 25 -30 t/ha at a charge of 1000 trees per hectare, blossoming at 2-3 days after the Williams breed; being auto-sterile, it needs an pollinator.

The fruit has a medium size; it is egg-shaped, the skin colour at consumer maturation is yellow; under strong sunshine conditions it is lightly red on the sunbathed side. The pulp half–fine, without sclereides in the most years; the dry substance content is 14-16%. The taste is good to very good, sweet, with a pleasant aroma. It is remarked by its resistance against scurf, its tolerance to the bacterial burning in orchard conditions and – in the absence of fungicides treatments – it presents some tolerance degree to the white staining (*Micosphaerella sentiva*) and to the brown staining (*Fabraea maculata*) attack.

It requires 2-3 treatments for the San-Josė louse combat and 1-2 treatments for the meliferous fleas (*Psylla* sp.) attack.

The fruits can be kept in stores without refrigerators until April, when they reach consumer maturity. The stores must be well sterilized and have to assure an atmospheric humidity of 85-90%.

[1] * = cultivated biotype

The breed Orizont, sin 2/102-81, homologated in the year 2003, was obtained after the scheme: [(b.c.* x Pyrus serotina x Olivier de Serres) x Olivier de Serees] x Josephine de Malines.

It is remarked by its resistance against scurf, bacterial burning, *Psylla* sp. The tree has a medium strength, big branching angles, a globe shaped crown, a tendency of branches emptying – a fact that imposes annual shortening cuttings of the semi-skeleton. The fruit is spherical, lightly prolonged, medium to large, being yellow at consumer maturity (December- January, in stores without refrigerators); it has a good taste. The production potential is 20-25 t/ha.

The Corina breed, sin 9/55-81, was obtained after the following scheme: Passe Crassane x [(b.c.* x Pyrus serotina x Olivier de Serres) x Decana de Iarnă].

The tree has a medium strength; it blossoms 2-3 days before the Williams breed; the fruit bearing potential is 25-30 t/ha. The fruit is cone frustum shaped, yellow tanned at consumer maturity (October-December), with a good to very good taste. It is resistant against scurf and bacterial fire and is sensible to *Psylla* sp.

The Tudor breed, homologated in the year 2007, was obtained after the following scheme: [(b.c.* Pyrus serotina x Decana de iarnă) x Passe Crassane] x TN 30-44A.

The tree has a medium strength, a pyramidal crown; it bears fruits on medium and short branches; medium blossoming. The realized production in the year 5 after planting (grafted on a franco graft bearer) was 18.5 t/ha – and the estimated potential is 30-40 t/ha. It has an affinity to the quince tree. The fruit is big, pear – shaped; the basic skin colour is yellow, covered with vivid red on ½ of the surface at consumer maturity, with a very attractive appearance. The fruit pulp is cream coloured, with a fine structure, without sclereides, with a very good taste (dry substances 14.5%). The consumption period is October – November, when kept in non-refrigerated stores. The breed is resistant against scurf (*Venturia pirina*), tolerant at the bacterial fire (*Erwinia amylovora*) and Psylla sp. The testing of the resistance against scurf was done under the conditions of not applying fungicides treatments, a situation revealing also the tolerance to the other diseases of the species: white staining, brown staining, etc. From the performed observations in the test cultures, this breed can be cultivated with a reduced number of phyto-sanitary treatments (4-5 as compared to 15-16). The treatments have in view the combat of the San José louse, the diminishing of the biological reserve of *Psylla* sp and the attack pressure reduction of the bacteria *Erwinia amylovora* (bacterial fire).

The economical efficiency: the diminishment of the negative impact on the environment; the cost reduction at the phytosanitary treatments with circa 50-60%, representing a reduction with 10-15% of the total production expenses.

The applicability domain: commercial plantations, family orchards in the zones favourable for the pear trees culture; genitor potential in the improvement works.

The selections 2/8-85 and 9/19-81 are in the final test phase, the first obtained sexuate intraspecific hybridization by the modified backcross method,

and the second obtained by the same method, by sexuate inter-specific hybridization.

Both elites remark themselves by resistance or tolerance to the bacterial fire, scurf, white and brown staining, *Psylla* sp. The tree has a small to medium strength, productions of 30-35 t/ha, showy fruits and very good taste. The consumer maturation period is October – November.

Further testing of the other selections, in different stages in the competition micro-cultures, will follow. After the results obtained till now, the selections 25/25-86; 36/18-86; 4/17-88; 4/117-88 are remarked, selections which meet the qualities conforming to the established objectives, respectively appearance and pleasant taste of the fruits, high production potential, genetic resistance against the principal diseases and pests of the pear tree.

The homologated breeds: Euras, Tudor, Corina and Orizont are included in the official breed catalogue and multiply themselves in the nursery.

CONCLUSIONS

The initial gene sources for the resistance against scurf (*Venturia pirina*), the bacterial fire (*Erwinia amylovora*), *Psylla* sp., were the cultivated biotypes, having ascendancy in *Pyrus serotina*, originating in North Korea.

For the improvement of the fruits appearance and of the taste qualities – and also of other useful agronomic features, as genitors were used breeds of the European assortment, so that the good taste of the fruits is transmitted to the descendents by the breeds Josephine de Malines, Decana de iarnă, Decana comisiei, TN 30/44 Angers, Passe Crassane.

In all analyzed cases, the combinations in which biotypes originating from Pyrus serotina were used; the transmission percentage of the resistance against diseases and pests to the descendants is greater than in the case of the intraspecific hybridization. It seems that the resistance against scurf is monogamically controlled, because the segregation is done in distinct classes: resistant and sensible.

The duration of obtaining a commercial breed by using the mentioned genotypes is at least 20-25 years.

The behaviour of some walnut biotypes in the city of Urseni, county Timiş

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Keywords: walnut, biotypes, biometry, chemical composition

ABSTRACT

Seniority of walnut culture and the fact that it is spread widely in different climatic conditions and soil around the globe have led to the conclusion that the walnut species is a very plastic, easily adaptable one. The long time culture of walnut and its wide spread in different climatic and soil conditions in the world made up the conclusion that the walnut is a very plastic species, easy adaptable. Because of its heterosexual pollination, within the species *Juglans regia* L. there are some trees resistant to frost and others very sensitive, some with late flowering and others with early flowering, resistant to diseases in different ways, productive or less productive. This variability has an advantage because it is possible to choose the most representative biotypes proper for the soil, climatic and economical conditions of each region. On the occasion of propagation is evident that the fruits were chosen, the ones which seemed more valuable and it was a small selection. Natural conditions of the new regions of the outstanding culture may often harsh than those in places of origin of the species have led to a natural selection, by eliminating less rustic biotypes. The best biotypes in Urseni area are considered U 1007, U 1009 and U 1008 as they have a good size and form index and a high percentage of kernel.

INTRODUCTION

In Banat, the walnut is spread everywhere especially in the southern part, it is present in towns (urban and rural) and also in family gardens. In Romania were conducted research programs on the selection of the most valuable types, and artificial hybridization between these types by some authorities [1, 2, 3]. As a result of work carried out was obtained and recommended for implementation in manufacturing several varieties of walnut.

The long time culture of walnut and its wide spread in different climatic and soil conditions in the world made up the conclusion that the walnut is a very plastic species, easy adaptable.

The purpose of this paper work was to determine the most valuable biotypes in Urseni area in order to recommend them for culture in this part of the country and to multiplicate them. So there were established the biotypes that had a good size and form index and also a high percentage of kernel in the nut shell.

MATERIALS AND METHODS

In the present work we studied several biotypes of walnut, grown in the town Urseni, from where we had the possibility of collecting the biological material. Trees are grown in the hearth village, near housing, they are old and local biotypes and Geoagiu 65 variety was considered the witness of the experiment, being cultivated at the Didactic Station Timişoara.

Local biotypes were brought to the laboratory of Fruit Culture Discipline, where there were performed gravimetric and biometric calculations.

In the laboratory there were done biometrical measurements and there were determined the big diameter, the small diameter and the large height of

walnuts which gave the shape and the size of the fruits and they were also weighted.

The physical-mechanical composition of walnuts was determined by measuring the thinness of the nutshell and the space occupied by the kernel. The varieties that have more kernel than nutshell are the most valuable.

RESULTS AND DISCUSSIONS

The values of the biometric elements of fruits are presented in table 1.

Index size fruit (Is), are worth between 31.32 mm in biotype U 1008 and 42.36 mm in biotype U 1002, and the variety Geoagiu 65 (witness) has values of 39.30 mm. The rest of the biotypes have values between these limits. This means that the fruit sizes are quite varied, from large, as is the case biotype U 1002 to very small, as is the case biotype U 1008.

Index shaped fruit (If), is calculated to determine accurately the shape of fruit. Index of form is between 137.68 to biotype U 1004, respectively biotype 91.14 to U 1002. A more detailed analysis of this index shows that the 2 varieties have oval-shaped fruit, plus witness variety, 4 are ovoid and 3 are spheroid.

The physical-mechanical composition of the fruit is an essential factor in determining the quality of walnuts. International standards regarding the chemical-mechanical composition of fruits provide a value of over 42-50% kernel of the average mass, thin peel, pleasant taste. The physical-mechanical composition of the studied biotypes is presented in table 2.

Mass average varies between 9.40 grams for biotype U 1009 and 30.60 grams for biotype U 1002. Most of the biotypes have values around 12.00 grams, only the witness has a higher average mass of 20.06 grams.

Percentage of kernel varies from 33.33% to biotype U 1002, up to 53.57% to biotype U 1007. The percentage of kernel is very good for the biotypes taken in the study, thus: 6 of biotypes taken in the study have a good kernel, over 42.5%, including the witness. The varieties that have less nutshell percentage are also valuable and they are U 1007 and U 1009.

CONCLUSIONS

As we mentioned in the introductive par of this paper work the purpose of this paper work was to determine the most valuable biotypes in Urseni area in order to recommend them for culture in this part of the country and to multiplicate them. So there were established the biotypes that had a good size and form index and also a high percentage of kernel in the nut shell.

Biotype that have valuable fruits (large fruit with a high percentage of kernels) are U 1007, U 1009, U 1008, which have a rate of over 50%, followed by biotype U 1003, U 1004, U 1006 with over 46.00% kernel and witness Geoagiu 65 with 44.89% core.

We recommend the multiplication of these biotypes as they are very valuable and easy to cultivate in the region of Timiş County.

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Tables

Table 1. The biometric elements of the fruits (average 2005-2007) (mm)

Nr. crt.	Genotype	Shape size			Is	If	Fruit shape
		D	d	H			
1	U 1001	41,90	35,13	38,84	38,62	100,84	spherical
2	U 1002	38,26	37,06	51,76	42,36	91,14	spherical
3	U 1003	35,86	32,43	40,68	36,32	119,13	ovoid
4	U 1004	32,52	30,06	38,62	33,73	137,68	elliptic
5	U 1005	35,25	29,68	33,33	32,75	102,68	spherical
6	U 1006	32,08	30,89	36,18	33,05	114,91	ovoid
7	U 1007	37,05	35,44	42,85	38,44	118,22	ovoid
8	U 1008	29,86	26,86	37,25	31,32	131,34	elliptic
9	U 1009	33,18	30,33	35,12	32,87	110,59	ovoid
10	Geoagiu 65	36,28	34,92	46,72	39,30	131,23	elliptic

Table 2. Physical-mechanical composition of the fruits (average 2005-2007)

Nr. crt.	Biotype	Average mass (g)	% of kernel	% of shell
1	U 1001	17,30	36,41	63,59
2	U 1002	30,60	33,33	66,67
3	U 1003	14,80	47,97	52,03
4	U 1004	12,70	46,45	53,55
5	U 1005	9,80	36,00	64,00
6	U 1006	10,00	46,00	54,00
7	U 1007	11,20	53,57	46,43
8	U 1008	12,00	50,00	50,00
9	U 1009	9,40	53,19	46,81
10	Geoagiu 65	20,06	44,89	55,11

The biological efficiency of some products for the combat against the San-José (*Quadraspidiotus perniciosus Comst.*) louse under the conditions of the tree growing Voineşti region

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Keywords: apple tree, pest, attack, new insecticides, attack degree.

ABSTRACT

The San-José (*Quadraspidiotus perniciosus Comst.*) louse is an extremely dangerous pest for the Dâmbovița County orchards.

The researches, performed at SCDP Voineşti in the period 2006-2008, present the results regarding the efficiency of some new insecticides, besides the classical insecticides with known biological efficiency, in the combat of the San-José louse. A good efficiency was found at the substances Movento 150 OD in the year 2006, respectively at Movento 150 SC in the year 2007. Also a maximum efficiency was observed in the year 2008 at the mixture of the chemical product Movento 100 SC conc. 0.1% and the mineral oil (Confidor oil) conc. 0.2%, with a mobile grub's mortality of 94.6%.

INTRODUCTION

The San-José (*Quadraspidiotus perniciosus Comst.*) louse is an extremely dangerous pest for the Dâmbovița County orchards, the damages manifesting themselves initially by the general weakening of the trees, an aspect that leads in time to their death.

The pest nourishes itself by pricking and sucking the sap from the tissues of the attacked organs and in parallel it injects saliva, containing an enzyme complex, at which the plant reacts by a colouring in red and red violet of the afflicted zones.

The sap exhausted branches loose buds, the tissues get necrosis and split and the trees dry out from the top to the base. The fruits remain small and deformed – and the leaves grow yellow and fall down.

The researches performed at SCDP Voineşti in the period 2006-2008, present the results regarding the efficiency of some new insecticides, besides classical insecticides with known biological efficiency in the combat of the San-José louse.

MATERIALS AND METHODS

The researches were organized in the period 2006-2008 on an experimental lot of the tree growing farm no. 1 at SCDP Voineşti, on the Ionathan breed, on the graft bearer M 106. The crown form is free palmed, with planting distances of 4 x 3.5 m, the intervals between the rees rows being maintained covered with grass – and herbicides being used on the row for weeds combat. The tree age is 14 years.

The experiment was organized in the years 2006-2007, with 3 variants each, respectively 6 variants in 2008.

2006: V_1 – Movento 150 OD conc. 0.1%; V_2 – Decis 25 WG (STD) conc. 0.003%; V_3 – Untreated witness.

2007: V_1 – Movento 150 SC conc. 0.083%; V_2 – Pirinex quick conc. 0.1%; V_3 – Untreated witness.

2008: V_1 – Decis Mega 50 EW conc. 0.015%; V_2 – Movento 100 SC conc. 0.125%; V_3 – Movento 100 SC conc. 0.1%; V_4 – Movento 100 SC conc. 0.1% + mineral oil (Confidor Oil) conc. 0,2%; V_5 – Reldan 40 EC conc. 0.15% ;V_6 – Untreated witness.

The trees presented a medium biological reserve - and the pest evolution was followed up on samples of attacked branches, registering the coming out of the first mobile grubs, the maximum coming out and the end of each generation.

The treatments were applied at warning with the treatment pump – Atomizor STHIL 400. The number of applied treatments: 4 (2 treatments/ generation). The solution quantity was calculated for 1500 l/ha. Each variant comprises 5 trees. Annually 2 observations and determinations on branches of different ages: 1 year, 2 years and over 2 years each were performed, being taken pieces of 30 cm each of the attacked zones.

RESULTS AND DISCUSSIONS

In the last years, in the Dâmbovița County orchards a come back of the the San-José louse attack was observed, especially in the apple tree orchards, having two generations per year. The damages caused by them impose the correct treatment warning and the promotion of the best combat products.

The new product Movento 150 OD was studied in comparison with a standard insecticide - Decis 25 WG (STD) conc. 0.003% and with the untreated witness in the year 2006 – and the product Movento 150 SC was studied in the year 2007, in comparison with the standard variant Pirinex quick conc. 0.1% and with the untreated witness.

From the table no. 1 it can be seen that the product Movento 150 OD assured, following the observations performed at the 2 generations, a grub's mortality of 94.0% as compared with the standard insecticide - Decis 25 WG (STD) with 70.5% - and a natural mortality of 22.7 % at the untreated witness in the year 2006. The insecticide Movento 150 SC presented in the year 2007 a mortality of 90.8%, as compared with the standard variant Pirinex quick (STD) 73.1% and with the untreated witness, with 21.9%.

In the table no. 2 presents the results obtained in the year 2008, regarding the biological efficiency of the product Movento 100 SC, applied in different concentrations, besides the standard variant Reldan 40 EC and with the untreated witness. The best pest combat action was observed at the mix: Movento 100 SC + mineral oil (Confidor Oil) conc. 0.2%, with a mobile grub's mortality of 94.6%, as compared with STD Reldan 40 EC 93.8% - and with the untreated witness 21.9%. The data resulted following the observations performed at the 2 generations developed annually in the Voinești tree growing region.

CONCLUSIONS

The used insecticides had a good effect on the limitation of the din San-José louses attack, - and the tested substances can be used successfully in the combat of this pest in the Voineşti tree growing region and in zones with similar climatically conditions.

The product Movento 150 OD presented a good efficiency in the year 2006, with a mortality of 94.0% - and in the year 2007 the insecticide Movento 150 SC was pointed our with a good combat action, presenting a mortality of 90.8%.

Among the insecticides tested in the year 2008, the mix of the product Movento 100 SC conc. 0.1% + mineral oil (Confidor Oil) conc. 0.2% presented the best efficiency, with mobile grubs' mortality of 94.6%, as compared with the untreated witness variant with 21.9%.

The attack of the San-José louse (*Quadraspidiotus perniciosus Comst*.) on the young branches of the apple tree breeds leeds to trees growth and development modifications.

The alternative use of the insecticide products reduces the appearing possibility of the resistance phenomenon; their use in combat has always to be based on a correct application of the insecticide solution on the plant.

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Table 1. The biological efficiency of the products Movento 150 OD and Movento 150 SC in the combat of the San-José louse in the period 2006-2007.

Variant (product)	Conc. %	Year	Obs. Nr.	*Quadraspidiotus perniciosus*		
				Total mobile grubs	of which mortality	
					Nr.	%
Movento 150 OD	0,1	2006	I	908	819	90,1
			II	876	858	97,9
Total variant				**1784**	**1677**	**94,0**
Decis 25 WG (STD)	0,003	2006	I	900	553	61,4
			II	830	667	80,3
Total variant				**1730**	**1220**	**70,5**
Untreated witness	-	2006	I	885	219	24,7
			II	949	199	20,9
Total variant				**1834**	**418**	**22,7**
Movento 150 SC	0,083	2007	I	755	675	89,4
			II	803	741	92,2
Total variant				**1558**	**1416**	**90,8**
Pirinex quick (STD)	0,1	2007	I	900	545	60,5
			II	725	643	88,6
Total variant				**1625**	**1188**	**73,1**
Untreated witness	-	2007	I	875	288	32,9
			II	902	178	19,7
Total variant				**1777**	**466**	**26,2**

Table 2. The biological efficiency of some new insecticides in the combat of the San-José louse in the year 2008.

Variant (product)	Conc. %	Obs. nr.	*Quadraspidiotus perniciosus*		
			Total mobile grubs	of which mortality	
				Nr.	%
Decis Mega 50 EW	0,015	I	900	830	92,2
		II	860	802	93,2
Total variant			**1760**	**1632**	**92,7**
Movento 100 SC	0,125	I	592	527	89,0
		II	814	730	89,6
Total variant			**1406**	**1257**	**89,4**
Movento 100 SC	0,1	I	795	680	85,5
		II	639	565	88,4
Total variant			**1434**	**1245**	**86,8**
Movento 100 SC + mineral oil (Confidor Oil)	0,1	I	695	665	95,6
	0,2	II	938	880	93,8
Total variant			**1633**	**1545**	**94,6**
Reldan 40 EC (STD)	0,15	I	739	695	94,0
		II	598	560	93,6
Total variant			**1337**	**1255**	**93,8**
Untreated witness	-	I	900	187	20,7
		II	1775	399	22,4
Total variant			**2675**	**586**	**21,9**

Some results in Clingstone breeding from south-eastern of Romania

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Keywords: clingstone, pavie, fruit quality, can, cultivar

ABSTRACT

In the last years, the clingstone peach or pavie are appreciated more and more. Some of them were cultivated for processing and for fresh consumption too. The goals of this program were to study and obtain new cultivars with superior fruit quality, different ripening time and resistant to diseases.

INTRODUCTION

This paper presents the best pavie genotypes in the ecological conditions of South-Eastern area.

MATERIALS AND METHODS

The clingstone genotypes were observed from the phonological point of view. There were made biometrical measurements and analyses on fruit, tests of trees productivity etc.

The trees are organized in competition trials.

The planting distances were 4/3 m and the planting density was 833 trees/ha.

RESULTS AND DISCUSSIONS

The genotypes have medium (75.0:86.0 g) or big fruit (200 g) (table 1).

The dry matter is between 9.7% (NJC 110) and 13.5% (Catherine Sel.1). Malic acidity is between 0.35 mg% (NJC 105 Sel. A.P.) and 0.75 mg% (NJC 108 Control).

The fruit are very attractive, well coloured in yellow, orange ore red. The flesh is very firm.

The flavour is very pleasant and it became more intense in processing.

Most of the selected genotypes have spherical fruit (NJC 105 Sel. A.P., Catherine Sel.1 etc.) but some of them have flat fruit (H-C4R1T14 and V.T. PTT 03.AP).

The ripening time is different, from H-C4R1T14 (end of June) to Excelsior (beginning of October) (table 2).

Yield is between 23.0 kg/tree (H-C4R1T14) and 45.0 kg/tree (Catherine Sel.1), or between 19.0 t/ha and 37.5 t/ha.

CONCLUSIONS

The results show that these clingstone cultivars have good proprieties of fruit, a pleasant flavour, big percentage of dry substance and a good productivity.

We recommend all those new cultivars for extending in orchards. These are good for canneries, or fresh consumption, too.

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Tables

Table 1 – Quality test of the fruit
Research Station of Fruit Growing Constanța, 2008

No.	Genotype	Average fruit weight (g)	Dry matter (%)	Acidity* (mg%)	Fruit appearance	Flesh quality	Destination
1	H-C4R1T14	75.0	12.5	0.62	Flat	White, firm, flavoured	Can and fresh consumption
2	NJC 108 (Control)	115.0	10.5	0.75	Spheric-ovoidal	Yellow, firm	For processing
3	NJC 110	100.0	9.7	0.38	Spherical	Yellow, firm	Can and fresh consumption
4	NJC 105 Sel. A.P.	150.0	11.5	0.35	Spherical	Yellow-orange, firm	Can and fresh consumption
5	NJC 81	85.0	10.0	0.52	Ovoidal	Yellow, firm	Can
6	CATHERINE Sel.1	200.0	13.5	0.59	Spherical	Orange, firm, flavoured	Can and fresh consumption
7	NJC 85 Sel. L.P.	165.0	12.7	0.61	Spheric-ovoidal	Yellow, firm	For processing
8	BR7P2Sel. V.T.	99.0	11.5	0.36	Ovoidal	Yellow, firm, flavoured	Fresh consumption and processing
9	V.T. PTT 03.AP	85.0	12.3	0.49	Flat	White, firm	Fresh consumption and can
10	EXCELSIOR	106.0	10.0	0.54	Spherical	Orange, firm	Can and fresh consumption

* Acidity mg malic acid/100 g flesh fruit

Table 2 – Ripening time and average yield (multiannual data)
Research Station of Fruit Growing Constanța, 2008

Genotype	Ripening time	Yield	
		kg/tree	t/ha*
H-C4R1T14	25.06-23.07	23.0	19.0
NJC 108 (Control)	28.06-27.07	27.0	22.5
NJC 110	03.07-18.07	25.0	21.0
NJC 105 Sel. A.P.	17.07-16.07	27.0	22.5
BR7P2Sel. V.T.	19.07-28.07	29.0	24.0
NJC 81	20.07-18.08	24.0	20.0
CATHERINE Sel.1	22.07-25.08	45.0	37.5
NJC 85 Sel. L.P.	01.08-03.09	30.0	25.0
V.T. PTT 03.AP	15.08-27.08	24.0	20.0
EXCELSIOR	17.09-03.10	38.0	31.6
Average		29.2	24.31

* the orchard density is: 833 trees/ha

The influence of the constructive and functional parameters of the sprinkling equipments in tree growing on the qualitative work indices

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Keywords: pump**,** flow, nozzle, pressure, output, parameter.

ABSTRACT

The rapid development of the new plant protection methods is strongly related to the rapid development of the technical realization means. Hence it is necessary to perform an integration of the research works in the domain of the agro-pharmaceutical products and also in the domain of the sprinkling devices and machines. The diversity of sprinkling devices and machinery, the physical-chemical features of the pesticides, of the pathogens, require particularly pretentious endeavour regarding the preparation, the applying and the evaluation of each treatment. The applying quality consists in assuring a certain commercial product dose (active substance) per surface unit. The assurance of the phytosanitary product dose per surface unit and of the solution repartition uniformity (the quality working indices) – the principal conditions for the realization of a treatment - depend on respecting the solution norm, its concentration and the constructive and functional parameters of the sprinkling machinery's active organs.

INTRODUCTION

In the tree growing technologies, indifferent of the species and the breeds in culture, the prevention, the stopping and the combat of the disease and pest attacks, represent an important and mandatory sequence, which influences to the highest degree, as quantity and quality, the fruit production - and also the biological potential transmitted for the next 2-3 years.

Referring to fungicides, insecticides or acaricides, the quality of the treatments applying in the tree growing cultures assures the materialization of the biological effect.

The chemical treatments with pesticides must assure a high biological effect, based on economical efficiency. The biological effect is assured by respecting the product dose, the repartition uniformity of the solution and the working standard per surface unit, hence obtaining superior working quality indices.

The factors that influence the chemical treatments in tree growing are: the sprinkling output, the working speed and the trees heights. The sprinkling output is determined by constructive and functional factors of the active working organs of the sprinkling equipments, by the features of the spraying system (the type and the number of the spraying heads, the working pressure and the drop size), the features of the liquid pump and of the fan.

It is very important to analyze the influence of the constructive and functional parameters of the active working organs of the sprinkling equipments in the tree growing, for establishing their optimal values, in order to obtain the best working qualitative indices. The very high prices of the pesticides and the negative impact on the environment, the production losses and the low output of the phytosanitary treatments implies the setting of optimal working parameters of

the sprinkling equipments in the tree growing, in order to obtain superior working qualitative indices and the optimization of the working technologies with these equipments, depending on the concrete tree growing conditions.

MATERIALS AND METHODS

For the setting of the constructive and functional parameters, the experimentation under field and laboratory conditions was performed on two sprinkling equipments, which work both on the pneumatic spraying principle and the hydraulic principle with born jet. The study was performed on the sprinkling machines T 1200.32 and MST 900, intended to perform orchard treatments - which are owned by SCDP Voineşti.

The research performing methodology has as purpose the setting of the testing mode of the former enumerated equipments. The optimal constructive and functional parameters and their influence on the working qualitative indices were followed up, in order to obtain a high efficiency of the phyto-sanitary treatments. The determination of the working qualitative indices will be done at different working speeds and pressures of the machines. In the framework of the experiments, the following working qualitative indices will be determined: the pump flow, the pump volumetric output, the flow through the nozzles, the flow coefficient.

The study was performed under field and laboratory conditions, by analyzing the sprinkling machines T 1200.32 and MST 900 in June, July, August 2005, Mai-July 2006, in the mechanical workshop and in the SCDP Voineşti production and research farms.

The equipments used in the experimentation worked together with the tractor U-445 DT.

The apple tree plantation with the Frumos de Voineşti and Mutsu breeds, where the study was performed, has a surface of 5 ha; it is of the intensive type, with the medium density of 833 trees/ha; the tree age is 28 years, the crowns are flattened (fruit bearing hedge), 1 m wide and the trees are 4 m high.

RESULTS AND DISCUSSIONS

The liquid flows of the two pumps were determined volumetrically, using water at the temperature of 20^0C as work liquid, in three repetitions for each pressure value.

For the different working pressure values, comprised between 0 and 20 bars, the volumic pump with four membranes M104S IMOVILLI realised liquid flows comprised between 97 and 90 l/min, at the rotation speed of 540 rot./min.

The medium flow values at different pressures and the statistical indices' values (the standard deviation, the variation coefficient and the distribution uniformity), calculated with statistical relations, are centralized in the table 1.

The statistical and graphical processing and interpretation mode of the results permitted analyse of the working pressure influence on the flow realised by this pump.

The correlation between the working pressure and the liquid flow uniformity, realized by the pump M104S, is presented in the picture 1.

The liquid flow trough the spraying devices were determined both for the T1200.32 sprinkling machine and for the MST 900 sprinkling machine.

The determination of the liquid flow through the spraying devices, that fitted the T1200.32 sprinkling machine, was performed by the volumetric method.

On the spraying device were mounted both TIFONE nozzles, with diameters comprised between 0.8-2 mm ALBUZ nozzles, with diameters comprised between 0.8 and 1.5 mm.

The influence of the working pressure on the liquid flow through the spraying device (nozzles) of the T 1200.32 machine is presented in the table 2.

The correlation between the working pressure and the total liquid flow at the spraying device of the T 1200.32 machine, fitted with Albuz nozzles, is presented in the picture 2.

The correlation between the working pressure and the liquid flow uniformity was analyzed depending on the nozzle diameter and the vortex disc type, picture 3.

Picture 4 presents the correlation between the position of the regulating valve and the liquid flow uniformity at the pressure of 1.5 bars, for the spraying device of the MST 900 sprinkling machine.

CONCLUSIONS

Following the study regarding the influence of the working pressure on the liquid of the two pump types, the following showed up:

- The pressure increase leads to a reducing of the liquid flow uniformity at the piston volume pumps;
- In the case of the centrifugal pumps, the pressure increase is accompanied by the increase of the flow uniformity.

Referring to the volume output of the pumps, following the performed calculation, it resulted that the volume pumps assure a greater output as compared with the centrifugal ones.

In order to establish the influence of the working pressure on the liquid flow through the nozzles at the two spraying systems, the statistical indices' values (the standard deviation, the variation coefficient and the flow uniformity) were analyzed:

- the flow uniformity increases in relation with the working pressure increase and the nozzle diameter for the spraying devices of the T1200.32 machine;
- in the case of the spraying devices fitting the MST900 machine, the flow uniformity increases in relation with the working pressure increase and with the section of the regulating valve.

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Tables

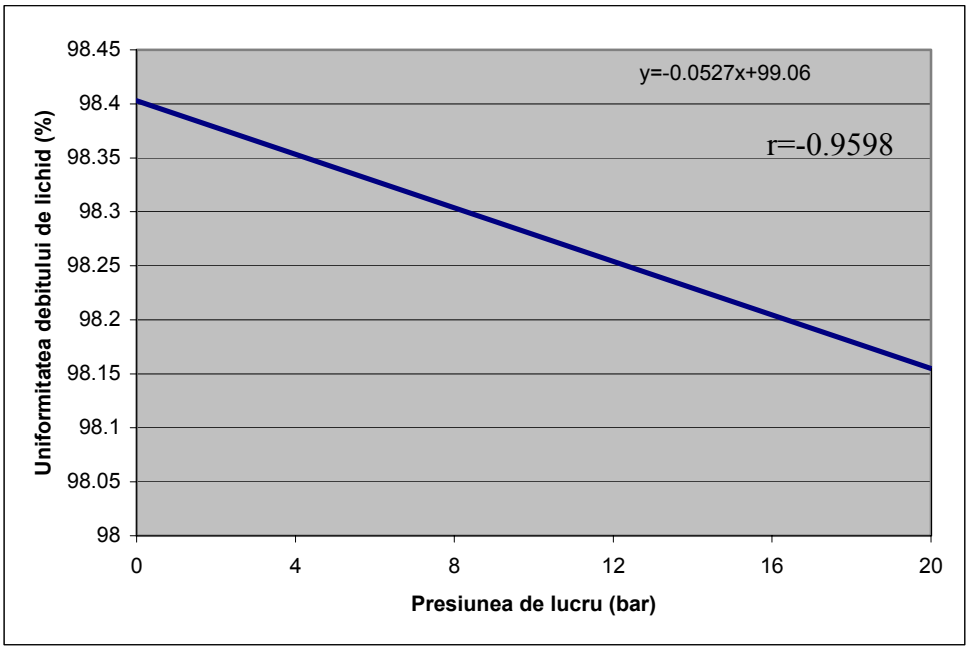
Table 1. The influence of the working pressure on the liquid flow, realized by the M104S IMOVILLI pump

Pressure (bar)	Liquid flow (l/min)			Medium value l/min	Standard deviation δ (l/min)	Variation coefficient c.v.%	Flow uniformity %
	R_1	R_2	R_3				
0	97	95	96	96	1	1,04	98,96
4	95	94	96	95	1	1,05	98,95
8	95	93	95	94,33	1,15	1,21	98,79
12	94	92	91	92,33	1,52	1,64	98,36
16	93	92	91	91	1,73	1,90	98,1
20	88	91	91	90	1,73	1,92	98,08

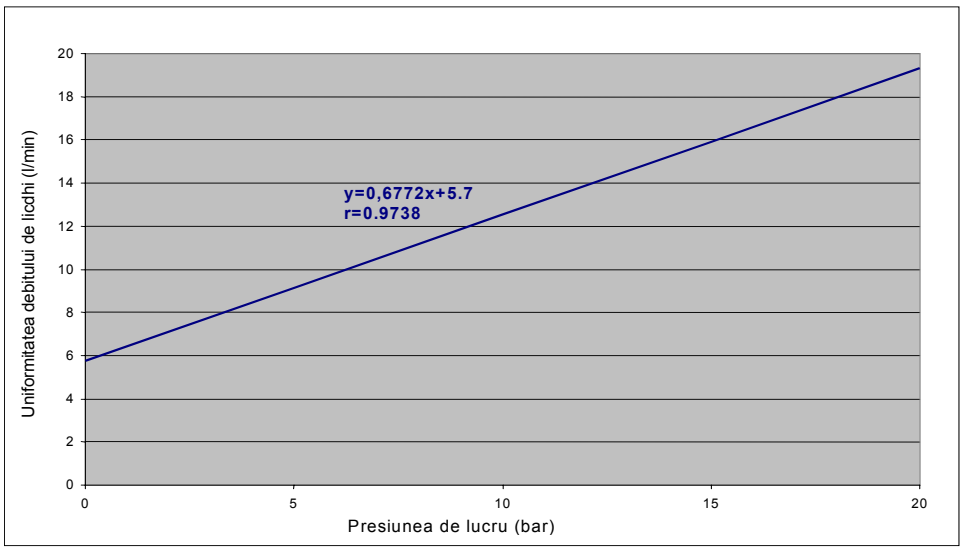
Table 2. The liquid flow through the spraying device, depending on the pressure, at the machine T1200.32

Pressure (bar)	Flow through the nozzles (l/min)						Total flow through the device (l/min)
	0,8	0,8	1	1	1,2	1,5	
5	0,56	0,56	0,64	0,64	0,78	1,01	8,38
10	0,99	0,99	1,03	1,03	1,33	1,64	14,02
15	1,08	1,08	1,18	1,18	1,53	1,93	15,36
20	1,26	1,26	1,40	1,40	1,86	2,40	19,22

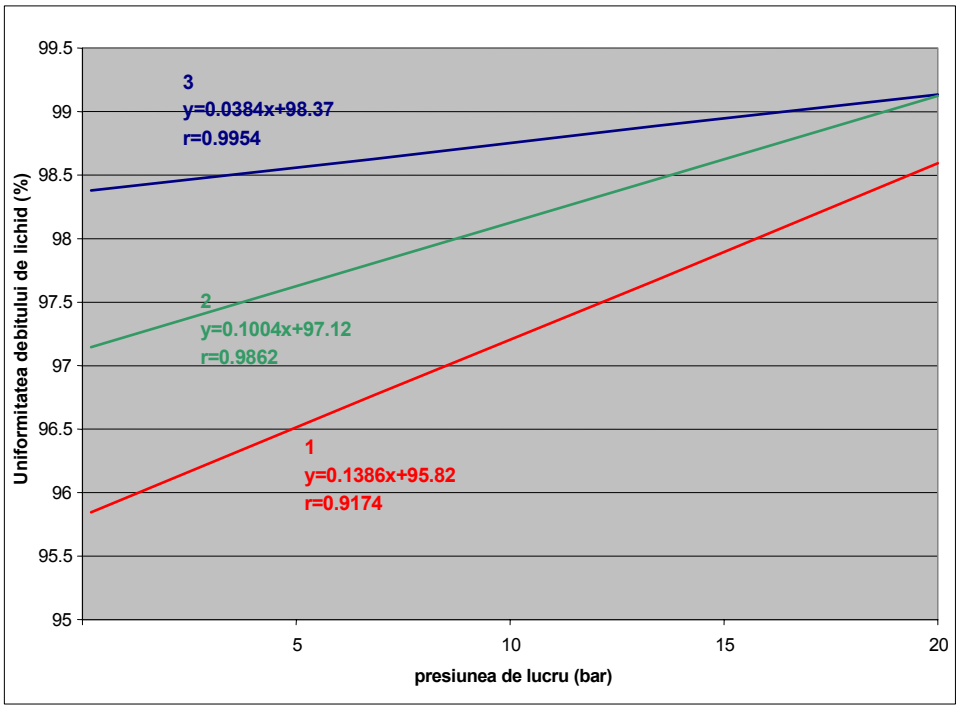
Pictures



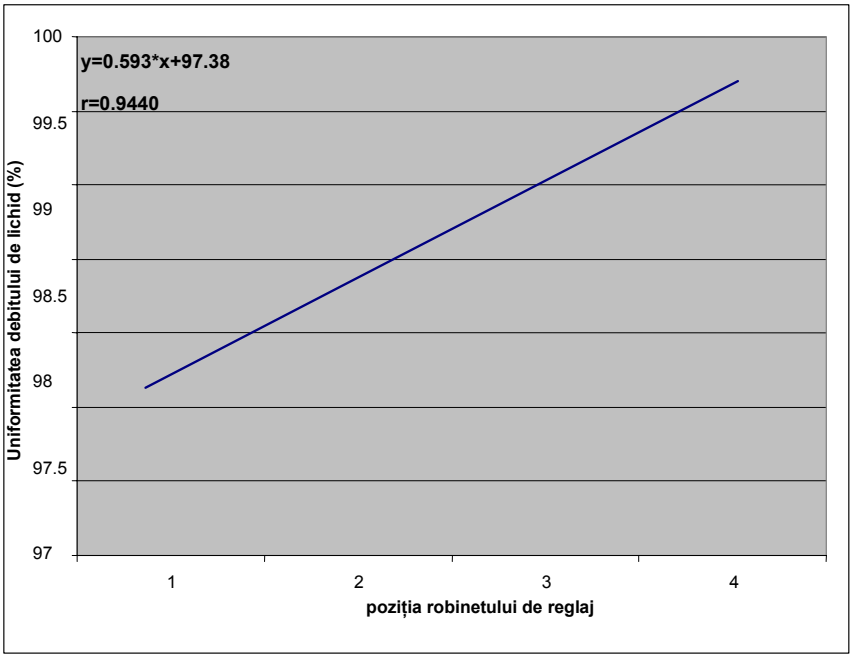
Picture 1. The correlation between the working pressure and the liquid flow uniformity realized by the de pump M104S IMOVILLI



Picture 2. The correlation between the working pressure and the total liquid flow at the spraying device of the T1200.32 machine, fitted with ALBUZ nozzles.



Picture 3. The correlation between the working pressure and the liquid flow uniformity for the nozzle with a diameter of ∅1,2 mm, 1 – without vortex disc, 2 – vortex disc with an hole diameter of ∅1 mm, 3 - vortex disc with an hole diameter of ∅1.2 mm



Picture 4. The correlation between the position of the regulation valve and the flow uniformity at the pressure of 1.5 bars

Integrated management of weed control in stone-fruit orchard in a sustainable agriculture

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Keywords: environmental protection, agrotechnical methods, gliyphosate, postemergency period, control efficacy

ABSTRACT

This study aimed to design an assessment program for the efficacy of agrotechnical methods compared with the chemicals ones, in stone orchards. The result of the observations showed that agrotechnical methods assure an satisfactory efficacy level in weeds control and the best results showed on the mulching variant plots. On the scything plot, though the weeds control was not completely diminished, after the three consecutive scything, the weeds were kept at an unharmful growth level, for the trees. The weeds are also unable to store nutrient reserves to survive over the winter.

Though the highest efficacy level in weeds control was achieved by the chemical methods, they are not recommended in a sustainable agriculture. As chemicals for the weeds control plot we have used herbicides based on gliyphosate, to protect the useful fauna and also because they showed to be easily degradable in soil and residual deposits free in fruits.

On the mulching plot, this method assured o very good weeds control and could be easily applied with low costs. Unless it showed a good weeds control, especially on the perennial ones, mulching layer showed also to have a fertilizing effect on the soil, contributing to the organic enrichment of the ground.

INTRODUCTION

Every year the stone orchards are increasingly infested with weeds, both concurrent for trees and difficult to control (*Amaranthus retroflexus, Chenopodium album, Polygonum ssp., Stellaria media, Cirsium arvense, Elymus repens, Echinochloa crus-galli, Sorghum halepense, Digitaria sanguinalis, Setaria spp., Cynodon dactylon etc.*).

The concept of integrated management weeds control is based on "threshold tolerance" which means the highest number of weeds, with no injury effect on the trees or economic yield loss.

In the new conditions of a sustainable agriculture, the integrated weed control in the stone-fruit orchards needs to be performed combining harmoniously the agrotechnical, biological and chemical methods together with control and organizational means.

This study tries to present some weeds control data and the observations were carried out in the stone- fruit orchard of ICDPP - Bucharest. To achieve the best results in weed control, mostly the perennial ones and taking into consideration the severe ecological demands for the environmental protection, we have carried out both agrotechnical (weeding, scything, mulching) and chemical methods (herbicides based on glyphosate). The herbicide treatment was carried out with new equipment designed by INMA.

The purpose of these studies was to replace the exclusive usage of chemical control, mostly because herbicides shown a low effect on the perennial weeds in the orchards.

MATERIALS AND METHODS

The researches were carried out at the ICDPP-Bucharest stone-fruit orchard, on a brown forest soil, at neutral pH, in the absence of irrigation.

The experiment was designed in randomized plots, each of them in four replications. On the weeding (variant) plots through mechanical work were carried out two weeding. On other variant plots the weeds were scything, and used as mulching vegetal layer for farther variant plots. During the vegetation period this mulching layer was twice restored. On the scything variant plots were carried out three scything, for depriving plant to do seeds.

The chemical treatment was carried out in postemergency period, using an herbicide based on gliphosat (Roundup), because showed no remanence in soil, had a minimising environmental effect and have been well accepted in the integrated control systems. Following this control strategy, the gliphosat treatment was carried out in two different ways: one of 4l/ha and the second one of two treatments: first in postemergency period, when the perennial weeds were 15-20 cm high, and second in postemergency period when the soil was reinfested.

The observations about the efficacy of the control methods were recorded on the 30 an 60 days from the chemical treatments.

RESULTS AND DISCUSSIONS

The weeds infestation level of the orchard was very high exceeding 200 plants/ m^2 (Table 1 and 2).

The main weeds observed on the experimental plots were:

- annual grasses: *Echinochloa cruss-galli* (L) Pal Beauv., *Setaria glauca* Pal. Beauv., *Setaria viridis* Pal. Beauv, *Lolium perenne* Lam.;
- perennial grasses: *Cynodon dactylon* (L), *Agropyron* r*epens* (L.) Pal. Beauv.;
- annual blw: *Stellaria media* (L.) Vill., *Amaranthus retroflexus* L., *Chenopodium album* L., *Solanum nigrum* L., *Galinsoga parviflora* Cav., *Portulaca oleracea* L., *Hibiscus trionum* L., *Polygonum aviculare* L., *Polygonum convolvulus* L., *Veronica hederifol*ia L., *Lamium amplexicaule* L., *Lamium purpureum* L., *Capsella bursa-pastoris* L., *Matricaria inodora* L.;
- perennial blw: Convolvulus arvensis L., *Sonchus arvensis* L., *Cirsium arvense* (L.) Scop., *Taraxacum officinale* Web., *Trifolium repens* L., *Plantago major* L., *Rumex acetosella* L., etc.

On the weeding variant plots, the control efficacy was over 90%. This control method though showed to be very efficacy, because of the variability of climatic conditions, the treatments can not be always properly carried out at the suitable vegetation time.

In the scything variant plots the control efficacy was over 87% (second variant). On the plots (variant 3) where the weeds have been only scything, though in the begining the efficacy of weeds control was satisfactory, for the entire vegetation period it showed not to be over 50%; this method was used for

depriving weeds to do seeds and to remove their concurrence for water and nutrients.

As we expected the best results after 30 days from the chemical treatment were obtained by the concentration of 4l/ha, on the chemical variant plots the efficacy of weeds control showed to be over 92%. The gliphosat treatment effect appeared between 12^{th} and 15^{th} days and the plants showed leaves gradually yellowing until plants dieing. The *Cynodon dactylon* specie was not completely removed by 4l/ha gliphosat concentration treatment. After 30-40 days from the chemical treatment grow annual weeds from the seeds, and the renewal of annual blws begin after the 50-60 days, consequently is needed a second treatment.

Taking into account these observations, on the variant plots where the herbicide Roundup was in 3l/ha concentration treatment, in post emergency was carried out a second treatment in the same concentration. Table 3 presents the efficacy of this concentration treatment and on these variant plots were shown the best results in weeds control. Though at the beginning the weeds control level seems to be higher at the concentration treatment of 4l/ha, the variant of two concentration treatment of 3l/ha ensure a sustainable and better stone orchard protection against weeds concurrence.

CONCLUSIONS

The observations noted in this experiment lead to the conclusions that both the agrotechnical and chemical methods ensure a good weeds control, the weeds control efficacy level exceeded 80%. On the weeding variant plots the efficacy of weeds control is lower, but the three times weeding keep the weeds at a growth level not harmful for the orchard trees. And in the same time has the aim to deprive weeds to accumulate nutrients to surviving wintertime.

The mulching method ensure a good weeds control, it is easy to carried out and low cost. Besides the high level of weeds control, especially the perennial weeds, the mulching layer is a fertilizer, promoting soil enrichment in organic material.

On the chemical weeds control it was pondered the use of herbicides based on gliphosat, because they did not damage the useful fauna and are rapidly degraded in soil, free of reminisce residues in fruits.

The herbicides treatment was applied by the mean of original equipment created by the National Institute of Mechanical Agriculture.

The best weeds control results were achieved with two gliposat treatment of 3l/ha: in postemergence first treatment when the weeds growth were 15-20 cm high, and the second treatment in postemergence when was reinfested the soil.

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Tables

Table 1. Weeds control in the stone orchard at 30 days from the chemical treatment

Variant	Grasses		Blw		Total	
	No. pl./m^2	E%	No. pl./m^2	E%	No. pl./m^2	E%
Weeding	4,0	90,8	13,0	91,1	17,0	91,0
Scyting+mulching	5,0	88,5	18,0	87,7	23,0	87,9
Scything	18,0	58,8	45,0	69,2	63,0	66,8
Roundup 3l/ha	8,0	81,6	21	85,6	29,0	84,7
Roundup 4l/ha	3,0	93,1	9,5	93,5	12,5	93,4
Control standard	43,7	-	146,5	-	190,2	-

Table 2. Weeds control in the stone orchard at 60 days from the chemical treatment

Variant	Grasses		Blw		Total	
	No. pl./m^2	E%	No. pl./m^2	E%	No. pl./m^2	E%
Weeding	4,0	92,5	10.0	93,8	14	93,5
Scything+mulching	7.0	87,0	20.0	87.7	27	87,5
Scything	27,0	50,0	83,0	49,2	110	49.4
Roundup 3l/ha	15,0	72,2	40,0	75.5	55	74,7
Roundup 4l/ha	10,0	81,4	25	84,7	35	83.9
Control standard	54,0	-	163.7	-	217,7	-

Table 3. The gliphosat efficacy after 30 days from the second postemergence treatment

Variant	Grasses		Blw		Total	
	No. pl./m^2	E%	No. pl./m^2	E%	No. pl./m^2	E%
Roundup 4l/ha	8,0	66,6	16,5	74,1	24,5	72,0
Roundup 3l/ha +3l/ha	1,2	90,5	7,0	89.0	8,2	90,6
Control standard	24,0	-	63.7	-	87,7	-

Research regarding the influence of distances between plants on saplings in Sapling's School

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Keywords: transplanted, seeded, nursery, saplings

ABSTRACT

Classic technology for producing grafted trees supposes the existence of three years cycles for generative multiplication (in the first year we get rootstock, in the second year we graft the rootstock and finally at the end of the third year we get the grafted tree). On can seed directly in field I but the saplings are uniform less and they have taproot. In Europe, the technology of producing grafted trees extends on two years. We consider it is necessary try to reduce the time of producing grafted trees by improving some technological sequences of classical technology.

INTRODUCTION

This paper wants to offer a modest improvement of same sequences of classical technology, sequences that will conduce to increasing of productivity and decreasing of prime costs. The time between seed and grafted can be reduced to 1 year.

MATERIAL AND METHODS

For achieving the proposed objective we conceived a polifactorial experience using seed of *myrobolan (Prunnus cerasifera L.)* and plant of *mirobolan*. These plants were obtained in a sand platform.

Factor A –type of plants with 2 graduations:

a1 – seedling directly;

a2 – transplanted plants from sand platform.

Factor B – distances between plants on row with 4 graduations:

b1 –5 cm;

b2 – 10 cm;

b3 – 20 cm;

b4 – 30 cm.

From the combination of these 2 factors result a number of 8 variants:

a1b1 – seedling at 5 cm;

a1b2 – seedling at 10 cm;

a1b3 – seedling at 20 cm;

a1b4 - seedling at 30 cm;

a2b1 – plants transplanted at 5 cm;

a2b2 – plants transplanted at 10 cm;

a2b3 - plants transplanted at 20 cm;

a2b4 – plants transplanted at 30 cm.

One part of seed was seeded in a sand platform in spring. The other part was seeded directly in the school of saplings at the distances indicated by factor B. The plants from platform were transplanted at the same distances indicated by factor B.

In autumn it was made observations and determinations such as:
- Percent of grafted plants.
- Production of grafted trees.
- Production of STAS trees

RESULTS AND DISCUSSIONS:

Regarding number of leaves, the average was de 7.11 with standard deviation ± 0.95. On can say that the average can be anytime between limits: 8.06 (7.11 + 0.95) and 6.16 (7.11 – 0.95). The variation coefficient indicates medium uniformity.

For the parameter "plants length" statistical analyses indicate the average 83.86 mm and standard deviation 14.89. Anytime the length of transplanted plants ca is between 68.97-98.75 mm. The variation coefficient indicates medium uniformity.

Between these 2 parameters, number of leafs and length of plants exist a positive correlation r = 0.9992.

The percent of grafted saplings was between limits 48.9(V5)-98.5(V4)% (table 2).

V2, V5, V6 indicate a non significant difference from V1-Mt, regarding grafted trees. V3, V4, V7 and V8 indicate a negative difference very significant from V1-Mt, regarding grafted trees.

In autumn, at the end of vegetation period, the saplings were dig out and planted in champ II at the distances 90 x 20 cm.

In table 3 on can see the dynamic of growing up of the graft.

At the end of vegetation period, the lower growing up was at V1, (144 cm) and the bigger growing up was at V2 (192.5 cm) (table 3). The grafted trees that were from seeded directly had 177.58 cm, and the grafted trees that were from transplanted plants had the average of growing up 170.58 cm. All the variants presented bigger growing than V1-Mt.

The production of grafted trees was between limits 40398(V3)-45595(V4). The percent of standard trees was 73.45-82.90%. The differences between Mt and the other variants were non significant (table 4).

CONCLUSIONS:

- Seeding or transplanting in saplings school on can reduce the time necessary for obtain grafted trees.
- The distances between plants on row (5 cm, 10 cm, 20 cm, and 30 cm) influence the number of grafted trees.
- We recommend the distances on row, between plants by 10 cm (V2 and V6).
- In champ II are no statistical differences between variants regarding grafted trees productions.

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Tables

Table 1. Characteristics of transplanted plants

Parameter	Variance S^2	Average X	Standard deviation S	Variation Coefficient S%	Correlation Nr. of leafs – Plants length
Nr. of leafs	0,9116	7,1124	0,9548	13,4244	0,9992
Plants length	221,9913	83,86 mm	14,8994	17,7670	

Table 2. Number of grafted saplings

Variants	Factor A	Factor B	% of grafted saplings	Grafted saplings	Difference from Mt.	Signific.
V1- Mt	**Seeded directly**	5 cm	49,2	105506	-	
V2		10 cm	95,6	101760	-3746	
V3		20 cm	97,3	51515	-53991	000
V4		30 cm	98,7	35166	-70340	000
V5	**Transplanted**	5 cm	48,9	103450	-2056	
V6		10 cm	94,8	99856	-5650	
V7		20 cm	97	50978	-54528	000
V8		30 cm	98,6	34656	-70850	000
DL 5%=7955 DL 1%=11026 DL 0,01%=15318						

Table 3. Growing up dynamic of the graft (cm)

Var.	Month						
	April	**May**	**June**	**July**	**August**	**Sept.**	**Oct.**
V 1(Mt)	11,09	31,64	52,72	83,89	112,30	129,39	144
V2	13,46	40,93	69,18	112,38	151,48	173,83	192,5
V3	12,93	39,33	66,49	108,00	145,58	167,06	185
V4	13,19	40,13	67,84	110,19	148,53	170,44	188,75
Media 1	**12.67**	**38.01**	**64.06**	**103.62**	**139.47**	**160.18**	**177.56**
V5	11,32	34,35	53,92	85,84	114,92	132,40	147,33
V6	12,93	39,33	66,49	108,00	145,58	167,06	185
V7	12,58	38,27	64,69	105,08	141,64	162,54	180
V8	11,88	36,14	61,10	99,25	133,77	153,51	170
Media 2	**12.18**	**37.02**	**61.55**	**99.54**	**133.98**	**153.88**	**170.58**

Table 4. Number of grafted trees STAS

Variants	Grafted trees STAS		Dif. ± from Mt		Significant
	Number	**%**	**Number**	**%**	
V1- Mt	43038	78,25		100	
V2	44044	80,08	1006	102,34	Insignificant
V3	40398	73,45	-2640	93,87	Insignificant
V4	45595	82,90	2557	105,94	Insignificant
V5	43467	79,03	429	101,00	Insignificant
V6	45408	82,56	2370	105,51	Insignificant
V7	42328	76,96	-710	98,35	Insignificant
V8	41052	74,64	-1986	95,39	Insignificant
DL 5%=5375, DL 1%= 7450, DL 0,01%=10350					

Figures

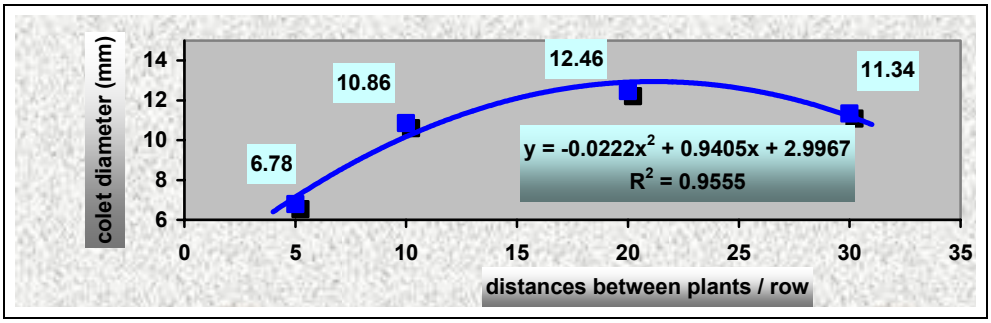

Fig. 1 The influence of distances between plants on row on colet diameter for the saplings seeded directly

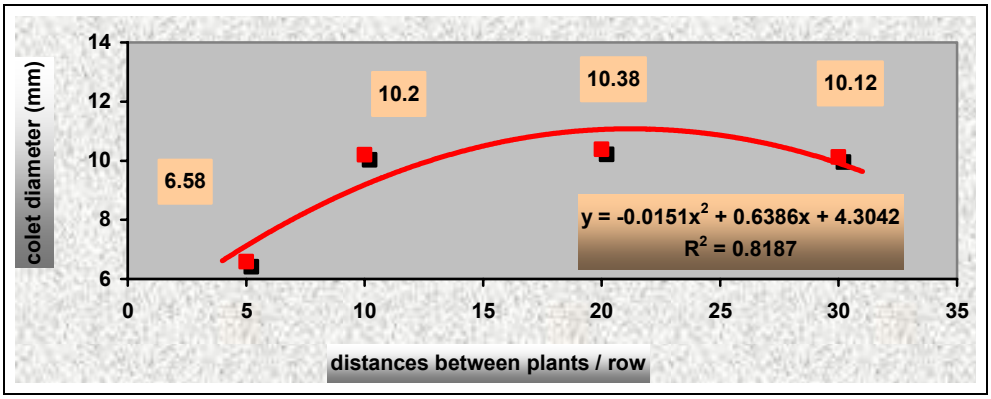

Fig. 2 The influence of distances between plants on row on colet diameter for the transplanted saplings

Researches concerning the influence of late frosts upon the apricot production of some varieties cultivated in conditions of the Didactic Station Timişoara

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Keywords: apricot, varieties, late frosts, phenophases, production

ABSTRACT

The apricot tree is one of the most sensitive species to late frosts in our country. Due to its early beginning of phenophases and early flowering, it frequently gets affected by the late frosts that come in spring. During 2006-2008, twelve varieties of apricot cultivated in conditions of the Didactic Station of our University were observed and studied: Earlyryl, Dana, Neptun, Saturn, Cea mai bună de Ungaria (witness), Venus, Callatis, Sulina, Favorit, Selena, Silvana and Olimp. There were noted the development of fruiting phenophases of these species and the influence of the climatic conditions in that period upon the fruit binding degree and the production in summer. The best productions were obtained in 2006, because the flowers and the bind fruits were not affected by late frosts, as the temperatures were higher. The damages were observed in 2007 and 2008 when, because of the high temperatures in February, the apricot trees started their phenophases and they were strongly affected by the late frosts in March. Concerning the production of apricots per tree, in 2006 the best production was given by Venus variety, in 2007 the witness „Cea mai bună de Ungaria" and in 2008 we could remark Favorit variety as having the highest production per tree.

INTRODUCTION

In the present paper we want to present the high influence of the late frosts in spring upon the production of apricot trees in conditions of Timişoara. Knowing the fact that the apricot tree is one of the most sensitive species to late frosts, because of its early development of fruiting phenophases, we tried to observe how obvious are the damages caused by the late frosts upon the productions. The motivation behind the study was to determine the most valuable varieties that can be exploited in the specific climatic conditions of Timişoara area.

MATERIALS AND METHODS

We studied 12 apricot varieties cultivated at the Didactic Station Timişoara, as following: Earlyryl, Dana, Neptun, Saturn, Cea mai bună de Ungaria (witness), Venus, Callatis, Sulina, Favorit, Selena, Silvana and Olimp. The apricot trees were planted in the spring of 1997, at a 5 m distance between the rows and 4 m distance between the fruit trees on a row, having a density of 500 plants/ha.

The working method used was a stationary one, based on two steps. The first, the field step was based on observing the development of vegetative and fruiting phenophases, counting the flower buds, the bind fruits and the mature ones and weighting them. The second step, which was executed in the laboratory, was based on calculation and interpretation of the collected data.

RESULTS AND DISCUSSIONS

We will present the development of the fruiting phenophases observed at the studied varieties during 2006-2008 and the influence of late frosts upon the apricot production.

In 2006, the bud inflation started in 25.02, being observed at Earlyryl and Dana varieties and concluded with the bud inflation of Sulina, Selena and Silvana, which were observed in 03.03 (table 1).

The beginning of flowering started in 10.03 at Earlyryl variety and continued until 19.03 for Silvana variety, observing that the varieties had a grouped blooming. The flowering duration was almost unitary, between 5 days (Olimp variety) and 9 days (Earlyryl variety).

In the current year, there were no late spring frosts so the apricot production was not damaged at all.

In 2007, the bud inflation started at 21.02 for Earlyryl variety and ended at 28.02 for the late varieties Selena and Silvana.

The beginning of flowering took place at 05.03, for Earlyryl and continued until 14.03 for Silvana variety, the other varieties having a grouped flowering, around 12.03. The flowering duration was also unitary, between 6 days (Neptun and Saturn varieties) and 9 days Earlyryl variety (table 2).

In 2008, the bud inflation started at 06.02 for Earlyryl variety and ended at 14.02 for the late variety Silvana.

The beginning of flowering took place at 20.02, for Earlyryl variety and continued until 28.02 for Neptun and Silvana varieties. The other varieties had a staged flowering period, which began in 22.02 and ended in 06.03. The flowering duration was also unitary; between 6 days (most of the varieties) and 9 days Cea mai bună de Ungaria and Sulina varieties (table 3).

In 2006, the highest apricot production/tree was obtained from Venus variety, which had 42.5 kg/tree, more than the witness, having a very significant positive difference to the witness Cea mai bună de Ungaria (35.6 kg /tree). Favorit variety had also a higher production than the witness of 38.0 kg/tree. Among the other varieties, Callatis variety had no difference to the witness, because its medium production was close to the one of the witness and Sulina variety had a distinct significant positive difference to the witness with a production value close to it of 33.5 kg/tree. The other varieties had a very significant negative difference to the witness, which means lower productions than the one of the witness. We can observe that Neptun variety had th lowest production of 17.0 kg/tree (table 4).

In 2007, the witness Cea mai bună de Ungaria had the highest value concerning the medium production of 12.0 kg/tree and Favorit variety had a production very close to the witness of 11.7 kg/tree. Another variety with a production value close to the witness was Callatis, which had 11.0 kg/tree and a distinct significant negative difference to the witness. All the other varieties had apricot production values much lower than the witness variety and they all registered very significant negative differences to the witness. The lowest production in 2007 was given by Dana variety of only 4.60 kg/tree (table 5).

We can observe that in 2007 the productions were very low by comparing them to the ones obtained in 2006. This is due to the effect of the late spring frosts

at the end of March and again at the end of April. The production was not only compromised at the end of March when most of the varieties had bind fruits, but also in April when the fruits were in the growing phenophase and they fell off the tree.

In 2008, Favorit variety had the highest production of 12,16 kg/tree and had no difference to the witness, then it was followed by Cea mai bună de Ungaria witness variety, which had 11.60 kg/tree and Callatis variety with 10.9 kg/tree. The other varieties had lower productions and registered very significant negative differences to the witness. The lowest production in 2008 was given, as in 2007, by Dana variety, which had 4.91 kg/tree (table 9).

The medium apricot production in 2008 was also very low due to the late spring frosts that damaged the production at the end of March when took place the fruit growth phenophase. Most of the fruits were affected and fell of the tree, which is why the production was so compromised.

CONCLUSIONS

The results show that the late spring frosts have a very high impact upon the apricot production of the varieties cultivated in the climatic conditions of Timişoara.

We can see that in 2006, when there were no late frosts the production was good, between 17.0 kg/tree from Neptun variety and 42.5 kg/tree from Venus variety. This is due to the fact that the bud inflation started at the end of February and the blooming period was ended by the end of March and the temperatures were high enough when the fruit binding phenophases began so there was no risk for the late spring frosts to come.

In 2007 the development of the phenophases was almost the same as in the past year, the bud inflation started at the end of February and the blooming period ended by the middle-end of March. The biggest problem in this year were the late spring frosts at the end of March and end of April, which compromised the production twice by damaging the newly bind fruits (end of March) and the formed fruits that started to develop (end of April), which fell of the apricot trees. This is the reason why in 2007 the highest production was of only 12.0 kg/tree from Cea mai bună de Ungaria witness variety and the lowest production was given by Dana variety of only 4.60 kg/tree.

The climatic conditions of 2008 were different than in the past two years, so that the fruiting phenophases started in the first decade of February, much earlier than in 2006 and 2007. The bud inflation started at the beginning of February (06.02) and ended on the 14th of February, while the blooming period started at the end of February (20.02) and ended at the beginning of March (6.03). At the end of March, when the fruits were formed and started to develop the late spring frosts came and the apricot production was considerably damaged. The highest production was given by Favorit variety (12.16 kg/tree) and the lowest was also from Dana variety of only 4.91 kg/tree.

Considering all these, we recommend for culture in this part of the country the following apricot varieties, which had a constant behaviour during the three studied years: Favorit, Cea mai bună de Ungaria and Callatis.

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Tables

Table 1. The development of fruiting phenophases in 2006

Variety	Bud inflation	Bud opening	Flowering			Duration of flowering
			Beginning	In full	Ending	
Earlyryl	25.02	28.02	10.03	13.03	19.03	9
Dana	25.02	28.02	11.03	14.03	19.03	8
Neptun	26.02	01.03	13.03	16.03	21.03	8
Saturn	26.02	01.03	13.03	15.03	20.03	7
Cea mai bună de Ungaria	28.02	04.03	14.03	17.03	22.03	8
Venus	01.03	05.03	16.03	19.03	23.03	7
Callatis	01.03	05.03	17.03	21.03	24.03	7
Sulina	03.03	06.03	17.03	20.03	23.03	6
Favorit	28.02	05.03	17.03	20.03	22.03	5
Selena	03.03	06.03	16.03	19.03	22.03	6
Silvana	03.03	07.03	19.03	21.03	25.03	6
Olimp	01.03	05.03	18.03	20.03	23.03	5

Table 2. The development of fruiting phenophases in 2007

Variety	Bud inflation	Bud opening	Flowering			Duration of flowering
			Beginning	In full	Ending	
Earlyryl	21.02	25.02	05.03	08.03	14.03	9
Dana	23.02	27.02	07.03	10.03	14.03	7
Neptun	25.02	01.03	13.03	17.03	19.03	6
Saturn	25.02	28.02	10.03	13.03	16.03	6
Cea mai bună de Ungaria	23.02	27.02	08.03	12.03	16.03	8
Venus	27.02	03.03	12.03	14.03	20.03	8
Callatis	27.02	03.03	12.03	15.03	20.03	8
Sulina	25.02	01.03	12.03	16.03	18.03	6
Favorit	25.02	01.03	10.03	12.03	16.03	6
Selena	28.02	03.03	12.03	14.03	20.03	8
Silvana	28.02	04.03	14.03	17.03	22.03	8
Olimp	25.02	01.03	10.03	13.03	18.03	8

Table 3. The development of fruiting phenophases in 2008

Variety	Bud inflation	Bud opening	Flowering			Duration of flowering
			Beginning	In full	Ending	
Earlyryl	06.02	10.02	20.02	23.02	27.02	7
Dana	08.02	12.02	22.02	25.02	01.03	7
Neptun	11.02	15.02	28.02	02.03	06.03	7
Saturn	10.02	14.02	25.02	28.02	02.03	6
Cea mai bună de Ungaria	07.02	13.02	23.02	27.02	04.03	9
Venus	12.02	19.02	26.02	01.03	05.03	7
Callatis	12.02	19.02	26.02	01.03	06.03	8
Sulina	11.02	15.02	24.02	28.02	05.03	9
Favorit	10.02	14.02	25.02	28.02	04.03	7
Selena	13.02	17.02	26.02	01.03	05.03	7
Silvana	14.02	19.02	28.02	03.03	06.03	6
Olimp	10.02	14.02	25.02	27.02	03.03	6

Table 4. Apricot production in 2006

Variety	Medium production (kg/tree)	Relative value %	Difference to the witness	Significance
Earlyryl	25.6	71.91	-10.0	000
Dana	21.6	60.67	-14.0	000
Neptun	17.0	47.75	-18.6	000
Saturn	24.0	67.42	-11.6	000
Cea mai bună de Ungaria	35.6	100	0	W.
Venus	42.5	119.38	6.9	XXX
Callatis	35.0	98.31	-0.6	-
Sulina	33.5	94.10	-2.1	00
Favorit	38.0	106.74	2.4	XX
Selena	30.0	84.27	-5.6	000
Silvana	25.5	71.63	-10.1	000
Olimp	31.5	88.48	-4.1	000

DL 0.1% = 1.50 DL 1% = 2.05 DL 5% = 2.75

Table 5. Apricot production in 2007

Variety	Medium production (kg/tree)	Relative value %	Difference to the witness	Significance
Earlyryl	8.21	68.39	-3.79	000
Dana	4.60	38.33	-7.40	000
Neptun	8.00	66.70	-4.00	000
Saturn	7.00	58.33	-5.00	000
Cea mai bună de Ungaria	12.0	100	0	W.
Venus	9.50	79.17	-2.50	000
Callatis	11.0	91.67	-1.00	0
Sulina	10.0	83.33	-2.00	000
Favorit	11.7	97.50	-0.30	-
Selena	5.26	43.89	-6.73	000
Silvana	8.70	72.50	-3.33	000
Olimp	4.80	40.00	-7.20	000

DL 0.1% = 0.82 DL 1% = 1.12 DL 5% = 1.51

Table 6. Apricot production in 2008

Variety	Medium production (kg/tree)	Relative value %	Difference to the witness	Significance
Earlyryl	8.22	70.86	-3.38	000
Dana	4.91	42.30	-6.69	000
Neptun	8.07	69.54	-3.53	000
Saturn	7.27	62.64	-4.33	000
Cea mai bună de Ungaria	11.6	100	0	W.
Venus	9.50	81.90	-2.10	000
Callatis	10.9	93.97	-0.70	-
Sulina	9.73	83.91	-1.87	000
Favorit	12.16	104.89	0.57	-
Selena	5.76	49.71	-5.83	000
Silvana	9.33	80.46	-2.27	000
Olimp	5.00	43.10	-6.60	000

DL 0.1% = 0.92 DL 1% = 1.26 DL 5% = 1.69

Preliminary studies in designing for mathematical pattern for the apricot dieback

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Keywords: stone fruit trees, cryptogamic diseases, ecological elements

ABSTRACT

The ecological debilitation and the biological dieback of the apricot is a phenomenon frequently encountered in the plantations from Romania, with different intensities in accordance with the cultivated soil, the area climatic conditions, trees' phenology, lignicolous fungi development conditions, pathogens' virulence. From branches of trees starting decline, pathogenic fungi with lignicolous behavior have been isolated, such as: from stem and branches older than 2 years – *Monilinia laxa, Cytospora cincta, Eutypa lata, Schizophyllium commune, Stereum purpureum, Coniothyrium amygdali;* from root and collar*: Cylindrocarpon radicicola, Fusarium sambucinum* The attack moment, determined by the climatic conditions that increase the host plant's sensitivity (temperature, rainfall) and the pathogen's virulence; the phenology phase of the host plant development; apricot physiology; the moment when the plant is the most sensitive – in the autumn when the leaves fall until April next year.

INTRODUCTION

The cryptogamic diseases are almost entirely of multi-factorial etiology, the etiological agents are grouped in two large categories that are connected with the genetical or rised at the host plant level particularities and are influenced by external factors, among which are the ecological elements, the applied agrophytotechnical measures, so this means man's intervention over the plant in the created eco-system.

Early drying is a disease usually affecting stone fruit trees, with the most obvious damaging outcomes in apricot.

In Romania, apricot early drying has been described in 1930 (Tr. Săvulescu, 1932). During the decade 1930-1940 the disease turned in calamity, leading to drying of more than 50% apricot trees occurring in this country (Sonea, 1940). This phenomenon subsequently diminished, due to resistant cultivars and to superior culture technologies, the extent of early of trees being 5-35 %.

Studies on apricot biological decline in Romania continued with biological and ecological aspects of fungi involved in this process (Ciurea 1987, 1989, Rafailă et al., 1982; Oprea et al., 1983, 1985, 1987, 1993, 1995; Trandafirescu, 1984).

The evolution of the apricot dieback has been researched by us in the context of epidemiological parameters: the attack moment of lignicolous fungi, determined by climatic conditions that increase the sensitivity of the host plant (temperature, rainfalls) and the pathogen's virulence; the phenology phase of the host plant development; apricot physiology; the moment when the plant is the most sensitive – in the autumn when the leaves fall until April next year. These represent preliminary data for making of a mathematic pattern.

MATERIALS AND METHODS

The researches regarding the apricot biological dieback in the Romanian ecological conditions were extended over a period of 10 years, including orchards from all crop zones. Biological samples were taken from the trees about to dry, out of which the lignicolous fungi that play a role in the dieback process were isolated in lab conditions (Groclaude, 1979).

The biological parameters were observed at the identified species by the current lab techniques (Tuit, 1968).

In orchards there have been made studies of epidemiology regarding the *Cytospora cincta* and *Eutypa lata* fungi, by artificial infection realized through wounds made by cutting the crust with a knife and applying on the wound the fungi (under the form of mycelium, ascospore, picnospores); the wounds were protected with moist paper bands and plastic strips; the observations were made each month, including the following points:

- the penetration mean of the pathogen in the host plant was realized through artificial infections on different ages branches, or natural (the falling place of the leaves);
- fungi virulence was experimented by repeated infections in different periods of the year with anamorphic and teleomorphic fructification or with mycelium farmed on culture medium;
- the attack production moment was underlined by monthly infections on wood of different ages (multi-annual, coppices);
- the period for which a wound remains open and sensitive to the lignicolous fungi infection was realized by accomplishing a multiple of 50 cuts of the multi-annual branches crust. Successively, for 50 days, the wounds were injected with mycelium of the studied fungi;
- the capture of the spores in the teleomorphic status, produced by perithecia developed on 2 years dried branches, was made by detaching them and maintaining them on the ground from autumn until spring, covered by a metallic net. Over them, at 20 cm, a stand with blades oiled with vaseline was fixed, and the blades were changed and examined every 20 days. The spores expel was observed in the period October-April, in connection with the climatic data.

RESULTS AND DISCUSSIONS

From investigations performed in apricot orchards in districts with the broadest areas cropped with apricot trees, in South, South-East and West of the country during 1996-2006, it was recorded that trees sensitive to early drying, 1-2 years before drying exhibited slight vegetation, sometimes leaves appeared before flowering or simultaneously, an abnormal fact in this species; leaves remained small, getting brown and drying, without falling. Fruits remained small, with sponging pulp. Sometimes wilt occurred in full season or a huge defoliation took place. Cross section in branches affected revealed browning of ligneous and cambium tissues.

From branches of trees starting decline, pathogenic fungi with lignicolous behaviour have been isolated, such as:

- from stem and branches older than 2 years – *Monilinia laxa, Cytospora cincta, Eutypa lata, Schizophyllium commune, Stereum purpureum, Coniothyrium amygdali;*
- from root and collar*: Cylindrocarpon radicicola, Fusarium sambucinum*

The evolution of the dieback was followed through epidemiological studies: the sensitiveness of the host plant at the pathogenic action of the lignicolous fungi is the entering phase in the vegetative rest. In this phase simple carbohydrates substances are accumulated (September – October), which are best metabolized by fungi: fructose, glucose, sucrose, maltose, melobiose as well as nitrogen, amino-acids and amines sources like: histamines, asparagines, aspartic acid, glutamic acid, alanine, norvaline, vanillin, lysine.

In this period there are conditions for fungi spores penetration into the vegetal tissues ligneous vessels through natural (the leaves falling place) or artificial (formation cuts) wounds.

In this period there are rainfall conditions (rain), and temperatures between 16 – 26°C (Fig. 3).

In November 2006, following the first rain of 26 mm, after 2 hours there were captured 32 spores on 10 blades. The rain continued another 58 hours. In the 24h period there were captured 108 spores/10 blades; in 36h the number of captured spores was of 216/10 blades. Although the rain persisted the number of spores decreased.

Between the two rain cycles there was a period of 120 days without rain, followed by 27.8 mm of rain thus capturing 320 spores on 10 blades in 8 hours.

December and January were characterized by snow falls, and the spores' release stopped. After the snow melted, there were rainfalls in February, and the spores release continued. The phenomenon from autumn repeated, spores spreading being realized through rain water and wind, and the wounds on the branches resulted from the cuts were infected with the pathogen fungus (fig. 2).

The present spores' quantity on a wound influences the production of the infection. In this process, the wood age is important, thus a 2 years old wood is infected with a smaller concentration of spores than a multi-annual one

The favourable conditions for the infections evolution are maintained in winter and spring, until May, when the disease is stopped (fig. 1).

Following the apricot biological cycle, it can be observed that this specie is sensitive to lignicolous fungi infection from autumn until spring next year. When the tree enters the vegetative rest, there are transformations produced within the plant's physiology: the tissues gather mono-saccharide like: fructose, glucose, sucrose, maltose, melobiose and amino-acids and amines (histamines, asparagines, aspartic acid, glutamic acid, alanine, norvaline, vanillin, lysine), that are easily metabolized by the lignicolous pathogens. This is the moment when natural wounds appear on the branches, as a consequence of leaves fall, or of agrophytotechnical interventions, wounds that remain open up to 46 days, making possible the spores' penetration. In this period (September - November) the rainfall is present as rain and the temperatures are in average of 14.3°C. After a

forced rest, the climatic conditions become optimal again for the infections production, the pathogen fungi having again optimal attack moments. In May-August period the disease evolution is stopped (table 1)

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Table 1. The biological cycle of the apricot connected with the sensitivity to lignicolous fungi infections

<table>
<tr><td>pp. mm</td><td></td><td></td><td></td><td></td><td></td><td>12</td><td>111,2</td><td>60,2</td><td>snow</td><td>100,2</td><td>118,2</td><td>140</td></tr>
<tr><td>average t°C</td><td></td><td></td><td></td><td></td><td>16,5</td><td>15,8</td><td>10,8</td><td>5,5</td><td>-8</td><td>+5</td><td>13,5</td><td>17,8</td></tr>
<tr><td>infections optimum</td><td>-</td><td>-</td><td>-</td><td>-</td><td>+</td><td>+</td><td>+</td><td>+</td><td>-</td><td>+</td><td>+</td><td>+</td></tr>
<tr><td rowspan="5"></td><td rowspan="5" colspan="3">Vegetation period</td><td colspan="5">Organic rest</td><td>Forced rest</td><td rowspan="3">Un-budded</td><td rowspan="3">Blooming</td></tr>
<tr><td colspan="4"></td><td colspan="3">Deep rest</td><td></td></tr>
<tr><td colspan="7">Substances accumulation phase</td></tr>
<tr><td rowspan="2"></td><td colspan="7">carbohydrates substances: fructose, glucose, sucrose, maltose, melobiose</td></tr>
<tr><td colspan="7">amino-acids and amines: histamines, asparagines, aspartic acid, glutamic acid, alanine, norvaline, vanillin, lysine</td></tr>
<tr><td>Month</td><td>V</td><td>VI</td><td>VII</td><td>VIII</td><td>IX</td><td>X</td><td>XI</td><td>XII</td><td>I</td><td>II</td><td>III</td><td>IV</td></tr>
<tr><td>year</td><td colspan="8">2004</td><td colspan="4">2005</td></tr>
</table>

Fig. 1

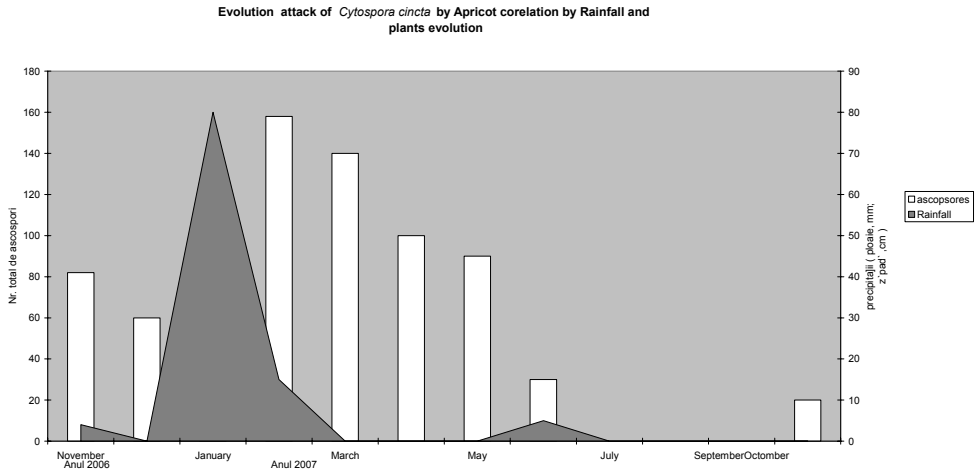


Fig. 2. Rainfall influence over spores' release of *Cytospora cincta* fungus

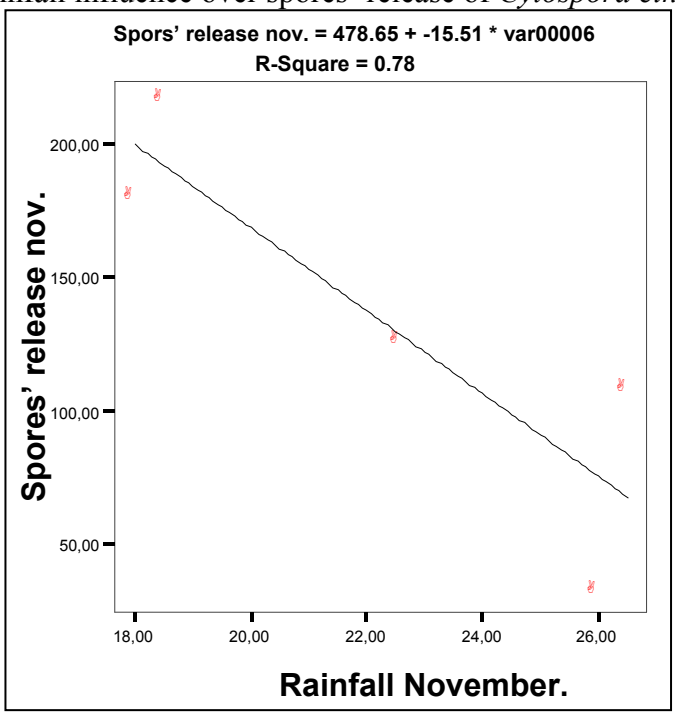
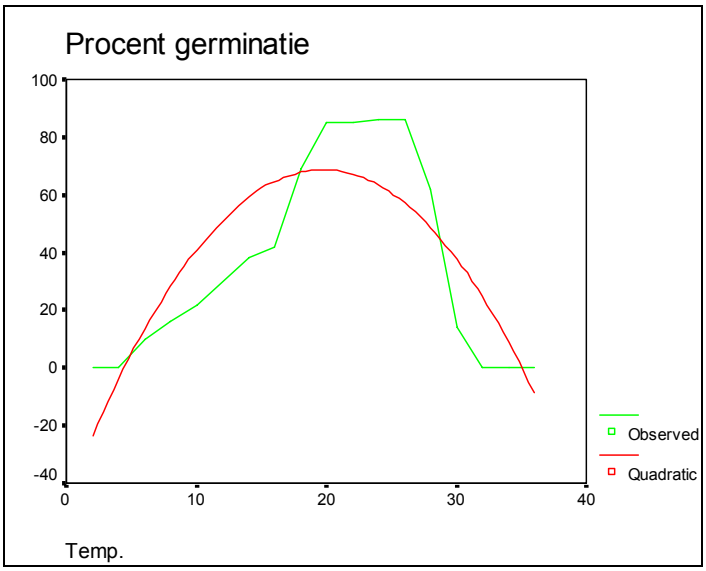


Fig. 3. Percentage germination spores' *Cytospora cincta*
Percentage conidia germination integration on Method Quadrati



Preliminary results concerning the fruit rate-setting in peach tree by fruiting pruning

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Keywords: peach tree, fruiting pruning, rate-setting, load of fruits

ABSTRACT

The peach tree is one of the most valuable fruit species mainly because of fruit's quality. The peaches are nice coloured fruits, flavoured, juicy, with excellent taste, rich in organic and mineral substances. All the different types of peaches, including industrial peaches and nectarines, have a phasing ripening of over 100 days, from 15-20 June until September, giving fruits to the consumers for a long period. The experiment was placed in Periam, the studied varieties being: Spring Lady, Caldesi 2000, Nectaross and Maja. The trees were grafted on peach and they were planted at the distance 4.0 x 2.5 m, having a density of 1000 trees/hectare. The rate-setting of fruiting branches (mixed branches) was made considering the age of the trees (4 years), their vigour and high density in the orchard, being chosen only the vigorous mixed branches. In 2008, all the peach varieties, mainly the nectarines (Caldesi 2000 variety) had twin fruits, some times triple or even four fruits. This situation is due to the double pistils and to the flower buds that are very close one to another, which led to the union of the closed fruits. This is the main reason why the fruit rate-setting is necessary in the peach tree culture technology. A proper number of fruits left on the tree will give superior quality fruits, richer in sugars and less acidity, with a normal weight, adequate to the variety.

INTRODUCTION

The peach tree is one of the most valuable fruit species mainly because of fruit's quality. The peaches are nice coloured fruits, flavoured, juicy, with excellent taste, rich in organic and mineral substances.

All the different types of peaches, including industrial peaches and nectarines, have a phasing ripening of over 100 days, from 15-20 June until September, giving fruits to the consumers for a long period.

The yield rate-setting is very necessary because of the following biological features:

- The peach tree forms each year a certain number of flower buds, probably 10 times more than necessary;
- The flower buds are grouped as two, very close and that is why there is not enough space for the growth of peaches;
- Without fruit rate-setting the peaches stay small, of inferior quality, the trees loose nutrients, the vegetative growing will be week and freeze during winter.

A proper fruit rate-setting is made by pruning, then a chemical rate-setting and then a manual one.

MATERIALS AND METHODS

The experiment was placed in Periam, near Timişoara, the owner of the pear orchard being Mr. Mitrovici Dean.

The studied varieties are: Spring Lady, Galddesi, Nectaross and Maja. The trees were grafted on peach and planted at the distances of 4,0 x 2,5 m, having a

density of 100 trees/ha. The tree crown is palspindel busch, being easy to maintain, having a good lighting.

The flower branches rate-setting (mixed) was made according to the trees' ages (4 years), their vigour and high density of 1000 trees/ha. There were chosen only mixed and vigorous branches of 40-60 cm and 6-8 mm diameter at the base of the branch. For each variety there were observed 5 trees.

RESULTS AND DISCUSSIONS

The number of mixed branches left in the tree crown is presented in table 1. We can observe that the number of mixed branches kept on the trees is between 57.8 for Maja variety and 84.6 for Spring Lady variety. The number of kept mixed branches on a tree was correlated to the vigour of the tree. On a hectare of orchard the number of mixed branches varies between 57800 and 84600. If we consider that a mixed branch has to produce at least 0.300 kg fruits, then the production/hectare can oscillate between almost 20 tones for Maja variety and 28 tones for Spring Lady variety.

Spring Lady variety has a number of nodes that varies between 19 and 24, of which the nodes that have flower buds are between 11 and 17. At each fertile node there can be found in many cases two flower buds, that is on each mixed branch there can be found between 16,5 and 25,5 flower buds (table 2).

Maja variety has a number of nodes that varies between 17 and 22, of which the nodes that have flower buds are between 8 and 17. The flower buds on a mixed branch can be between 12 and 25, the necessity of rate-setting being obvious to this variety, though it had a moderate fruit load after the phenophase of fruit bind (table 3).

Nectaross variety the number of fertile nodes on the mixed branches varies between 11 and 17 and in total on 10 mixed branches we have 141 fertile nodes and only 62 vegetative nodes. This leads to a severe fruit rate-setting and a careful pruning as the long pruning means a more difficult replacement of the fruit branches (table 4).

Caldesi 2000 nectarine variety has fertile nodes on the whole length of the mixed branches. Out of 204 total nodes on 10 mixed branches 79 are vegetative and 125 are fertile. The fertile nodes often have two flower buds and a vegetative one (table 4).

In 2008, all the peach varieties, mainly the nectarines (Caldesi 2000 variety) had twin fruits, some times triple or even four fruits. This situation is due to the double pistils and to the flower buds that are very close one to another, which led to the union of the closed fruits.

CONCLUSIONS

The peach tree culture technology is very sophisticated mainly because of the need of fruit rate-setting, which is necessary in order to have good quality fruits.

Almost all one year old branches have flower buds, excepting the greedy branches. So the fruit rate-setting and even the shortening pruning are necessary for a good culture technology.

Out of the fruiting branches specific to the peach trees only the mixed ones are being kept, after pruning, for fruiting. There are kept only the medium vigorous mixed branches that are 40-60 cm long and 6-8 mm base diameter. The others are pruned or left as small branches of only 2-3 buds at the bottom of the tree crown for regeneration. On the kept mixed branches the fertile nodes have to represent 60-75% of the total ones.

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Tables

Table 1. The mixed branches load left on the trees, 2008

No.	Variety	No. of mixed branches in the trees					Σ	Average per tree	Mixed branches/ hectare
		1	2	3	4	5			
1	Spring Lady	52	92	71	96	112	423	84,6	84600
2	Maja	66	58	42	62	51	289	57,8	57800
3	Caldesi 2000	66	83	48	71	69	337	67,4	67400
4	Nectaross	53	87	54	52	46	292	58,4	58400

Table 2. The repartition of the vegetative and flowering buds on the mixed branches SPRING LADY variety, 2008

Variety	No. of mixed branches	Total buds	Of which		
			Vegetative	Flower buds	
SPRING LADY	1	22	8	14	
	2	19	6	13	
	3	20	7	13	
	4	21	4	17	
	5	24	12	12	
	6	21	5	16	
	7	22	7	15	
	8	22	10	12	
	9	19	8	11	
	10	21	8	13	
	Total	211	75	136	64,4%

Table 3. The repartition of the vegetative and flowering buds on the mixed branches MAJA variety, 2008

No. of mixed branches	Total buds	Of which		
		Vegetative	Flower buds	
1	19	4	15	
2	17	4	13	
3	20	8	12	
4	20	7	13	
5	19	7	12	
6	22	6	16	
7	22	14	8	
8	20	5	15	
9	20	10	10	
10	19	2	17	
Total	198	67	131	65,6%

Table 4. The repartition of the vegetative and flowering buds on the mixed branches NECTAROSS and CALDESI 2000 varieties, 2008

Variety	No. of mixed branches	Total buds	Of which		
			Vegetative	Flower buds	
NECTAROSS	1	20	6	14	
	2	21	7	14	
	3	22	6	16	
	4	17	4	13	
	5	24	7	17	
	6	18	7	11	
	7	23	4	19	
	8	16	2	14	
	9	22	8	14	
	10	20	11	9	
	Total	203	62	141	69,4%
CALDESI 2000	1	21	10	11	
	2	17	6	11	
	3	18	4	14	
	4	19	10	9	
	5	22	12	10	
	6	19	4	15	
	7	19	8	11	
	8	23	6	17	
	9	24	8	16	
	10	22	11	11	
	Total	204	79	125	61,10%

Soil maintaining methods implied in the apples quantity and quality increase in the intensive orchards

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Tree Growing Research & Development Station Voineşti

Keywords: apple tree breeds, vegetative tree growing, production, ecological weed combat

ABSTRACT

The researches performed at the Tree Growing Research & Development Station Voineşti in the period 2004 – 2007 point out some soil maintenance methods with beneficial influences on maintaining the soil fertility and humidity status in the drought periods. Among the soil maintenance methods, the variant implied in the apples quantity and quality increase is that with the soil lying fallow on the interval and with the soil covered up on the trees row, which maintains a high humidity in the roots zone and a temperature with minimum variations, prevents the weeds growth on the trees row, without herbicide intervention – and in the same time contributes to the increase of the organic material content, due to the decomposition in time of the vegetal material, resulting from the grass mowing from the interval between the tree rows or under the crown projection.

INTRODUCTION

Great and quality productions are obtained by optimally applying the whole range of technological measures, indifferent of the surface owned by each tree grower.

In the culture technology, an important part in the apples quantity and quality increase is played by the soil maintaining works , which have the purpose to assure optimal growth and fruit bearing conditions, by destroying the competition weeds and by improving the physical soil status.

In establishing the soil maintaining system in the orchards, one must have in view the ground protection against sinking, a very consolidated vegetal carpet, which permits, in any period of the year and in any weather, the circulation on the intervals, imposed by the technological necessities, the assurance of the soil proprieties improvement and the fertility increase by the contribution of the grasses cultivated between the rows.

The use of grass bands, with repeated mowing for covering, not only helps the easier passing of the mechanical machinery - but also the soil sinking on the tracks, formed by the wheels of the tractor, combined with the working machinery, is substantially reduced, as compared with the maintaining as black ploughed field, especially in the rainy periods (Şuta A., Kuncser E., 1974).

The grass covering on the trees row maintains a structural soil, reduces the temperature oscillations under the covering, The organically residues enrich the soil by decomposition, and on the slanted grounds it prevents the erosion (Adina Perianu, 2004).

The researches performed at the Tree Growing Research & Development Station Voineşti in the period 2004 – 2007 point out some soil maintenance methods with beneficial influences on maintaining the soil fertility and humidity status in the drought periods.

MATERIALS AND METHODS

In order to establish the best soil maintaining methods in the apple tree orchards and the best biological weeds combat methods at the Generos and Florina breeds, grafted on the graft bearer MM 106, the following variants were organized:

V_1 – (Mt) black ploughed field;

V_2 – laying fallow on the interval, with manual soil works on the trees row;

V_3 – laying fallow on the interval, and treated with herbicides on the trees row;

V_4 – laying fallow on the interval and covered with grass on the trees row, with material from the grass mowing on the intervals between the trees rows;

V_5 – laying fallow on the interval and covered with polyethylene foil on the trees row.

The experiment was organized on a surface of 4000 sqm for each apple tree breed, with trees aged 8 years, 12 trees per variant being observed.

In the experiment period (2004-2007), the climatically conditions were favourable for the trees growth and fruit bearing, being characterised by a medium annual temperature greater with 0.3^0C than the normal one of the zone (8.8^0C), with a total of annual precipitations exceeding the normal one of 782 mm (in the year 2005 were registered 1113 mm).

The soil on which the experiments were performed is brown eumezobazical, weakly pseudogleizat, with a clayish texture, with a weak acid pH (5.7-5.9). The humus content is medium at the surface (2.0-2.9%), medium provided with nitrogen and weakly provided with phosforus and potassium.

Observations and determinations were performed regarding the trunk girth growth, the annual length growths, the production registering and the medium fruits weight. The soil humidity and temperature in different moments of the day were also determined, depending on the maintaining variant.

RESULTS AND DISCUSSIONS

The vegetative tree growth at an age of 11 years, represented by the trunk girth at the Generos and Florina breeds, grafted on the graft bearer MM 106, had values comprised between 31.5 and 36.5 cm, with an growth increase of 2.1 and 3 cm, the greater values being registered at V_4, with the grass covered soil on the trees row (table 1). Under prolonged drought conditions, the covering resulting from the grasses of the interval between the tree rows assured a better water conservation at roots level, determining a more intense vegetative growth in the hydric stress periods, having also the role of ecological combat against the weeds, growing on the tree row or under the crown projection, without the intervention of herbicides.

The medium length of the annual growths presents values comprised between 40.5 cm and 46.8 cm at the Generos breed and of 39.0-45.3 cm at the Florina breed, both grafted on the graft bearer MM 106. Insignificant differences are found between the studied variants; all the same greater values are registered at the witness variant - black ploughed field, where the weeds do not contribute at the tree growth stopping, these being destroyed by the works applied to the soil..

The soil maintaining mode has a great influence on the fruit production quantity and quality increase.

From the data presented in table 1, it is found that the medium fruit production at the Generos/MM 106 breed oscillated between 28.9 and 36.0 t/ha, being greater at the variant 4, laying fallow on the interval and grass covered soil on the trees row, with vegetal material resulting from mowing the grasses of the interval between the tree rows, exceeding the witness variant with 9%. The same aspect is pointed out also at the Florina/MM 106 breed, where the fruit production was comprised between 30.3 and 35.3 t/ha and exceeded the witness variant by 10%. The medium fruit growth has values comprised between 156 and 163 g at the Generos breed and 148-153 g at the Florina breed, the greater fruits being registered at variant 4.

The soil humidity determined in the study's years in August, in the depths of 0-40 cm, shows different values depending on the soil maintaining variant and on the depths.

In the table 2, two distinct aspects are presented: the humidity registered in the Florina breed lot after a drought period, and at the Generos breed, after a 27.3 mm rainfall.

In the interval of 0-10 cm, at the variant 4, the humidity was of 21.4% on the trees row, as compared with 10.5 – 13.3 at the other variants.

After a rainfall of 27.3 mm, the soil humidity regime improved in the horizon of 0-10 cm, so that at the surface the humidity was 19.8 – 26.1%, and at 0 - 10 cm it had values of 15.3 – 19.2%. The humidity did not increase at the variant 5, with polyethylen foil on the trees row, where the humidity maintained itself in the same limits as before the rain, 11.1 – 12.1%.

In the conditions of a normal pluviometric regime, the variant that maintained the highest humidity at the soil surface and at the depths of 0-40 cm was variant 4, lying fallow on the interval and grass covered soil on the trees row with vegetal material, resulting from mowing the grasses on the interval between the tree rows. At the variant 4, in August, the humidity at the surface was 13.8%, as compared with 7.8-9.6% at the other variants. A higher humidity is also maintained at the surface on the fallow interval, but at the depths of 40 cm the humidity attains over 14%.

The temperature in different moments of the day, depending on the soil maintaining variant, is presented in the table 3.

The soil grass covering on the trees row with vegetal material resulting from grasses mowing on the interval between the trees rows, has a positive effect also in the case of temperature regulation, especially on sunny hot days. The temperature registered in July-August shows that under the grass, at 13 and 15 hours, it maintained itself at 26.0-27.8^{0}C (almost like at 8 hours – 24.5^{0}C) on hot days, as compared with 44.5-48.5^{0}C at the black plugged field and the worked on the trees row' variants.

The grass covering deposed on the trees row or under the crown projection, resulting from the interval between the trees rows, contributes to the organic material content increase, due to the decomposition in time of the vegetal

material, with beneficial influences on the vegetative growths, the production increase and the apples quality.

CONCLUSIONS

The vegetative tree growth, represented by the trunk girth growth increase at the age of 11 years was greater at the variant V_4 - laying fallow on the interval and grass covered on the trees row, respectively 2.6 cm, at the Generos breed and 3.0 cm at the Florina breed, both breeds grafted on the graft bearer MM 106.

At the variant 4 – laying fallow on the interval and grass covered on the trees row, the greatest production was registered: at the Generos breed 36t/ha and at the Florina breed 35.3t/ha. The medium fruits weight was 163 g at the Generos breed and 153 g at the Florina breed.

Under the conditions of a normal pluviometric regime, the variant, which maintained the highest humidity at the soil surface and in the depths of 0-40 cm, was V_4 - laying fallow on the interval and grass covered on the trees row, with vegetal material resulting from mowing the grasses of the interval between the tree rows, with 21.4%, as compared with 10.5-13.3% at the other variants.

The temperature registered in July-August shows that under the grass covering at 13 and 15 hours it maintained itself at 26.0.-.27.8 ^{0}C (almost like at 8 hour – 24.5^{0}C) on hot days, as compared with 44.5-48.5^{0}C at the black ploughed field and the 'worked on the trees row' variants.

The variant V_4 - laying fallow on the interval and grass covered on the trees row, is considered with perspective, maintaining a high humidity in the roots zone and a temperature with minimum oscillations, preventing the weeds growth on the trees row, without herbicide interventions and in the same time it contributes to the organic material content increase, due to the decomposition in time of the vegetal material, resulted from the grasses mowing on the interval between the trees rows. This is the variant which combats ecologically the weeds growing on the trees rows or under the crown projection.

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Tables

Table 1. The vegetative tree growths, the production and the fruits medium weight at the Generos and Florina breeds, grafted on MM 106, at different soil maintaining variants

(833 trees/ha)

Breed and variant	Vegetative growth			Fruit production		Fruits medium weight – g -
	Trunk Girth		Medium length of annual growths (cm)			
	cm	Growth increase		T/Ha	% of Mt	
GENEROS/MM 106 breed						
Variant 1	31,9	2,5	46,8	33,1	100	156
Variant 2	33,5	2,2	46,4	30,4	92	157
Variant 3	31,8	2,1	40,5	28,9	87	160
Variant 4	31,6	2,6	41,5	36,0	109	163
Variant 5	33,1	2,5	44,2	30,9	93	156
FLORINA/MM 106 breed						
Variant 1	31,5	2,9	45,3	32,2	100	149
Variant 2	33,7	2,7	43,7	32,6	101	149
Variant 3	36,6	2,8	44,7	34,2	106	148
Variant 4	34,9	3,0	43,3	35,3	110	153
Variant 5	32,0	2,8	39,0	30,3	94	148

Table 2. The soil humidity determined at different depths and soil maintaining variants

(August)

Variant	Sample place	Soil humidity (%) at the depth of:				
		0 cm	0-10 cm	11-20 cm	21-30 cm	31-40 cm
FLORINA breed – after a drought period						
Variant 1	on the tree row	6,8	13,2	12,6	11,7	14,0
	on the interval	9,3	14,8	14,8	15,6	17,1
Variant 2	on the tree row	9,0	10,9	12,0	11,8	12,0
	on the interval	17,6	10,5	10,7	9,6	11,1
Variant 3	on the tree row	9,9	13,5	12,0	15,2	15,4
Variant 4	on the tree row	19,2	21,4	17,8	17,2	18,0
	on the interval	16,5	11,6	11,0	11,2	11,5
Variant 5	on the tree row	11,1	13,3	13,1	13,1	12,8
GENEROS breed– after a 37.3 mm rainfall						
Variant 1	on the tree row	18,8	18,7	13,7	11,1	10,5
	on the interval	26,1	19,2	13,2	9,8	9,2
Variant 2	on the tree row	21,8	17,3	10,8	9,9	10,4
	on the interval	20,0	16,8	10,5	9,3	8,0
Variant 3	on the tree row	19,8	19,1	12,7	13,1	12,9
Variant 4	on the tree row	21,8	18,9	15,4	11,4	10,0
	on the interval	20,7	15,3	11,8	8,6	8,6
Variant 5	on the tree row	11,1	12,1	12,3	12,5	12,0

Table 3. The temperature at different moments of the day, depending on the soil maintaining variant

(July-August)

Place	Temperature on cloudy days (^{0}C)			Temperature on sunny days (^{0}C)		
	8 hours	**13 hours**	**15 hours**	**8 hours**	**13 hours**	**15 hours**
Sheltered	15,0	23,0	22,3	23,0	32,0	33,0
In the air	15,4	22,0	26,4	23,8	32,0	33,5
At the soil - black field	19,0	27,6	27,2	25,5	42,0	44,5
- fallow on the interval	15,0	22,5	24,6	22,3	28,5	30,6
- herbicidated on row	16,8	25,5	26,0	26,3	40,0	43,6
- worked on the row	17,5	26,5	28,0	26,9	46,0	48,5
- covered on the row - over	16,6	25,2	26,0	28,1	43,0	43,6
- under the covering	16,8	21,0	22,9	24,5	26,0	27,8
- over the foil	16,5	23,2	26,4	26,4	40,5	43,7
- under the foil	17,2	24,2	28,2	24,4	36,5	38,3

Drip irrigation in the nursery – technological measure for increasing of economic efficiency

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ABSTRACT

In the nursery, the obtaining of high productions of tree on surface unit, which generate consistent profits, is necessary to use performing technologies.

There are two technological sequences in the nursery practice which must be appreciated simultaneously: irrigation and fertilization.

On the Istrita Nursery, which is located in the steppe area, the climatic conditions of the latest years can be described as pour in precipitations. In this case, the rational furnishing of water irrigation in the nursery, on the entire vegetation cycle is a necessity.

The Istrita Nursery has a classic irrigation system, which is often inefficient (problems in springtime with water supply, and also in summer with inconstancy of the water debit). All this difficulties generate:

- high lost of graft trees (50% in the arid years), specially on the case of some tree species. Because of the lack of water in the early spring a high graft eye drop off, get late in life or staying dormant.
- decreasing or diminishing of the standard trees as products the nursery

MATERIALS AND METHODS

Starting with these facts, in 2008, on Istrita Nursery was introduced drip irrigation system in production domain of parent stock (school of seedling plants and in the grafted nursery (field I and field II). This it was fit up and adapted corresponding to the nursery. Drip irrigation plant has the following component parts:

Water source, which consist of one drilled well, existing in the farm which provide for needful of water for one sprinkle (rate of sprinkle).

Installation to put under pressure. Through the fact that drip irrigation require generally lower pressures 0,5-1,5 at., we used a submersible pump, with about 10 volume mc/hour connected to one hydrophore that will ensure constant values of the pressure.

Fertilization system, by which ensure the fertilizers solubilization and distribution of those in transport and distribution system to plants.

The filtering system. This is represented by one performing filter which keeps water impurities, including very sharp abeyance particles and sea weeds.

Transportation system. The water is transported subterranean until the row end of trees by polyethylene tube with high density, buried, and coupled by help of some compressors fitting.

Sprinkle tubes (active part of the irrigation plant). These are manufactured by polyethylene and they are attaching to the transportation tubes by help of some special connectors. From 30 to 30 cm they are endowing with some orifices (dripper) that accomplish one continuous film at length row of trees. The distance between sprinkle tubes, on the transportation tubes, has been established in accordance with the distance between rows of plants.

RESULTS OBTAINED

Analyzing in complexity the effect of drip irrigation in the frame of soil-plant-crop technology-environment system, the applicability as technological measure results from the following benefits:

Benefits in comparison with soil:

- the drip irrigation avoids the soil structure weathering, scrub of mineral elements and the it arable state compactation;
- they prevent the soil ram and crust making;
- the soil may be maintain at one constant level and one optimum humidity level, according to the growing require of grafted trees, of seedling plant or marcots.

Benefits in comparison with plant:

- foliar system is not sprinkled, limiting the spread of favoured disease through moist environment;
- they don't cause a sudden cooling of air device to the plants, removing the restrictions bound up by the timetable of sprinkles application;
- water contribution is slowly and regular, and the radicular system is not complied to thermal stress;
- they allow an adequate respiration of plant roots during vegetation period, as a result of the fact that the soil micropors remain generally dry and aired. The humidity level is a little above field capacity of soil excepting one small area at round of dropping orifice.
- the sprinkle application it may be do in spring early when the water is absolutely necessary for starting of vegetation of graft nibs, brollies springing in the nursery of seedling or strike root to seedlings in the nursery at field I

Benefits in comparison with fertilization (fertirrigation):

- the solubilizated fertilizers reach easily on the plant roots that absorb them quickly
- fertilization time begin at the same time with the starting in vegetation and follows fenophase of plants growth;
- Thrift of fertilizer. These are totally undertaken by plants, reducing in the same time the wastage by leaching and surface scrub;
- it is reduce the soil pollution;
- fertirrigation ensure a surplus of nourishing elements necessary in the periods of plant intensive growth.

Benefits in comparison with other irrigation method:

- they achieve an important water thrift. The water amount used represents 10% confronted by classical irrigation method.
- it is record an important reduction of water wastage by evaporation: 90% by water applied is used effectively by plants;
- may be applied indifferent by wind conditions;
- automation of irrigation is make easily and with low costs;
- thrift of energy for pumping and safety in exploitation, work pressure being low;
- maintain a soil temperature higher in comparison with furrow irrigation and aspersion irrigation, with benefit effect on the growth process;

- they may use also the water with higher rate at mineralization, because this is not in directly connection with plant.

Benefits in comparison with crop technology:

- the land remain available all the time, the working of irrigation system by dripping being independent toward the other papers for crops maintenance;
- the thrift of hand labour, removing practically manually works of removal of wink rain used for aspersion irrigation;

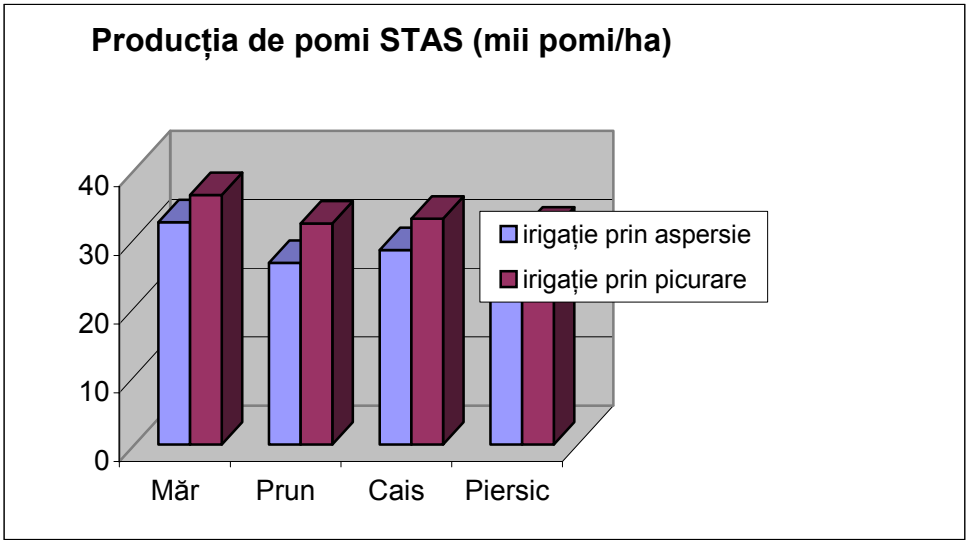
Although represent a great investment, the effect of drip irrigation have been emphasized through the production spore and implicitly of revenues, spores produced by: reducing of nibs grafted number not started in vegetation (applying the early irrigation in spring); the percentage of trees STAS/ha., reducing of outlay with hand work, etc

Analysing productions to main trees species multiplied in the nursery (table 1) these have recorded rising between 12-21,50%, with an average by 16%.

Table 1

The effect of drip irrigation on production and revenues in cp. II of nursery, Istrița 2008

Species	Production of trees STAS (thousand tree/ha)		Revenues Venituri (thousand lei/ha) (price of capitalization 9 lei/piece		Spores of production and revenues %
	Aspersion irrigation	Drip irrigation	Aspersion irrigation	Drip irrigation	
Apple tree	32,40	36,35	291,60	327,15	12,19
Plum tree	26,50	32,20	238,50	289,80	21,50
Apricot tree	28,35	32,89	255,15	296,01	16,01
Peach tree	27,20	31,33	244,80	281,97	15,18
Average	**28,61**	**33,19**	**2578,51**	**298,73**	**16,00**



It must have doing the mention that the Istrita nursery has benefited by water source, already existent and by energy source. But yet with costs increasing ensuring these tow components, the period at damping of investment it does not surpass any production cycle (2 years).

CONCLUSION

- drip irrigation is the most efficient for the nursery orchard;
- production intensification (tree and youngling STAS) is significant ca. 12-21.5%;
- Drip irrigation in a measure that apt to be a specific ecological agriculture technologic measure with benefits for plant, soil and culture technologies in his ensemble.

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Researches regarding climatic conditions interaction over apricot culture in Dobrogea

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Keywords: climatic changes, *Prunus armeniaca*, assortment, cultivar

ABSTRACT

The apricot, which is a fond species warmth, found from always good growth conditions and bearing in south-east zone of Romania and particularly in Dobrogea. The climatic changes recorded in last ten years effected negative over apricot culture, effect which was perceived differentiated depending on the cultivar and the biology of this. The effected studies and the outcomes demonstrate important cultivated cultivars of assortment choice on zones and allow the choice to the most appropriate cultivars to the clime conditions and specifics soil of each zone.

INTRODUCTION

In whole world, the researches what do themselves for the apricot species have amongst the prior objectives relation among the climatic conditions and apricot culture. In our country the relation among the climatic conditions and apricot culture was studied greatly time and by highly many researchers reminding on: Constantinescu N. (1955), Burloi Niculina (1957, 1958), Bordeianu T. (1961), Cojean Natalia (1961), Manescu Creola (1975), Topor Elena (1987, 2002), Stanciu T. (1989), Roman Ana-Maria (1983, 1992). The obtained outcomes to all these studies corresponded to a certain time periods and to an assortment with which worked, tracing so the leader line of relation among the climatic conditions and the apricot biology from culture zone.

The obtained outcomes to more apricot selections and cultivars are correlative with the registered clime changes in last ten years and interpreted in the interplay relation.

MATERIALS AND METHODS

The biological material with which worked is composed from 12 apricot cultivars and selections which cover from very early until very late blooming period, planted in a comparative culture to Valu lui Traian. Each is represented through 20 trees planted of 4.5/4.5 m. Crown form is free flattened on the row direction. The culture technique is specific apricot, in which applied bearing cuttings, treatments, the soil works, irrigation, the fruit evaluation and harvest. The cultivars and selections from this comparative crop are:

- for early blooming period: NJA 42, CR 2-63, Fortuna, Traian
- for medium blooming period: Neptun, Dacia, Orizont, Amiral
- for late blooming period: Sirena, Umberto, Auras, VT 95.03.49

For the climatic conditions interaction interpretation over trees were done remarks regarding the stages of bud breaking and blossom, vegetative growth, productivity and fruits quality.

The represented clime conditions through minimum and maximum averages temperatures from spring, and winter time, late frosts of spring hoarfrosts, wind and precipitations were taken from the “Meteorological Station”

located to Valu lui Traian from Dobrogea and has the next coordinates: altitude: 53 m, latitude: 44°10', longitude: 38°29'.

RESULTS AND DISCUSSIONS

The climatic dates representing the mean temperature and precipitations for different time periods respective for period 1942-2005 (63 years) and for period 1997-2007 (last 10 years) it showing so table 1:

- **Mean temperature**, for time period of 63 years is of 10.7°C while period to the last 10 years is of 11.7°C, showing off an increase of one degree Celsius;
- **Total precipitations**, the period average of 63 years is of 416.7 mm, while the average to the last 10 years is of 506.3 mm showing off an increase of 89.6 mm. Though it recorded this increase of precipitations quantity, the trees not could to profit by she, as the rainfall were under form of "shower" and they drained light soil. Too phenomena were enough dense in last 10 years. The precipitations which were in small quantity, less than 10 mm did not be useful tree. Apricot culture realized in optimal parameters only in practice conditions of 2-3 irrigations over vegetation period, with 800 c.m./ha each. From table 1 can see as in each month of mean temperature and rainfall value is for period to the last 10 years bigger comparatively with the period average of 63 years (with very small exceptions).

Minimum absolute temperature for a period of 30 years between 1977-2007 had contained values between -9.0°C in 1.02.1981 and -21.4°C in 31.01.1987, values what did not affected never the apricot. The minimum registered temperatures on run of these periods of 30 years turned out in the months: December in 6 years; January in 7 years and February in 17 years. The apricot is the incoming species in the rest vegetative inmost beginning from September its October and this rest is very short, approximate 30-40 days, thereto it enters optional rest.

The active temperatures are the temperatures what have the bigger value plus 6.5°C and its acts for the start in vegetation of apricot after this and-satisfied inmost rest period. The apricot pushes along in vegetation through blossoming. Depending on the active temperatures action and the inmost rest fulfilment, the apricot can push along in earlier its later vegetation, creating so a variation very large of blossom dates from a year to different.

In period to the last 10 years (1998-2007) the apricot blossomed the earliest in year 2002 beginning from 3 March and the latest in the year 2003 beginning from 21 April. Between the cultivars with early blossom NJA 42, CR 2-63, Traian were 7 days, so in the year 2002 (between 3-9 March) as well as in the year 2003 (between 21-27 April). In the others the apricot years blossomed between these limits (Table 2). If the variation limits of blossom period are very large going until a month between years, the harvest period limits are much smaller, only of 5 to 10 days from a year to different.

Active temperatures degrees sum ($\sum$°C > +6.5°C) needed of each cultivar for the starting to blossom was calculated yearly, show its in the table 3 only the extremities, the ones suitable years 2002 and 2003 for 3 cultivars with late prime.

It maybe to see that though it exists a difference of more of a month of blossom date from a year to different, for same cultivar e.g. CR 2-63, sum of active temperatures which they start the blossom has approximate same value, respective 307.2°C in 2002 when it blossomed on date of 6 March and 302.3°C in 2003 when it blossomed on 25 April. This working characterizes the biological requirements of each cultivar. Until the start to the blossom, minimum and maximum temperatures as production moment and their alternation not had negative effects over apricot. The trees blossomed earlier in March or later in April after biology of each the insurance and cultivar thermal needed degrees of this vegetative stage.

In last 10 years, the low temperatures under degrees zero Celsius and hoarfrosts they turned out from what in what later, in some years arriving just down to May month how was in the years 1999, 2000, 2001, 2003, 2004, 2006, 2007.

The frequency appearance of low temperatures until of freeze and of hoarfrosts, after the trees entered the blossom process entailed yield losses in different percents, from 20% until 85-90%, e.g. years 1999, 2001, 2008 its just total in the year 2002.

In the breeding programme framework of apricot to Research Station for Fruit Growing Constanța constant followed the cultivars obtaining with proof against temperature variances from spring and winter time and also cultivars obtaining with a long and inmost rest for blossom how later in spring. This objective proved of not is the ideal for apricot resistance. In the climatic changes context from hindmost years were tougher to the low temperatures action cultivars with blossom very early as: CR 2-63, Earliril, Fortuna, NJA 42. One of the realized cultivars in the breeding programme for the late blossom objective is the cultivar Auras. In the year conditions 2008, though it blossomed very late comparatively with the rest apricot cultivars, had most of suffered being affected of the low temperatures in proportion of over 90%.

Analysing the behaviour of two apricot cultivars, one with early blossom period - Fortuna and one with the very late blossom period – Auras in the year conditions 2008, they observe themselves as:

a. the blossom period of those two cultivars was:

Fortuna cultivar - bud breaking period between 13-15 March
- blossom period between 16-26 March

Auras cultivar - bud breaking period between 16-19 March
- blossom period between 20-30 March;

b. temperatures to limit of freeze they were in the days of 16, 20, 27, 28 March;

c. in the variation conditions of contained temperatures between -3.5°C and +21.6°C (Table 4). In these conditions Fortuna cultivar blossomed and fructified normally, while the cultivar Auras was affected strong. The young fruits, with the size of 0.5-1.0 cm diameter, they began to pine, to deform them it and next they fell nearly in whole from trees.

The hoarfrosts and the frosts which turned out in the blossom and fruits growth periods affected in different degrees yearly yields. The fruits quality is

influenced by more factors amongst which count: fruits quantity on tree, soil management, genetic of cultivar. Certainly in the years with due losses temperatures, the fruit quantity on tree smaller, but the quality to this is better (bigger fruits and better coloured).

CONCLUSIONS

The obtained results to the behaviour study of 12 apricot cultivars and selections in period 1997-2007 under influencing temperatures variances from the winter and spring period and of other climatic elements as: hoarfrost, wind, rainfalls got off on the record the next conclusions:

- It emphasized the temperatures variation from the winter time, but more chosen from the spring time creating large limits night variation – day, but also from a day to other;
- Low temperatures, under $0^{o}C$ and hoarfrosts turned out from what in what later, in some years arriving just down to May month, examples being the years 1999, 2000, 2001, 2003, 2004, 2006, 2007.
- Rainfall quantity recorded relative increase, but the utility to those for trees was much lower, at times just harmful, owing to character of "shower". For the put in value of biological potential of taken cultivars in study was the needed irrigation, applying 2-3 soaks per annum with 800 c.m./ha each;
- Never not happened to lose the fruits production its partial or total only effect of temperature variances from the winter time, but when they turned out pending to the blossom its or after the completion to the blossom, the losses were extreme, going until total compromising of yields (2000 year);
- Realization in the breeding programme framework of apricot of to some new cultivars with the blossom very late, amongst which it counts and the cultivar Auras did not solved resistance problem to the low temperatures from spring period;
- Auras cultivar has a biological long and inmost rest, it pushes along in vegetation and blossom the latest and still was the most affected of the low temperatures from year spring 2008 losing its yield in proportion of over 90%;
- Waits contrary proved of are tougher to the temperature decreases, so in this year, as well as in other, the cultivars with blossom very early: CR 2-63, NJA 42, Earliril, Fortuna;
- In conclusion, we was considering as in the relation among the climatic conditions and apricot of culture zone is needed to intervene with protective measures such as watering with protective substances before blossom, hedging roofs.

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Tables

Table 1 – Mean temperatures value and precipitations for different time periods at Valu lui Traian – Constanța

Month	Mean yearly temperature for 63 years (since 1942-till 2005)	Mean yearly temperature for last 10 years (1997- 2007)	Total precipitations mm, average for 63 years (since 1942-till 2005)	Total precipitations mm, for last 10 years (1997- 2007)
I	-0.4	0.5	27.1	30.6
II	0.9	1.6	23.2	26.8
III	4.4	6.3	28.2	39.6
IV	9.7	10.5	31.7	22.4
V	15.3	15.9	37.3	35.8
VI	19.4	20.7	47.8	40.1
VII	21.9	23.6	36.2	58.8
VIII	21.3	22.6	37.0	62.5
IX	16.9	17.6	32.2	76.0
X	11.5	12.3	34.0	37.4
XI	6.5	7.1	41.0	43.5
XII	2.1	-1.3	41.0	32.8
Annual average	10.7 ^{o}C	11.7^{o}C	416.7 mm	506.3 mm

Table 2 – Data regarding the blooming and the ripening of apricot tree between 1997-2008 periods

Year	Blooming date (limits)	Ripening date (limits)
1997	17.IV…24.IV	18.VI-6.VIII
1998	30.III…4.IV	8.VI-10.VIII
1999	24.III…6.IV	11.VI-31.VII
2000	1.IV…6.IV	9.VI-25.VII
2001	17.III…21.III	11.VI-30.VII
2002	3.III…9.III	without yield
2003	21.IV…27.IV	18.VI-17.VIII
2004	24.III…27.III	14.VI-12.VIII
2005	11.IV…16.IV	17.VI-14.VIII
2006	2.IV…5.IV	15.VI-10.VIII
2007	11.III…29.III	13.VI-
2008	16.III…30.III	

Table 3 – Sum of the active temperatures (> 6.5^{o}C) for apricot blooming

Cultivar	∑^{o}C necessary for start the blooming			
	in 2002		in 2003	
	Date	∑^{o}C	Date	∑^{o}C
Cultivars with early blooming				
CR 2-63	6.III	307.2	25.IV	302.3
Traian	5.III	301.9	25.IV	302.3
Fortuna	3.III	301.9	24.IV	297.6
Cultivars with late blooming				
Sirena	8.III	324.2	26.IV	307.1
Umberto	11.III	325.9	27.IV	312.2
Auras	12.III	325.9	27.IV	312.2

Table 4 – Data regarding the temperatures variation in blossom period 2008

Date: March 2008	Maximum temp. ^{o}C	Minimum temp. ^{o}C	Cultivar/Blossom stage
13	14.6	5.0	
14	12.0	4.5	
15	17.5	2.6	
16	14.4	0.0	FORTUNA
17	21.6	4.0	Bud breaking: 13-15 March
18	18.6	5.5	The beginning of blossom: 16 March
19	12.0	3.5	The end of blossom: 26 March
20	11.8	-2.5	
21	10.0	1.6	
22	13.0	3.8	
23	12.8	3.2	
24	19.5	3.6	AURAS
25	14.5	5.2	Bud breaking: 16-19 March
26	11.0	0.6	The beginning of blossom: 20 March
27	13.2	-3.5	The end of blossom: 30 March
28	10.2	0.0	
29	11.5	1.7	
30	12.2	2.0	

Photo 1 - AURAS cultivar in conditions of 2008 year

Researches regarding the herbicides applications influences over the peach-trees plantations

Aurora Venig
S.C.D.P. Bihor

Keywords: Prunus persica, postemergent weed control

ABSTRACT

This research represents the synthesis of the experimental results that were carried out in 2007, at S.C.D.P. Bihor, by using 11 kinds of postemergent herbicides applied on a four years old peach-trees plantation. The made reproof and analysis were concerning the followings: the wild-growing plants' number/m^2, their weight/m^2, the plants' vegetation evolution, their extension after E.W.R.C. and the phytotoxic effect over the grafted trees. The obtained results show that after using the 11 kinds of herbicides, the number and weight of the monocotyledonous and dicotyledonous wild-growing plants were low and there was no phytotoxic effect over the grafted trees from the orchard.

INTRODUCTION

In order to obtain an important and high-quality fruit production, there should take place a technology improvement, especially in case of reducing the hand-work volume by applying herbicides.

There were organized many experiences in 2008 at S.C.D.P. Oradea regarding the herbicides application at the four years old peach-trees plantations.

MATERIALS AND METHODS

The used material was built from 11 kinds of herbicides (table no. 1), comparing to Mt, which was unthreatened. The herbicides were applied on the 2nd of June, 2007 on argiloiluvial soil, characterized by the profile of type A_o-B_t-C. The wild growing plants were during an active growth.

On the day of the treatment, the air's temperature was 19°C. The rainfalls were well divided. The yearly medium temperature was 12,6°C and the amount of precipitations was 548,4 mm.

The herbicides were applied in a fluid form.

The peach variety was Redhaven, grafted on franc.

REPROOF AND ANALYSIS

- the wild-growing plants number /m^2
- the wild-growing plants weight /m^2
- the plant's vegetation evolution
- the wild-growing plants extension after E.W.R.C.
- the phytotoxic effect over the grafted trees.

RESULTS AND DISCUSSIONS

The wild-growing plant's number/m^2 – as shown in table no. 2, all the used herbicides reduce the wild-growing plant's extension comparing to Mt (100%), the differences are very significant, being statistically ensured, excepting the Kansen herbicide, with a very low pest control.

The wild-growing plants weight/m^2-as shown in table no. 2, the herbicides influence over plants weight is alike to the influence over the wild-growing plants number/m^2, excepting Medallon and Simanex, whose values are not statistical assured.

The plant's vegetation evolution-as shown in table no. 3, after the herbicides application there were combated both kinds of wild-growing plants, the monocotyledonous and the dicotyledonous ones, the annual and also the perennial.

The wild-growing plants extension after E.W.R.C. - the information given in table nr. 1 emphasizes that all herbicides register low marks, situated between 1 and 5, which means a good control over the wild-growing plants, excepting the Kansen herbicide, that registers mark 8, which means a bad control.

The phytotoxic effect over the grafted trees-can be manifested through changing the colour, drying or other signs, but all these phenomenon were not registered after the herbicides application

CONCLUSIONS

1. In case of the variants, where the herbicides were applied, the wild-growing plants' number and weight were lower on the surface unit; the degree was diminished from 100% to percentages of 2-40%.
2. The applied herbicides combated wild-growing plants from the monocotyledonous and dicotyledonous group.
3. The wild-growing plants extension after E.W.R.C. registers low marks, between 1 and 5, which resembles a good control of the herbicides, excepting the Kansen herbicide.
4. The applied herbicides do not have a phytotoxic effect over the grafted trees.

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Table 1. The period and moment of the herbicides use and the dignity of the wild-growing plants extension after the E.W.R.C. scale

Nr. crt.	Used herbicide	Date of application	Moment of application	Applied quantity/ha	Extension after E.W.R.C. scale
1.	Mt	-	-	-	100%
2.	Efasate 36S	2.06.2007	postemergent	3 l	1
3.	Fusilade forte	2.06.2007	- " -	1,5 l	2
4.	Galant super	2.06.2007	- " -	1,5 l	1
5.	Roundup	2.06.2007	- " -	0,5 l	5
6.	Medallon	2.06.2007	- " -	3 l	4
7.	Fozat	2.06.2007	- " -	3 l	2

Table 2. The herbicides influence over the wild-growing plants number and weight over the peach-trees plantation

Nr. crt.	Variant	Wild-growing plants number					Wild-growing plants weight				
		E	Medium	Diff.	%	Importance	E	Medium	Diff.	%	Importance
1.	V1 (Mt)	121	40	-	-	-	1,895	0,632	-	100%	-
2.	V2	0,013	0,004	39,96	-	000	0,013	0,004	0,628	-	00
3.	V3	24,0	8,0	32,0	20	000	0,370	0,123	0,509	19	00
4.	V4	3,0	1,0	39,0	2	000	0,010	0,003	0,629	-	00
5.	V5	50,0	16,0	24,0	40	000	0,240	0,080	0,552	12	00
6.	V6	38,0	12,0	28,0	30	000	0,800	0,266	0,366	42	-
7.	V7	11,0	4,0	36,0	10	000	0,220	0,070	0,562	11	00
8.	V8	30,0	10,0	30,0	25	000	0,330	0,110	0,522	17	00
9.	V9	28,0	9,0	31,0	22	000	0,460	0,153	0,479	24	0
10.	V10	32,0	11,0	29,0	27	000	0,490	0,163	0,469	25	0
11.	V11	96,0	32,0	8,0	80	-	2,000	0,666	0,034	105	-
12.	V12	36,0	12,0	30,0	28	000	1,070	0,356	0,372	43	-
	DL	5%	12,52					0,372			
		1%	17,06					0,507			
		0,1%	22,92					0,682			

Table 3

Nr. crt.	Species	Monocotyledonous	Dicotyledonous	Annual	Perennial
1.	Matricaria inodora	-	Yes	yes	-
2.	Echinochloa crus galli	yes	-	-	yes
3.	Convolvulus arvensis	-	Yes	-	yes
4.	Chenopodium album	-	Yes	-	-
5.	Gypsophila muralis	-	Yes	yes	yes
6.	Amaranthus retroflexus	-	Yes	yes	-
7.	Polyganum aviculare	-	Yes	yes	-
8.	Stanchys lonata	-	Yes	yes	-
9.	Brassica nigra	-	Yes	-	yes
10.	Rorippa silvestris	-	Yes	yes	-
11.	Capsella bursa pastoris	-	Yes	yes	-
12.	Polygonum amfibium	-	Yes	-	yes
13.	Datura stramonium	-	Yes	yes	-
14.	Cirsium arvense	-	Yes	-	yes

The behaviour of some cherry varieties in the plain conditions of the north-western part of the country

Aurora Venig
S.C.D.P. Bihor

ABSTRACT

This research resembles the results of some reproof made during two years (2007 and 2008) on nine cherry varieties at S.C.D.P Bihor. The reproof were concerning: crown's diameter on the rows and between the rows, trees' height, crown' height, trunk's diameter, development of the fruit-bearing phases. Related to the obtained results, all nine cherry varieties were divided up to the vigour in three categories (low, middle and high vigour) and concerning the fruit-bearing phases in other three categories: early, middle, late. These results take an important place in establishing the planting distance.

INTRODUCTION

Cherry trees are a very important variety from the economical point of view of their nutritive, technological, commercial fruit characteristics and biological trees features.

For a high fruit production in the next years, from the qualitative and quantitative point of view, there must be taken into consideration a suitable place for both types of cherry trees, the foreign types and the Romanian ones.

Researches regarding the cherry trees breeding in our country were carried out by Parnia Corneliu and co-workers in 1979, by Cociu V. in 1982. At S.C.D.P., there were carried out researches in 2007, regarding the behaviour of some cherry varieties in the Western part of the country.

MATERIALS AND METHODS

The experience is organized at S.C.D.P. Bihor in the period 2007-2008, on an experimental lot formed in 2000 on a brown, argiloiluvial soil, characterized by the A_o-B_t-C type. The planting distances are 3/4 m. The variants are linearly situated, on three rows and contain a different number of trees.

The experience variants are represented by following variety: Timpurii de Cluj, Pándy, Érdi bötermö, Oblacinksa, Cigány meggy, Schatenmorelle, Ilva, Norhstar, Pitic de Iaşi.

The establishment of the cherry varieties that are recommended for the North-Western part of the country was made by performing some reproof on many years, on many cherry trees varieties.

The aimed characteristics were the following:

- the trees' vigour that refers to:
  - → the crown's diameter on the row and between the rows
  - → trees' height
  - → crown's height
  - → trunk's diameter
- development of the fruit-bearing phases

The trees' vigour is an important researching element because has directly consequences over the breeding technology. The trees' vigour is determined by a complex of endogenous and exogenous elements like: the varieties heredity, the pedoclimatic conditions, the applied agro-technique etc. For estimating this characteristics there were carried out measurements with special tools and the obtained results are given in tables' no. 1 and no. 2.

The crown's diameter on the row registers values between 2.50 m (in case of Pitic de Iaşi) and 3.80 m (in case of Pandy). The trees height has values between 1.90 m (in case of Pitic de Iaşi) and 4.70 (in case of Pandy).The trunk's diameter has values between 119.1±7.7 cm (for Timpurii de Cluj) and 54.5±1.1 cm (for Pitic de Iaşi)

Development of the fruit-bearing phases-after the winter rest, the offspring go through three successive stages. The starting moment and the crossing of these stages represent a theoretical and useful importance. It depends from one variety to another, being influenced by the climate conditions, especially the air's temperature. In table no. 3, there are shown the crossing of the fruit-bearing phases from 2007 and 2008. In this period of time, the air's temperature registered usual values for the proper time.

The annual medium temperatures for March and April were the followings: in 2007, in March 9.6^0C and in April 13.2^0C, in 2008 in March 6.5^0C and in April 11.5^0C. From the information given in table no. 3, the fruit-bearing phases in 2008 took places 2-3 days later than in 2007. The offspring begins on 13th of April (Timpurii de Cluj) and ends on 27th of June (Pitic de Iaşi). Fruit were mature from 21 of May (Timpurii de Cluj) to 25th of July (Pitic de Iaşi).

CONCLUSIONS

As a conclusion, cherry-trees have good conditions for growing and development in the North-Western part of the country. Related to the growing vigour, they might e divided into three categories:

- low vigour category: Pitic de Iaşi
- high vigour category: Pandy, Ilva, Timpurii de Cluj
- middle vigour category: Erdi botermo, Oblacinska, Ciganymeggy, Schatenmorelle, Northstar.

This divide is useful most to establish the planting distances.

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Table 1. Trees' vigour regarding the crown's diameter and height

Nr. crt.	Researched varieties	Crown's diameter		Trees' height (m)	Crown's height (m)
		on the row	between the rows		
1.	Pándy	3,80	3,70	4,70	3,80
2.	Timpurii de Cluj	3,50	3,20	3,50	2,80
3.	Érdi bötermö	2,80	2,30	2,50	2,20
4.	Oblacinska	3,10	3,00	3,70	3,20
5.	Cigány meggy	2,70	2,80	2,60	2,20
6.	Ilva	3,30	3,70	4,10	3,70
7.	Schatenmorelle	2,90	2,80	2,90	4,20
8.	Northstar	2,60	2,70	2,50	2,20
9.	Pitic de Iaşi	2,50	2,10	1,90	1,30
	Varieties medium	3,02	2,85	3,15	2,84

Table 2. Trees' vigour regarding the trunk's diameter

Nr. crt.	Researched varieties	Diameter x±Sx	%	Diff. to medium	+	Diff. significance
1.	Timpurii de Cluj	119,1±7,7	15,5	20,0	2,3	x
2.	Pándy	115,6±4,3	9,0	16,5	2,8	x
3.	Érdi bötermö	99,6±2,3	5,6	0,5	0,1	-
4.	Oblacinka	98,8±4,9	11,9	-0,3	0,04	-
5.	Cigány meggy	79,1±2,0	6,0	-20,0	2,8	0
6.	Ilva	106,3±2,5	5,8	7,2	1,5	-
7.	Schatenmorelle	111,8±5,7	12,4	12,7	1,8	-
8.	Northstar	107,6±4,9	10,9	8,5	1,3	-
9.	Pitic de Iaşi	54,5±1,1	4,9	-44,6	11,1	000
	Varieties medium	99,1±3,9	9,1			

DL 5% - 2,10
DL 1% - 2,90
DL 0,1% - 3,90

Table 3. The development of the breeding phases
(2007-2008)

Nr. crt.	Variety	Year			Blossom				Mature
					Beginning	Middle	End		
1.	Timpurii de Cluj	2007 2008	27-28 III 29-31 III	29-30 III 31 III-1 IV	13 IV 15 IV	16 IV 18 IV	23 IV 26 IV	15 V 3 VI	21 V 9 VI
2.	Pándy	2007 2008	30-31 III 2-4 IV	1 IV-2 IV 4-5 IV	16 IV 29 IV	19 IV 1 V	20 IV 2 IV	18 VI 19 VI	4 VII 7 VII
3.	Érdi bötermö	2007 2008	1-2 IV 2-4 IV	3-4 IV 5-6 IV	18 IV 21 IV	21 IV 24 IV	30 IV 2 V	18 VI 20 VI	24 VI 26 VI
4.	Oblacinska	2007 2008	1-2 IV 2-4 IV	3-4 IV 5-6 IV	18 IV 20 IV	21 IV 23 IV	26 IV 29 IV	12 VI 15 VI	18 VI 21 VI
5.	Cigány meggy	2007 2008	2-4 IV 5-7 IV	3-5 IV 7-8 IV	20 IV 22 IV	23 IV 25 IV	30 IV 2 V	20 VI 24 VI	26 VI 30 VI
6.	Ilva	2007 2008	26-28 III 28-30 III	28 III-29 III 30-31 III	12 IV 14 IV	15 IV 17 IV	18 IV 20 IV	11 VI 13 VI	17 VI 20 VI
7.	Schatenmorelle	2007 2008	26-28 III 29-31 III	28-30 III 31 III-1 IV	14 IV 15 IV	17 IV 18 IV	23 IV 25 IV	11 VI 13 VI	17 VI 19 VI
8.	Northstar	2007 2008	3-6 IV 1-3 IV	6-7 IV 3-4 IV	21 IV 18 IV	24 IV 21 IV	1 V 27 IV	7 VI 6 VI	13 VI 14 VI
9.	Pitic de Iaşi	2007 2008	4-6 IV 3-6 IV	6-7 IV 4-6 IV	21 IV 18 IV	24 IV 21 IV	1 V 27 VI	30 VI 27 VI	6 VII 25 VII

Research on the importance of leaf-falling chemical treatment against *Stigmina carpophila* fungus

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Keywords: *Stigmina carpophila*, chemical treatment, drupaceous species, fungus, fungicides

ABSTRACT

Over the past few years, there has been growing interest in fruit-tree growing, mainly in the drupaceous species. Based on either indigenous or imported varieties, the plantations must be given particular attention to their phytosanitary aspects, especially to the disease known as leaf spot caused by the pathogen *Stigmina carpophila*. The symptoms of the disease occur on the leaves as red-purple spots resulting in the fall of the attacked tissue and leaf perforation; lesions occur on the leaves, and the fruit become rugged which decreases the commercial value. Considering that conidium's germination occurs between 2-32ºC, and the conidia are present in the atmosphere all year round, infection is possible in any season, particularly in autumn when leaves are falling. Thus, this phenophase requires chemical treatment.

INTRODUCTION

Leaf and fruit spotting in the fruit trees caused by the fungus Stigmina carpophila (Lév.) M.B. Ellis is a frequent disease which is known in all the drupe-growing countries due to its variable attacks on the apricot, peach, cherry, sour-cherry, plum and other fruit trees.

The disease was first described in France in 1846. In Romania, it was observed on peach, cherry and plum trees in 1928 when the first paper on the phytosanitary status was published in our country.

The disease has recently gained economic importance, together with the increasing fruit-tree plantations and the weather conditions more favourable to the occurrence and development of the pathogen.

The present paper is aimed at determining the importance of the autumn chemical treatment on leaf falling.

MATERIALS AND METHODS

The research on the importance of the chemical treatment, applied on leaf falling against the *Stigmina carpophila* fungus, was carried out in 2005, 2006 and 2008, following the applications performed in the previous autumn seasons.

The drupaceous species under research were the following: cherry, sour cherry, plum, apricot and peach trees.

The experiments consisted in four variants, i.e. untreated control-V1, treatment over leaf-fall phenophase-V2, treatment during leaf falling and other three treatments during the vegetation time-V3, and treatment applied only during the vegetation time-V4.

The fungicides used were: Alcupral 50 PU (50% metallic copper as copper oxychloride) and Captan 50 PU (captan 50%), both in a concentration of 0.3%.

The differences that occurred between the control and the variant treated only during the leaf falling are percentage expressed.

RESULTS AND DISCUSSIONS

Tables 1, 2 and 3 present the average results, i.e. the attack degree of the *Stigmina carpophila* fungus.

The data shown in Table 1 result in the following:

The application of the treatment during the leaf falling (autumn 2004) is extremely important as it limits the attack degree by 16.6% (in the peach variant treated by Captan 50 PU) and 22.6% (in the sour cherry variant also treated by Captan 50 PU).

Regarding the percentage differences resulting from the calculation of the treatment variants applied to the control and only during the vegetation phase, the attack degree caused by the absence of treatment during the leaf falling is the following: 19.2% in cherry, 19.6% in sour cherry, 16.6% in plum, 19.7% in apricot, 12.8% in peach.

It is noteworthy that fungicide efficiency was observed when using a concentration of 0.3% in both commercial products; no significant decrease in the attack degree was recorded in either lower or higher concentrations. Consequently, the efficiency of the two products was noticed at the concentration of 0.3%; no higher concentration was justified, which resulted in low environmental pollution.

The results of the chemical treatment applied during the leaf falling stage in autumn 2005 were observed during the vegetation period in the year 2006 (the data shown in Table 2). The attack degree was low, as the characteristic symptoms of leaf spot varied between 16.6 (peach variant/Captan 50 PU) and 22.8 (sour cherry variant/Captan 50 PU) in the five drupaceous species under study. Like the previous year, the application of this treatment resulted in an approximately 20% lower infection.

In 2008 (Table 3), the treatment performed during the leaf falling in autumn 2007 led to lower degree attach which varied between 15.8 and 24.0%, compared to the untreated fruit trees. When treatment was applied during the vegetation phase, the degree attack was the following: 20.8% in cherry, 21.0% in sour cherry, 12.0% in plum, 23.5% in apricot, and 18.3% in peach.

At the same time, higher resistance to fungicide was observed when the pathogen attack degree was more intense. For instance, the apricot tree recorded the highest sensitivity during the experimental years: in 2008, the attack degree was 85% in the untreated variant whereas the treatment performed during the leaf falling stage resulted in much lower attach degree (15.8-17.6%), compared with the plum tree where a low attack degree (12.5%) was recorded, following one single treatment by 20.0-24.0%.

CONCLUSIONS

In conclusion, the treatment applied during the leaf falling has an important role as it limits the attack degree by 20% on average; the data resulted from the analysis of both the single treatment variant (i.e., during leaf falling) and the calculation of the differences from the control when treatment is applied only during the vegetation phase.

From the viewpoint of the substance used, 50% metallic copper as copper oxychloride or 50% captan, the attack degree is insignificant during leaf falling. Thus, the decrease in the attack degree of the leaf spot by 20% can occur as a result of the application of autumn chemical treatment during the leaf falling stage by both Alcupral 50 PU and Captan 50 PU.

The experiments show that the action of the fungicides in the orchard is gradually increasing as they penetrate the wooden tissue, blocking the development of the pathogen.

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Tables

Table 1. Winter treatment influence upon *Stigmina carpophila*, 2005

Species	Attack degree (%)/Percentage differences				
	V1	V2		V3	V4
		Alcupral 50 PU	Captan 50 PU		
Cherry	52.0	40.3/22.5	40.8/21.5	1	10.0/19.2
Sour cherry	46.0	35.8/22.1	35.6/22.6	1	9.0/19.6
Plum	12.0	9.8/18.3	9.7/19.2	0.5	2.0/16.6
Apricot	78.4	61.8/21.7	62.2/20.6	1.5	15.5/19.7
Peach	39.0	32.2/17.4	32.5/16.6	0.75	5/12.8

Table 2. Winter treatment influence upon *Stigmina carpophila*, 2006

Species	Attack degree (%)/Percentage differences				
	V1	V2		V3	V4
		Alcupral 50 PU	Captan 50 PU		
Cherry	44.0	35.5/19.3	36.0/18.2	1	9.0/20.4
Sour cherry	35.0	27.5/21.4	27.0/22.8	0.5	6.5/18.6
Plum	8.0	6.5/18.75	6.5/18.75	0.5	1.5/18.75
Apricot	65.0	52.5/19.2	51.5/20.7	1	14.0/21.5
Peach	27.0	22.0/18.5	22.5/16.6	0.5	4.5/16.6

Table 3. Winter treatment influence upon *Stigmina carpophila*, 2008

Species	Attack degree (%)/Percentage differences				
	V1	V2		V3	V4
		Alcupral 50 PU	Captan 50 PU		
Cherry	60.0	49.0/18.3	48.0/20.0	2	12.5/20.8
Sour cherry	47.5	38.5/18.9	38.5/18.9	1	10.0/21.0
Plum	12.5	10.0/20.0	9.5/24.0	0.5	1.5/12.0
Apricot	85.0	70.0/17.6	71.5/15.8	2.5	20.0/23.5
Peach	41.0	33.0/19.5	34.0/17.0	1	7.5/18.3

Phytosanitary condition of fruit-tree species in the Bucharest area in 2008

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Keywords: attack degree, diseases, fruit trees

ABSTRACT

Part of the biotic factors represented by a large range of phytopathogen viruses, bacteria and fungi lead to diseases that significantly limit the fruit-tree yields. For modern plantations and their advanced technology, it is necessary to know the occurrence and spreading of these pathogens on a certain area, as well as their evolution in time and space, together with the main determining factors, particularly the weather. These issues will support the organisation and application, in due time, of the prophylactic and disease control actions. Observations and measurements have been performed on seed species (apple, pear, quince), drupes (cherry, sour cherry, peach, nectarine, apricot), nut and mulberry tree. Climatically, the year 2008 was very favourable to the occurrence and spreading of an important number of pathogens in fruit-tree growing.

INTRODUCTION

The present paper is aimed to inform specialists in the fields of production, research and education about the occurrence and spreading of the phytopathogens around the Bucharest area, under the influence of the weather conditions of the year 2008. It is important to note that, in fruit-tree growing, the potential yield loss is approximately 20%.

At the same time, this paper is an opportunity to celebrate 80 years since the publication in 1928 of the first work in the field, ”Phytosanitary condition in the Popular Republic of Romania”, the first important specialist book coordinated by the Romanian academician Traian Săvulescu.

Environmental conditions favour the phytopathogen and disease growth and development. Among the most important factors that create plant predisposition to disease occurrence and spreading, there are: temperature (the best is around 20ºC) and humidity, particularly the high atmospheric humidity. Air temperature was low in the spring of 2008, and was accompanied by heavy rainfalls which resulted in lower resistance in the peach, plum, cherry, sour cherry and apricot trees to the following fungi: *Taphrina deformans*, *Taphrina pruni*, *Monilinia laxa* şi *Stigmina carpophila*.

MATERIALS AND METHODS

Observations and measurements were carried out on the following species: apple, pear, quince, cherry, sour cherry, apricot, peach, nectarine and plum, mulberry and nut trees.

The health condition was assessed by means of frequency, intensity and attack degree of each pathogen species.

The average results obtained have been expressed in percentage.

Measurements have been performed only on the fruit trees that have not been phytosanitarily during the year 2008.

RESULTS AND DISCUSSIONS

The data obtained (see Table 1) show that the pathogens attacked 11 fruit-tree species.

For the apple species (*Malus* sp.), the weather conditions of the year 2008 were favourable to the occurrence and development of the following pathogens: *Venturia inaequalis*, *Monilinia fructigena*, *Podosphaera leucotricha*, *Erwinia amylovora*. Leaf scab was manifest as brown spots whereas fruits scab occurred as brown spots, cracks along the spots, and asymmetric fruit shape. Moniliasis occurred on the fruit in autumn as brown spots and concentric white-greyish mould bags. Mildew attacked the extremities of the young offshoots in spring; the leaves remained small, covered in a whitish powder, and the inflorescences turned brown and withered. Fire blight resulted in flower fading, and yellowish bacterial exudates formation on the flower edges; also, part of the young offshoots turned brown and dried.

As concerns the attack degree and diseases produced by the above-mentioned pathogens, scab recorded values of 6.0%, moniliasis 2.0% whereas the highest attack degree (7.5%) was recorded in mildew; blight occurred only sporadically.

In the pear species (*Pyrus* sp.), fire blight (*Erwinia amylovora*) occurred sporadically as young fruit turned black and hard, whereas the offshoots turned black and dried. Moniliasis (*Monilinia fructigena*) recorded an attack degree of only 1%, with similar symptoms as the apple. Ashy leaf spot (*Mycosphaerella sentina*) occurred as grey spots with a brown edge and easily noticeable picnidia. The attack degree was 1.5%.

The quince tree (*Cydonia oblonga*) recorded only moniliasis (*Monilinia linharthiana*), attack degree 4.0%

The attack degree of shot-hole disease (*Stigmina carpophila*) in the cherry tree (*Prunus cerasus*) was 58.5%. It occurred as circular spots 5-7 mm in diameter, occurring on the leaves, where the attacked tissue fell and the leaf became pierced. The fruit showed small brown deep spots where the attacked tissue dried to the stone during the vegetation time. Moniliasis or the brown rot of stone fruits (*Monilinia laxa*), who's attack degree was 22.5%, occurred both on the young offshoots resulting in their fading, and on the mature fruit resulting in grey mildew bags.

Sour cherry (*Cerasus avium*) was attacked by *Stigmina carpophila*-A.D. 46.75% and *Monilinia laxa*-A.D. 36.0%, resulting in symptoms similar to the cherry tree; it was also attacked by *Blumeriella jaapii*-cherry leaf spot whose symptoms were similar to those described in the case of the cherry-tree, and the purple leaf spot that occurred sporadically as small circular reddish spots leading to premature withering and fading.

In the apricot tree (*Prunus armeniaca*), *Stigmina carpofila* manifested the highest attack degree of all the drupes, i.e. 84.15%; *Monilinia laxa* recorded 16.0% A.D. *Plum-pox* recorded an attack degree of 7.5%.

In the plum tree (*Prunus domestica*) the attack degree of the Stigmina carpophila pathogen was 12.5%, and of *Plum-pox virus* was 15.0%. *Capnodium*

salicinum occurred sporadically as black covering on the leaves, as well as *Taphrina pruni* on the fruit which covered in a whitish-grey layer.

In the peach tree (*Prunus persica*), *Taphrina deformans* occurred as leaf hypertrophy and reddening in an attack degree of 42.75%; also, *Sphaerotheca pannosa var. Persicae* occured as whitish spots on the leaves (2.0%). The attack degree for *Stigmina carpophila* was 40.0%, and for *Monilinia laxa* it was 6.0%.

The nectarine tree (*Prunus* sp.) recorded an attack degree of 31.5% under the influence of *Stigmina carpophila* and 5.5% in *Monilinia laxa*.

The mulberry tree (*Morus alba*) showed brown leaf spots (*Mycosphaerella mori*) of variable size; the attack degree was 3.0%.

The nit tree (*Juglans regia*) recorded *Xanthomonas arboricola* pv. *Juglandis* as brown-blackish spots on the leaves (4.5%) and *Gnomonia leptostyla* as brown spots and picnidia on the back side (3.0%).

CONCLUSIONS

From a climatic point of view, the year 2008 was extremely favourable for the occurrence of a significant number of pathogens in the Bucharest area.

It is noteworthy that the most dangerous pathogen of the drupaceous species, *Erwinia amylovora*, is still present in the area.

Almost 50% of the existing plum trees shoed symptoms typical to *Plum-pox virus*.

Stigmina carpophila, a highly occurring pathogen in all the drupaceous species, recorded the highest attack degree, i.e. 84.15% in the apricot tree.

The weather conditions of spring 2008 favoured the occurrence of *Taphrina pruni* in the plum-tree.

Taphrina deformans is still a problematic pathogen for the apricot tree.

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Tables

Table 1. Phytosanitary condition of the fruit-tree species in the Bucharest area, 2008

Fruit-tree species	Pathogen	Observations		
		Frequency (%)	Intensity (%)	Attack degree (%)
Apple	*Venturia inaequalis*	60	10	6.0
	Monilinia fructigena	50	5	2.5
	Podosphaera leucotricha	30	25	7.5
	Erwinia amylovora	Sporadic		
Pear	*Erwinia amylovora*	Sporadic		
	Monilinia fructigena	20	5	1.0
	Mycosphaerella sentina	30	5	1.5
Quince	*Monilinia linharthiana*	40	10	4.0
Cherry	*Stigmina carpophila*	90	65	58.5
	Monilinia laxa	90	25	22.5
Sour cherry	*Stigmina carpophila*	85	55	46.75
	Monilinia laxa	90	40	36.0
	Blumeriella japii	Sporadic		
Apricot	*Stigmina carpophila*	99	85	84.15
	Plum-pox	30	25	7.5
	Monilinia laxa	80	20	16.0
Plum	*Plum-pox virus*	50	30	15.0
	Stigmina carpophila	50	25	12.5
	Capnodium salicinum	Sporadic		
	Taphrina pruni	Sporadic		
Peach	*Taphrina deformans*	95	45	42.75
	Sphaerotheca pannosa var. persicae	20	10	2.0
	Stigmina carpophila	80	50	40.0
	Monilinia laxa	40	15	6.0
Nectarine	*Stigmina carpophila*	70	45	31.5
	Monilinia laxa	35	15	5.5
Mulberry	*Mycosphaerella mori*	30	10	3.0
Nut	*Xanthomonas juglandis*	45	10	4.5
	Gnomonia juglandis	30	10	3.0

VITICULTURE&OENOLOGY

Application of an ecological favourability index for the analysis of the production potential of the Viticultural Centre Pietroasa under the conditions of ecological viticulture

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Keywords: ecologic viticulture, organic viticulture, ecological viticultural index

ABSTRACT

In recent years considerable interest has been building up among our vine growers regarding ecological viticulture, which is enjoying strong development in other wine producing countries. An important step in the successful establishment of an ecological plantation of grapevine is the thorough evaluation and selection of the plot of land, taking into consideration all the specific requirements of ecological viticulture. This paper presents a new indicator named "ecological favourability index" or EFI which is based on the bioclimatic index of grapevine defined by Constantinescu in 1964, but also takes into account the specific effects of the land exposure and slope in relation to the degree of attach of diseases and pests against grapevine. The new index is applied to the evaluation of the suitability of the land in the Viticultural Centre of Pietroasa for ecological viticulture.

INTRODUCTION

Due to the multiple advantages related to consumer protection and environmental friendliness ecological (or organic) agriculture enjoys a special attention and is continuously growing abroad; yet, it is only in an incipient stage in our country. In the field of viticulture, in particular, due to the difficulties related to costs (which are 20-25% higher than in the case of traditional viticulture), although there is increasing interest from the producers for ecological viticulture, the surfaces of newly established plantations under this cultivation system are still insignificant. At the same time, the risk of an insufficient feasibility analysis cannot be neglected. Simply because traditional viticulture is successfully carried out in a certain location is not necessarily a guarantee of success in case of ecological viticulture too. The particular features of ecological viticulture require that, before taking the decision to establish such a plantation, a thorough analysis must be made of the production potential of the area, taking into consideration all the factors which may affect or limit the viability of the project.

In this paper we present some contributions to the evaluation of the potential for ecological production of a certain plot on the basis of the analysis of certain objective parameters, starting from the bioclimatic index of grapevine (Constantinescu *et al.*, 1964) used traditionally for the evaluation of the favourability of a certain plot of land for classic viticulture. Thus, a new parameter called *ecological favourability index (EFI)* was defined and applied to the evaluation of the land in the Viticultural Centre of Pietroasa.

MATERIALS AND METHODS

For the classification of plots of land based on their favourability for ecological viticulture various sources of information were used, such as:

- the MEDVIT database elaborated and maintained by the Institute for Research and Development of Vine and Wine Valea Calugărească;
- the scientific literature in the field (such as Chiriță, 1974; Teaci, 1980; Fregoni *et al*., 2003);
- data collected by the authors between 2001 and 2005 from experimental work aimed at studying the effect of the relief form on the health of grapes, expressed by the degree of attack Ga% which is mentioned in more detail below.

From these sources data was gathered regarding the climate indicators (average monthly and annual temperatures, monthly and yearly sunshine hours, monthly and yearly rainfall etc.), pedological indicators (type of soil, texture, drainage, pollution, porosity, effective edaphic volume, humus reserve etc.), relief (slopes, exposures, presence of terraces, landslides etc.).

Another start point was the bioclimatic index of grapevine (I_{bcv}) introduced by Constantinescu in 1964. This index takes into consideration the sum of effective sunshine hours, the balance of effective temperatures and the sum of annual rainfall, measured over several years in various viticultural regions. As such, a characteristic of this index is that it is usually determined for large areas, whole regions etc., using data provided by the meteorological stations. For this reason, a derived version called "the corrected I_{bcv} index" was also computed whenever more detailed information was available regarding the temperatures, sunshine hours and rainfall, for smaller units of land such as versants or plots. The problem is that this index is only useful and has been verified only for the evaluation of land suitability for establishing traditional plantations of grapevine.

Therefore, based on this bioclimatic index a new parameter was introduced namely the *ecological favourability index* or IFE, which, together with other data and indicators, can contribute to the evaluation of the potential for ecological production of a certain plot of land.

RESULTS AND DISCUSSIONS

The ecological favourability index (EFI).

As mentioned above, the new indicator EFI was developed starting from the *bioclimatic index of grapevine* (I_{bcv}), which is determined using the following formula:

$$I_{bcv} = \frac{\sum T_a °C \cdot \sum I_r}{\sum P_{mm} \cdot N_{zv}} : 10$$

In this formula

- $\sum T_a °C$ is the sum of annual effective temperatures during the vegetation period of grapevine,
- $\sum I_r$ is the sum of hours of effective sunshine
- $\sum P_{mm}$ is the sum of rainfall during the vegetation period

- N_{zv} is the number of days in the period of active vegetation, that is, between April 1st and September 30.

Studies have showed that for the various viticultural areas in Romania the values of the bioclimatic index range approximately between 4 and 15. Lower values (4-6) correspond to regions where the sun and water resources are scarce and where, for this reason, cultivation of grapevine is not recommended. Higher values (over 15) correspond to regions with significant sun resources but insufficient rainfall; grapevine can be grown in these areas provided irrigation is available. Such values of the bioclimatic index are computed for rather wide geographical areas, using multi-annual values of sun and rainfall resources, gathered and reported by meteorological stations. When such information is available at a lower scale – for a versant, for a plot etc. – more recise values called "corrected I_{bcv} values" can also be computed, and this has actually been done in the example included below.

The limitation, as far as we are concerned, of the bioclimatic index is that its usefulness has been demonstrated only regarding the establishment of traditional grapevine plantations. Even the corrected I_{bcv} values, which do include some information pertaining to the versant, plot etc., are not guaranteed to provide a good evaluation of the suitability of that land for ecological viticulture, because in this case other factors which cabin greatly influence the success of the project must also be taken into consideration. A most obvious example of such factors is the control of grapevine diseases and pests: in ecological viticulture the number of chemical agents allowed for addressing this crucial aspect is strictly limited. Thus, downy mildew and powdery mildew (*Plasmopara viticola* and *Uncinula necator*) which are well controlled with chemical agents in traditional viticulture may create serious difficulties in the case of ecological viticulture. Therefore, a proper selection of the land, which can contribute significantly to the reduction of such risks, is all the more essential.

It is known that the orientation (exposure) of the plot of land, as well as its slope, decisively influence the humidity and the microclimate in the plantation. In turn, these practically dictate the frequency and amplitude of the attacks of downy and powdery mildew. For these reasons it was considered appropriate to improve the bioclimatic index by taking into consideration the effect of land exposure and slope, by introducing two correction coefficients, $\mathbf{c_{fe}}$ for exposure and $\mathbf{c_{fp}}$ for the slope. This way it is possible to introduce into the analysis the more or less beneficial effect of the slope and exposure of a plot of land and this can be done in the general analysis stage, when various candidate plots are evaluated in order to select the most suitable from the point of view of ecological viticulture.

The two correction coefficients take values between 0.1 and 1 (Table 1). The values have been set empirically, based on the information gathered from the literature, but they can be adjusted later on, depending on the results of experimental work under way. Higher values correspond to a lower risk of attack from diseases and pests.

Table 1. Values of the correction coefficients for exposure (c_{fe}) and slope (c_{fp})

c_{fe}		c_{fp}	
Exposure	**value**	**Slope (%)**	**value**
SE-E	0.95	<2	0.10
SW-W	0.95	2.1-5.0	0.50
SW-S-SE	1.00	5.1-8.0	0.60
NW-N-NE	0.10	8.1-12.0	0.95
		12.1-18.0	1.00

Under these conditions, the formula for the calculation of the proposed index for ecological favourability is:

$$EFI = I_{bcv} \cdot c_{fe} \cdot c_{fp}$$ where:

I_{bcv} = the (corrected) bioclimatic index of grapevine;
c_{fe} = correction coefficient for the influence of land exposure (orientation);
c_{fp} = correction coefficient for the influence of land slope.

Analysis of the suitability of land in the Viticultural Centre Pietroasa from the viewpoint of ecological required the following steps:

(a) determination of the general multi-annual values of the bioclimatic index I_{bcv};

(b) correction of the general values of I_{bcv} when and where more detailed information is available regarding multi-annual sunshine hours, temperature and rainfall at the level of a versant, a plot etc.;

(c) calculation of the degree of attack (Ga%) for the main diseases which can affect grapevine;

(d) calculation of the values of the ecological favourability index EFI and the classification of land plots from the viewpoint of their suitability for the establishment of ecological grapevine plantations.

It must also be mentioned that the degree of attack (Ga%) is computed using the formula:

$$Ga(\%) = \frac{F \cdot I}{100}$$

where F is the frequency of the attack (that is, the number n of affected plants from the total number of studied plants) and I is the intensity of the attack.

From the beginning, from all the land plots available, the valleys, plane horizontal areas and micro depressions we excluded, as they are deemed not suitable for ecological viticulture. Then, for the remaining plots, according to the steps mentioned above, the values of the bioclimatic index or corrected bioclimatic index were determined, using the information and nomograms avaliable in the MEDVIT database. Then the results on the degree of attack Ga%, gathered throughout the years, were also integrated and it was possible to evidential certain relationships (correlations) between the values of I_{bcv} and those of Ga%, which can be expressed as correlation functions. As such, if the I_{bcv} values are known, using these functions it is possible to predict, with sufficient precision, the degree of attack Ga% which characterizes a certain plot of land. Finally the values of the ecological favourability index EFI were computed, using

the above-mentioned formula. All these results for the land of the Viticultural Centre of Pietroasa are presented in Table 2.

Table 2. Values of corrected I_{bcv}, Ga% and EFI for various categories of land in the Viticultural Centre Pietroasa

Relief form	Surface (% of total)	Land exposure (orientation)	Land slope (%)	Corrected I_{bcv}	Degree of attack Ga% for *Plasmopara viticola*	EFI
Flat plots, horizontal or with very low slope	47	-	2.1-5.0	7.33	9.22	0.37
Versant	9	SW-S-SE	5.1-8.0	7.96	9.0	2.39
Versant with terraces	32	SW-S-SE	18.1-25.0	9.92	8.31	9.92
Other types of land	12	-	-	5.05	-	0.00

It is interesting to discuss comparatively the values obtained for the bioclimatic index of grapevine I_{bcv} and the ecological favourability index EFI. It is seen, for example, that a higher value of the corrected I_{bcv} does not necessarily correlate to a higher value of the ecological favourability index EFI. This fact is due to the correction coefficients c_{fe} and c_{fp} which introduce the effect of land exposure and slope, and confirms that there are significant differences regarding the suitability of a plot of land for traditional and/or ecological viticulture.

It can be said that the bioclimatic index I_{bcv} provides information regarding the suitability of a plot of land for viticulture in general, whereas the EFI index ensures a more complete image regarding the suitability of the same plot of land for the establishment of a grapevine plantation in the ecological system.

By dividing the range of EFI values into several intervals it is possible to achieve a classification of the plots of land in the Viticultural Centre of Pietroasa. Thus, plots with EFI values lower than 5 were considered not suitable for ecological viticulture; those with EFI values between 5 and 8 were deemed suitable; and those with EFI values over 8 were considered very suitable for ecological viticulture. Analyzing the results shown in Table 2 we arrive to the conclusion that the most suitable plots of land in Pietroasa for establishing ecological plantations are the versants with terraces, with exposure towards SW-S-SE. he average value of EFI for these plots, which occupy 32% of the total land surface, is 9.92. From the same Table 2 it is apparent that the predicted values for the degree of attack Ga% are the lowest – which is also in agreement with the conclusions derived on the basis of the computed values of EFI. In other words, the lands which are indicated by the EFI values as most suitable for ecological viticulture are also characterized by the lowest Ga% values. This is an indirect indication of the validity and usefulness of the EFI index for the evaluation of land suitability for ecological viticulture.

CONCLUSIONS

This work presents an evaluation of the favourability of the land plots in the Viticultural Centre of Pietroasa for the establishment of grapevine plantations under the conditions of ecological viticulture. The basic idea was that a land with

valuable properties and good results from the viewpoint of traditional technology does not automatically suit the requirements of ecological viticulture. Starting from the bioclimatic index of grapevine two correction coefficients were introduced to take into account the effect of the land exposure and slope. A new parameter was thus defined, named ecological favourability index, which can serve to better evaluate plots of land from the viewpoint of their suitability for the establishment of ecological grapevine plantations.

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Studies regarding the evaluation of the performance characteristics in order to validate a method for iron determination from wines using flame atomic absorption spectrometry

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Keywords: iron, wines, FAAS, selectivity, linearity, limit of detection, limit of quantification

ABSTRACT

The aim of this paper is to evaluate the performance capabilities of a method for iron determination from wine samples. The used analytic technique is flame atomic absorption spectrometry (FAAS) with nitrogen oxide/acetylene flame after calcinations and uses the simple calibration method. It were followed the performance characteristics of the method. Thus, it were established the limit of detection (0.1068 mg/L), determination limits (0.3561 mg/L), range (1.5÷15mg/L), linearity (R=0.9998).

INTRODUCTION

It is well known that a lot of analytic measurements are made daily in worldwide laboratories. Some incidents from past proved that obtained results by a laboratory are not always confident and one reason is represented by incorrect, insufficiently developed or studied analytic methods. Firstly, it is necessary to develop and adapt the analytic methods with the aim and then validated in order to prove their compatibility with the required applicability range (Eurachem Guide, 1998; Tănase et al., 2002, 2004, 2007; Thomson et al., 1995, 2002).

In some areas, such as food analysis, the requirement for completely validated methods is sustained by legislation (93/99/EEC; FAO, 1997; HG 925/2005). A validation for an analytic method suppose an examination of the method's characteristics (Tănase et al., 2007; HG 925/2005): applicability (matrix and limit concentrations), selectivity/specificity, working and linear range, linearity, sensibility, limit of detection, limit of determination, accuracy, precision (repeatability, intermediate precision, reproducibility), recovery and other criteria that can be selected as necessary conditions (robustness).

The presence of excess iron (>9mg/L) leads to undesired modifications such as white/black precipitation.

In this paper will be described the characterization of performance parameters above mentioned of one method for iron determination from wine using flame atomic absorption spectrometry with oxidant flame nitrogen oxide/acetylene, after calcinations, using the simple calibration method.

MATERIALS AND METHODS

Reagents and solutions

In order to obtain the calibration curve it was used a Merck iron standard solution traceable to NIST – SRM 682 $Fe(NO_3)_3$ in HNO_3 0.5 mol/L, 1000mg/L Fe CertiPUR. It was used freshly prepared standards that were storage in polyethylene vessels. For the iron standards preparation and also as diluents for

calcinated wine samples was used 0.1N HNO_3 made from Merck suprapure concentrated HNO_3 65% m/m, (d=1.39g/mL) and HCl p.a. 37% (d=1.19g/mL) Merck. It was used ultrapure water. All the materials and vessels that were used were kept at least 24 hours in a plastic container filled with HNO_3 10% v/v and washed for several times with deionised water.

Sample

All the determinations were made on a certain wine matrix, in fact white wine, Italian Riesling, Premiat Murfatlar, dry, 11.5% vol., named as sample I in the following content. The samples were acquisitioned from market.

Instrumentation

In order to effect the measurements it was used an atomic absorption spectrometer Zeenit 700 from Analytic Jena equipped with autosampler AS52 S for dilution, 50 mm burner for nitrogen protoxide flame, monoelement lamp for iron. Also, the equipment has data processing soft, Win AAS ver: 3.16.0. The instrument is calibrated by the Romanian Metrology National Institute. The deionised water was obtained with ELIX 3 system and the ultrapure water was obtained using Simplicity UV system, both of them provided by Millipore. For calcination it was used a furnace with muffle, thermostat programming, model L9/11/B170, provided by Nabertherm/Germania. The wine samples were dried using a Memmert WNB10/Germania waterbath.

Procedure

The aliquot crucibles with 50 ml of wine were dried using water bath and were introduced in a furnace at an initial temperature not higher than 100^0C. The temperature was gradually increased with a maximum rate of 50^0C/h until 550^0C. The samples were calcinated until it was obtained white/grey ashes. The obtained residue was dissolved in a 1mL HCl 37% and made up to of 25mL 0.1 mol/L HNO_3 and the solutions were transferred in polyethylene bottles.

The processed samples according with this procedure are analyzed at λ=248.3nm using a nitrogen protoxide/acetylene flame and a calibration curve previously plotted. The optimal parameters of the instrument are described in table 1.

RESULTS AND DISCUSSIONS

In order to validate the method were established its performance parameters and the obtained results are presented as it follows below.

Applicability

The method can be used for iron determination from wine. The unit for wine iron content is mg/L.

Selectivity/specificity

The selectivity is the ability of analytic or bioanalytic method to measure and differentiate the analyst in the presence of the components that are expected to be present (Tănase et al., 2007).

In order to correct the background known as physical interference it was used deuterium lamp. The measurements were performed at wavelength λ=248.3nm. From previous scientific studies, at this wavelength there are no interferences produced by other elements (Welz et al., 1999).

Working and linear range

The area of a method is the range experimental established and statistical verified through procedure calibration between the concentration or the lowest mass and the concentration or the highest mass. The inferior limit of the range must be equal or higher that the detection limit of the method (SR ISO 8466-1). The range was obtained from linearity studies. For this, it was applied 2 tests: test for homogeneity of variance and linearity test (SR ISO 8466-1, SR ISO 8466-2)**.**

In order to verify the homogeneity of variance it was made 10 repeated determinations for the lowest concentration and 10 for the highest one (x_1 and x_{10}) from range. The variance of informing values must be concentration independent.

It was calculated the variance for minim and maxim level of concentration and it was obtained the values: $s_1^2 = 6.484 * 10^{-7}$ with an average value of absorbance $\overline{y_1} = 0.0334$ and $s_{10}^2 = 1.454 * 10^{-6}$ with an average value of absorbance $\overline{y_{10}} = 0.3083$.

The variance was tested according with Fischer test in order to examine the differences at limits of the range. With this purpose was calculated the testing value $PG = \frac{s_{10}^2}{s_1^2} = 2.24$ ($PG = \frac{s_{10}^2}{s_1^2}$ for $s_{10}^2 > s_1^2$ and $PG = \frac{s_1^2}{s_{10}^2}$ for $s_1^2 > s_{10}^2$).

Making a comparison between the PG value and known value of distribution F (Fischer-Snedecor) $F_{9, 9, 0..99} = 5.35$ it can be noticed that $PG < F_{9, 9, 0..99}$, so, the deviation between variance s_1^2 si s_{10}^2 it is not significant. As consequence, the preliminary range will be 1.5mg/L÷15mg/L.

In the *linearity statistic test* are used calibration data in order to calculate a linear calibration function and a non-linear calibration function, both of them presenting a standard deviation about the regression (standard residual deviation) s_{y1} si s_{y2}. For this purpose it were determined the absorbance values for 10 standard samples; the concentration of those samples were equidistant disposed on the whole range.

The difference of variance DS^2 was calculated with equation: $DS^2 = (N-2) s_{y1}^2 - (N-3) s_{y2}^2 = 4.364 * 10^{-6}$

The difference of variance DS^2 and the variance of calibration non-linear function were analyzed with a test F in order to examine the significant differences. The PG value that was necessary for F test was calculated with the equation: $PG = \frac{DS^2}{s_{y2}^2} = 1.230$.

Making comparisons between PG value and $F_{7, 7, 0..99} = 6.99$ (known value for Fischer-Snedecor law) it can be noticed that PG<F so, the calibration non-linear function doesn't offer a improved adjustment and the calibration function will be the linear one and the range 1.5 mg/L÷15 mg/L.

Linearity

Because the deviations from linearity are hard to be observed and the linear regression calculations aren't sufficient for curve linearity evaluation on a certain concentration range, it was supplementary applied other two graphical methods: graphical representation of residual errors and graphical representation of relative answers as function of *decimal logarithm of corresponding concentrations* (Bojita et al., 2003).

When the residual errors vs. concentration are plotted, for linear domains, these must be equally distributed between positive and negative values (Bojita et al., 2003) (fig.1). It can be noticed that for the first-degree function the deviations from regression line are corresponding to the theoretical directive having an accidental distribution.

When the *relative answers (absorbance/concentration) as function of logarithmic value of concentration* are plotted, the obtained line must be horizontal on the whole linear area, with a positive deviation at lower concentrations and a negative deviation at higher concentrations. The deviations must not be over ±5% from relative answers average (Bojita et al., 2003). The experimental results are presented in figure 2.

Comparing the experimental linear curve and the graphical representation of relative answers as function of iron concentration logarithm it can be observed that are respected theoretical indications so, this supplementary study sustain the choosing regarding range and also the linear function as calibration function for iron determination.

Linearity, calculated as $(1\text{-}S_b/b)x100$ (Jurado et al., 2007), was 99.32%.

Regarding the incertitude of an analytic result it is important to be mentioned that analytic error is composed from uncertainty in determination of measured value and uncertainty in estimation of the regression coefficients (SR ISO 8466-1). In the propagation law of errors for each x value, there is a confidence interval for real y value of which limit points are situated on two hyperbolic trajectories that delimit the calibration curve. Between these two trajectories it is expected that the real calibration function to have a significance level α, determined by Student variable for N-2 freedom degrees and a confidence interval of $1\text{-}\alpha$.

The confidence interval for iron concentration it is obtained using the equation:

$$\overline{\overline{x}}_{1,2} = \overline{\overline{x}} \pm VB(\overline{\overline{x}}),\ \overline{\overline{x}}_{1,2} = \frac{\overline{\overline{y}} - a}{b} \pm \frac{s_y \times t}{b} \times \sqrt{\frac{1}{N} + \frac{1}{\overline{\overline{n}}} + \frac{(\overline{\overline{y}} - \overline{y})^2}{b^2 \sum_{i=1}^{N} (x_i - \overline{x})^2}}$$

where: $\overline{\overline{x}} = \frac{\overline{y} - a}{b}$, $\overline{\overline{x}}$ being concentration of an analyzed sample calculated starting from an average of repeated determination $\overline{y}$, obtained on the same origin sample, N-number of points on calibration curve, n-number of repeated determinations (SR ISO 8466-1; Harvey, 2000).

In table 3 are presented the parameters of analysis method and of the linear calibration function that allowed effectuation of calculation for iron concentration estimation from wine samples on the basis of regression equation.

At a single determination of the mineralized sample, it was obtained the absorbance value 0.1236. According to statistic calculations it is obtained a concentration of 5.805 mg/L with a confidence interval of the analytic result of ±0.229mg/L. The true value of the concentration must be inside of the interval 5.576mg/L÷6.034mg/L (the area is imposed by the statistical certainty of the Student's law, at a confidence level of 95%; for N-2=8 degrees of freedom t=2.31). When the solution was analyzed for three times it was obtained an absorbance average of 0.1224; applying the statistic calculations it was obtained a concentration of 5.747mg/L with a confidence interval of the analytic result of ±0.147mg/L. The true value of the concentration must be inside the interval 5.600mg/L÷5.894mg/L (the area is imposed by the statistical certainty of the Student's law, at a confidence level of 95%; for N-2=8 degrees of freedom t=2.31).

The amplitude of the confidence interval is determined regarding the number of repeated determinations and by their results, the average of informing values and also by the method characteristics, the residual standard deviation and the sensibility. For a single value of the absorbance, the confidence interval of the analytic result is higher (±0.229mg/L) in comparison with many absorbance values (for example, ±0.147mg/L for 3 determinations).

The sensitivity of the method is given by the slope of the calibration function of the analysis method in the established range. If the calibration function is linear the sensitivity is constant on the whole range and this it is represented by the slope of the linear function, b. If the calibration function is nonlinear, the sensitivity, e, is equal with the first derivative of the function, as it follows: e = b+2cx . The sensitivity in the middle of the range is a characteristic of the method and is given by: $E = b+2c\bar{x}$, where E is the slope (tangent) of the calibration curve. The quality of the analysis method increases when the residual standard deviation decreases and when the *sensitivity* increases, the ratio between them being the standard deviation of the method, s_{xo}, that allows to the analyst to verify the quality of his own work.

In order to compare different analysis methods it can be used the variation coefficient of the method, percentage expressed, V_{xo} (SR ISO 8466-1; SR ISO 8466-2). The obtained values for these parameters of the methods are given in table 3.

Limit of detection (LoD) and limit of quantification (LoQ)

In the literature there are presented different formulae for calculation of the two limits. In this study were taken in account the values given by the apparatus and they were calculated with the below given relations:
LoD = 3*SD/b =0.1068 mg/L and LoQ = 10*SD/b = 0.3561 mg/L, where SD: absolute standard deviation calculated for blank (n=21 determinations).

Other important parameters for characterization of the proposed for validation method are accuracy, precision and robustness and those will be discussed in a future papers.

CONCLUSIONS

The aim of this study it was to elaborate, develop and validate an analytic quantitative method for iron determination from wine samples after their digestion through calcinations using flame atomic absorption spectrometry with nitrogen protoxide/acetylene flame.

It has proved that the developed method was suitable for the proposed subject and is linear and presents an adequate linear range. It was applied different criteria in order to establish the range and the evaluation of linearity: test for homogeneity of variance, linearity test, the values of linear regression parameters, graphical representation of residual errors and graphical representation of relative answers as function of decimal logarithm of corresponding concentrations; the method is linear in the concentration range 1.5÷15mg/L Fe (with a correlation coefficient R=0.9998 and slope 0.0205 mg/L). The detection limit of the method is 0.1068 mg/L and limit of quantification is 0.3561 mg/L.

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Tables

Table 1 – Method parameters

Spectrometer		**Flame**	
Line, λ	**248.3nm**	**Flame**	**C_2H_2/N_2O**
Slit	0.2nm	Fuel flow	170L/h
Lamp type	HCL	Burner type	50mm
Lamp current	6.0mA	Burner height	5mm
Integration time	4.0s	Nebulizer rate	5.0mL/min
D2-HCL current	16.5mA		

Table 2 – Experimental results for calibration

i	**x_i**	**$y_{i,1}$**	**$y_{i,2}$**	**$y_{i,3}$**	**$y_{i,4}$**	**$y_{i,5}$**	**$y_{i,6}$**	**$y_{i,7}$**	**$y_{i,8}$**	**$y_{i,9}$**	**$y_{i,10}$**
1	1.50	0.0335	0.0328	0.0325	0.0336	0.0342	0.0332	0.0348	0.0324	0.0341	0.0327
2	3.00	0.0654									
3	4.50	0.0988									
4	6.00	0.1283									
5	7.50	0.1602									
6	9.00	0.1874									
7	10.50	0.2203									
8	12.00	0.2492									
9	13.50	0.2842									
10	15.00	0.3100	0.3082	0.3084	0.3075	0.3097	0.3069	0.3063	0.3079	0.3088	0.3094

where: x_i is concentration of iron standard (mg/L), y_i is informing value (absorbance).

Table 3 – Linear and nonlinear regression data and characteristics of the method

i	x_i	y_i	$[y_i-(a +bx_i)]$	i	x_i	y_i	$[y_i-(a +bx_i)]$
1	1.50	0.0335	-0.00181273	6	9.00	0.1874	-0.00170970
2	3.00	0.0654	-0.00067212	7	10.50	0.2203	0.00043091
3	4.50	0.0988	0.00196848	8	12.00	0.2492	-0.00142848
4	6.00	0.1283	0.00070909	9	13.50	0.2842	0.00281212
5	7.50	0.1602	0.00184970	10=N	15.00	0.3100	-0.00214727
$\sum_{i=1}^{N}$	82.50	1.7373	-0.00181273				
	$\bar{x}$ =8.25	$\bar{y}$ =0.1737					

Linear function: y = a + bx

y = 0.004553+0.020506x a = 0.004553 (y-intercept) b = 0.020506 (slope=sensitivity)	determination coefficient: R^2 = 0.9996 correlation coefficient: R = 0.9998
standard deviation about the linear regression: $s_{y1} = \sqrt{\frac{\sum_{i=1}^{N}[y_i-(a+bx_i)]^2}{N-2}} = 1.911*10^{-3}$	standard deviation of method: $s_{xo1} = \frac{s_{y1}}{b} = 0.0932$ variation coefficient of the method (RSD%): $V_{xo1} = \frac{s_{xo1}}{\bar{x}} * 100 = 1.129$
standard deviation of the slope [Harvey, 2000]: $s_b = \sqrt{\frac{Ns_{y1}^2}{N\sum x_i^2 - (\sum x_i)^2}} = 0.00014$	standard deviation of the intercept [Harvey, 2000]: $s_a = \sqrt{\frac{s_{y1}^2 \sum x_i^2}{N\sum x_i^2 - (\sum x_i)^2}} = 0.001305$

Non-linear function: $y = a + bx + cx^2$

$y = 0.0025533 + 0.021173x - 0.000040404x^2$ a=0.0025533 (y-intercept) b=0.021173 c=-4.0404E-05 sensitivity in the middle of the range x: $E=b+ 2c\bar{x} = 0.020506$	determination coefficient : R^2 = 0.9997 correlation coefficient: R = 0.9998
standard deviation about the non-linear regression: $s_{y2} = \sqrt{\frac{\sum_{i-1}^{N}[y_i-(a+bx+cx^2)]^2}{N-3}} = 1.884*10^{-3}$	standard deviation of the method: $s_{xo2} = \frac{s_{y2}}{E} = 0.0919$ variation coefficient of the method (RSD%): $V_{xo} = \frac{s_{xo2}}{\bar{x}} * 100 = 1.114$

Figures

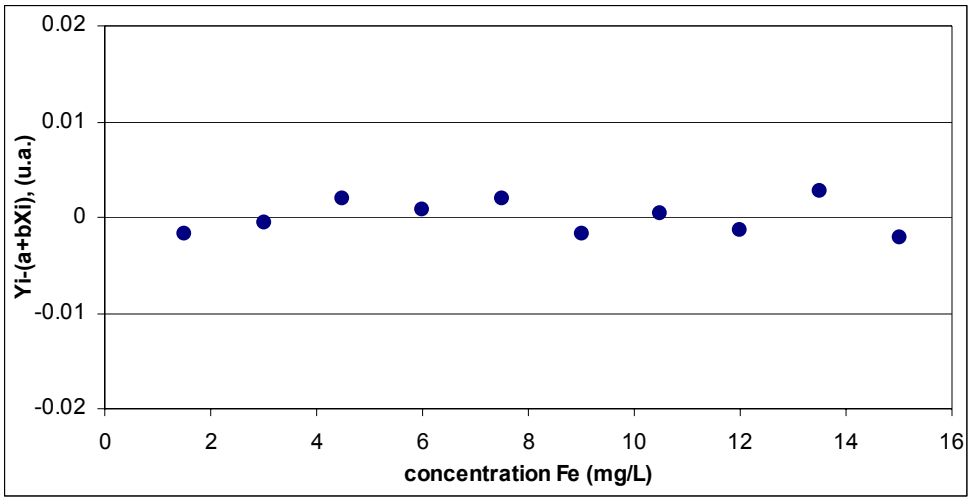

Fig. 1 – Residual error in linear regression

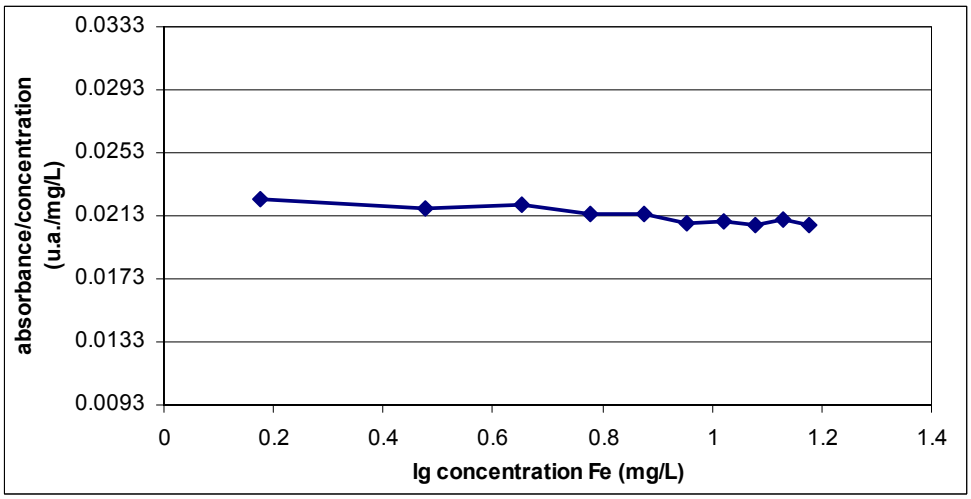

Fig. 2 – Graphical representation of relative answers as function of logarithmic value of concentration

Influence of the grafting wax types used for vine grafting on callosing during the forcing period and on vine quality within vine school

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Keywords: propagation, soudure, grapevine, grafting, cutting

INTRODUCTION

The research on the influence of grafting wax types used for vine grafting on callosing has been conducted in order to reduce the material losses in the forcing greenhouse as well as after field plantation, determined by uneven callosing in the grafting point. The modernization of the grafted vine facilities led to studying the factors which determine very good quality grafted vine.

The research conducted in Romania has proven the positive influence of certain stimulating substances on vine yield. During the last years it has been studied especially the influence of stimulators such as beta-indolil-acetic acid on tissues reconstruction and rooting stimulation.

METHOD AND MATERIAL

Victoria and Black flavoursome graft cords have been used for the experiment, being collected on the 8th of November 2005.

After cords collecting and trimming, it was preceded to the grey rot prevention treatment using 0.3% Beltanol concentration for 3 hours, followed by cords packing into polyethylene bags to be kept in cold rooms. The father plant, Berlandieri x Riparia Craciunel 26 was collected in January 2006. Afterwards it was trimmed into certain-length cuttings and treated with 0.3% Beltanol for 3 hours and kept in bags until grafting.

At the end of February, the grafting cords were trimmed into one internode fragments for grafting and treated with 0.3% Beltanol once again.

Dichlorobenzene acid 2.5 was used to stimulate callosing, adding it into Romanian paraffin (94% paraffin, 3% bitumen, 3% colophony) in two concentrations 0.001% and 0.003% and bee was mixed with Romanian paraffin in three concentrations of 2%, 4% and 6%.

Grafting was performed during the 20th-25th of March 2006 and the grafted cuttings' forcing was carried on during the 8th-21st of April 2006 using the partial-cover method.

RESULTS AND DISCUSSIONS

Studying the data obtained (table 1) after the research in the forcing greenhouse, one may notice a 96% circular callose to Rebwachs paraffin, followed shortly by the Romanian paraffin with 0.003% concentration stimulator adding (2.5 dichlorobenzene acid) and Romanian paraffin with 2% bee wax. The Romanian paraffin with 0.001% stimulator had an 88% callosing percentage in

the grafting point, followed by the Romanian paraffin with 6% bee was and by the witness with 76%. Studying the circular callosing on the basis, the best percentage belongs to the variant with Romanian paraffin and 0.003% stimulator but with a 10% of issued roots, followed by the Romanian paraffin with 2% bee wax with a 76% callosing percentage and the best rooting percentage of 20%. The variant with Rebwachs paraffin has a basis callosing percentage of 46% and 28% rooting. The callosing for this variant is circular and abundant.

The data obtained after vine collecting indicate the greatest yield for Rebwachs paraffin of 30.6 percentage with an average maturated length of 21.4 cm, with a 5.2 % number of roots whose diameter is higher or equal to 2 mm and a root average length of 26.3 cm, over passing the yield witness by 2.6% with an average root length that is 0.2% lower than it.

CONCLUSIONS

Studying the results in the two tables, from vines grafting, paraffining, forcing and field collecting compared to the witness data, one can conclude that using paraffins with callosing stimulators increases the percentage of grafted vines presenting a well-formed circular callose with a higher number of roots that are bigger in diameters than the witness's. The results obtained in the vine school proved that all the tested grafting wax types have not ensured the due hydric protection, the hydric stress causing biologic material losses.

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Table 1. Results of grafting wax types used in forcing greenhouse

Variety/father plat	cuttings with callose in the grafting point (%)			cuttings with callose on the basis of the father plant cutting (%)			cuttings with roots (%)	
	circular	partial	without callose	circular	partial	without callose	in the grafting point	on the basis of the father plant cutting
V1 Romanian paraffin	76	24	0	80	20	0	12	12
V2 Rebwachs	96	2	2	46	48	6	2	28
V3 (stimulator 0.001%) Victoria	88	12	0	74	22	4	4	10
V4 (stimulator 0.001%) Black flavoursome	72	24	4	76	14	10	0	10
V5 (stimulator 0.003%) Victoria	94	6	0	82	14	4	4	12
V6 (stimulator 0.003%) Black flavoursome	88	12	6	44	44	12	6	14
V7 bee wax 2%	94	6	0	76	16	8	4	10
V8 bee wax 4%	78	22	0	64	24	12	2	16
V9 bee wax 6%	86	14	0	62	14	14	2	20

Table 2. Results of analysis after vine collecting

Variant	Yield (%)	Average maturated length (cm)	Diameter to II internode (mm)	No. of roots		Roots average length (cm)
				Total	Of which 2 mm (Ø)	
V1 Romanian paraffin	28	21	7.1	8.2	4.9	26.5
V2 Rebwachs	30.6	21.4	8.2	8.5	5.2	26.3
V3 (stimulator 0.001%) Victoria	21.8	20.2	8.9	10.4	5.2	25.9
V4 (stimulator 0.001%) Black flavoursome	18.8	26.1	6.2	9.3	5.5	28.4
V5 (stimulator 0.003%) Victoria	17.4	21.0	7.5	10.3	6.5	24.2
V6 (stimulator 0.003%) Black flavoursome	26.5	24.2	7.8	11.2	5.7	23.2
V7 bee wax 2%	18.3	23.0	7.4	10.2	5.1	24.3
V8 bee wax 4%	19.5	19.3	5.5	10.9	5.1	22.7
V9 bee wax 6%	11.2	19.6	7.0	11.5	5.4	26.6

Preliminary results regarding the influence of agro technique system on soil microbiology and grape

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Keywords: green fertilizers, soil respiration, micro organisms, private vineyards

ABSTRACT

Soil cover corresponding to the global earth and was elaborated as erosion succession and transformation chemical – physics processes and the accumulated organic matter from plants, animals is a favorable habitat for developing of microorganisms (bacteria, fungus, algae). Microorganisms are a lot in the soil.

A lot of microorganism from soil is inactivated due the fact that at one moment the nutritive substances can be deficiency. Microorganism has an important role in the chemical reaction from soil, increasing the soil fertility.

Parts from soil microorganisms are responsible with disintegrate the organic matter from soil. Fungus increasing the availability of mineral nutrients for plants, agro bacterium bacteria increasing the nitrate nutrients from soil, in this sense in microorganisms will be used as bio fertilizers.

Another's microorganisms synthesis and eliminated vitamins in the soil which increasing the health of plants and their productivity, these are considerate phyto stimulators.

INTRODUCTION

The purpose of scientifically paper is to elaborated alternative technology to increase the quantity and quality of grape production. The alternative technologies applied will increase the activity of microorganism to improve the fertility of soil.

MATERIALS AND METHODS

The objectives of study are:

- Determination of plant vigour by weighing of annual and old wood eliminated by cutting operation;
- Quantified the grape fertility;
- Determination of soil and leaves respiration;
- Experimental block was established in 2007 in a private vineyard belong SC DICROP MUNTENIA SA, partner in the framework of 51-009/2007 research project.

The experimental variants are:

- V1 – unfertilized, without herbicides;
- V2 – fertilized with 40 t/h garbage without herbicides;
- V3 – fertilized with 40 t/ha garbage with herbicides;
- V4 – permanent grass with perennial plants (trefoil and lolium) on interval between rows plants, herbicides on rows;
- V5 – green fertilization (annual grass with pea and barley) on interval between rows plants, herbicides on rows;

- V6 – green fertilization of autumn in alternation with green fertilization of springtime on interval between rows plants, herbicides on rows; these green fertilizers are cutting and eliminated;
- V7 – green fertilization of autumn in alternation with green fertilization of springtime on interval between rows plants, herbicides on rows; these green fertilizers are cutting and keeping as mulch on the interval;
- V8 – permanent mulch on the intervals rows and rows plants, composed by straws cereals;
- V9 – unfertilized with total herbicides on the intervals rows and rows grape plants.

RESULTS AND DISCUSSIONS

The cutting of grape was realized in the springtime of 2008 on 30 plants per experimental variant.

The average of annual wood was 0,788 kg and for old wood was 0,855 kg. The effect of experimental factors wasn't quantified, because is the first year of experimental research. The value registers in the mulch organic variant (V8) and permanent grass variant (V4) was significant. All the values of variants were situated between the averages of variants (table 1).

These aspects can be correlated with a big quantity of water accumulated in profile soil during the winter and with the activity of microorganisms from soil that has a bigger quantity of organic matter.

The fertility of grape express by fertility coefficients was determinate function fertile and sterile grape shoots and the trend of length was quantified in three stages. The bigger number of grape shoots was identified in V3 and the lower number was in V5 (table 2).

The average length of shoot after the final observation registered the bigger value in V5 (cca. 40 cm). The most fertile grape shoots were found in V3 (42 fertile shoots). Relative fertility coefficient (Cfr) was registered at 1.61 on the total experiment. V1, V2 and V9 was registered a lower values and the bigger values more than average was observed in the V6 and V9. Absolute fertility coefficient (Cfa) on the total experiment is 1.86. V1 and V9 registered 1.76 respectively 1.54 and V6 – V7 had the bigger value (196, 1.94).

Relative productivity index (Ipr) on the total experiment is 0,201, with the lower values identified in V1 – 0.197 and V9 – 0.166 and bigger value in V6–V7. Absolute productivity index (Ipa) is characterized by 0,231 average value.

Leaves surface was determinate in the flowering stage of vegetation. The average of leaves surface is 1.42 dm^2. In V4 the leaf surface was 1.25 dm^2 and more than 1.47 dm^2 in V3, V7 and V9 (fig 1).

The respiration intensity of soil (fig. 3) on the total experiment registered 0.08 μmol CO2/kg/s (fig. 2). V1, V6 and V7 have values around the average of experiment, which means the activity of microorganisms is moderate. Though V3, V4, V5, V8 registered bigger values than average of experiment due green fertilization. These supplementation nutrients from green fertilizers have a positive impact for experimental variants. These represented a plus organic matter which will be disintegrated by the microorganisms from soil.

CONCLUSIONS

After one year of research activity, the preliminary conclusions are:

- the values of respiration emphasize the experimental variants fertilized with organic fertilization, in this sense the activity of microorganisms are reactivated and intensified;
- the impact of these alternative technologies with green fertilizers are a positive impact on vineyard by increasing the annual length of shoots and on the productivity and fertility of grape plants;
- photosynthesis processes are positively influenced by the organic fertilization in comparison with variants without fertilization, the leaf surface showed this aspect.

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Tables

Table 1. Annual and multi annual wood of grape

Variants	Annual wood (g)	Multi-annual wood (g)	Average of annual wood (g)	Average of multi-annual wood (g)
V1	0,725	0,861	0,788	0,855
V2	0,727	0,880		
V3	0,854	0,848		
V4	0,810	0,891		
V5	0,850	0,716		
V6	0,780	0,838		
V7	0,750	0,884		
V8	0,788	0,885		
V9	0,813	0,897		

Table 2. Length of shoots, number of fertile shoots, number of inflorescences on shoots

Date of examination		06.05.2008			15.05.2008	25.05.2008
Variants	Number of shoots	Length of shoots	Length of shoots	Length of shoots	Number of fertile shoots on grape plant	Number of inflorescences on grape plant
V1	42,75	11,46	16,55	38,75	38,50	67,91
V2	45,22	10,20	16,30	36,43	37,02	70,94
V3	48,75	9,41	16,03	36,83	42,48	80,39
V4	47,86	10,42	16,58	39,16	42,05	79,81
V5	42,16	10,40	15,92	39,47	36,30	70,50
V6	43,37	10.02	15,94	39,40	38,09	74,93
V7	46,33	9,50	16,00	38,89	41,21	80,06
V8	44,94	9,47	15,81	38,62	39,05	73,35
V9	43,54	10,29	16,24	38,52	37,31	57,68

Figures

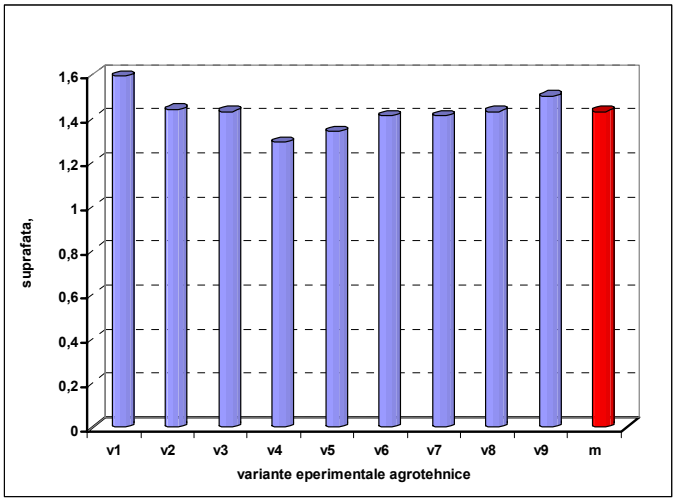

Fig. 1. Leaf surface

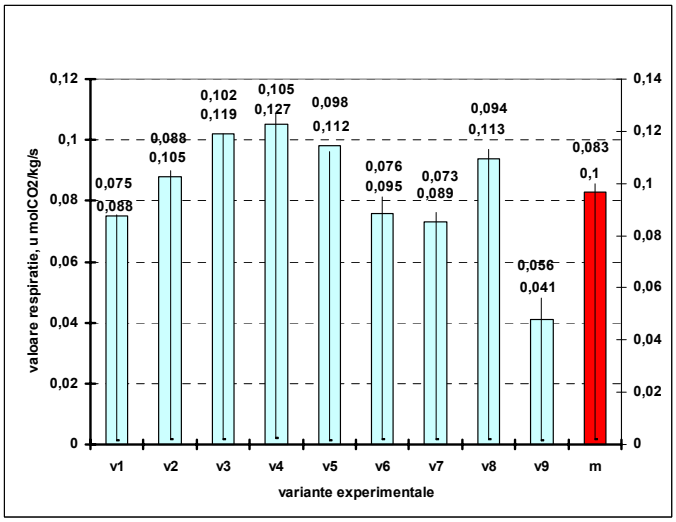

Fig. 2. Respiration of soil

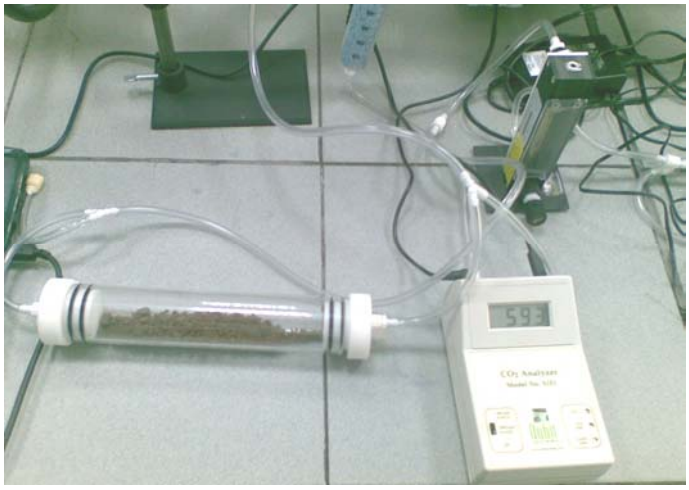

Fig. 3. Determination of soil respiration

Integrated Crop Management solutions to increase quantity and quality of the yield in viticulture at Pietroasele – 2006

I. Enoiu

Keywords: *Integrated Crop Management (ICM), main issues, targets, ag. chem, products, influences on crop and yield.*

ABSTRACT

Establishing an ICM programme should take into account the regular soil and the climatic conditions, history of the plantation, main targets for the current year, but for the coming years as well.

Product used should cover harmful agents control, improve resistance to the abnormal climatic conditions, improve resistance to the harmful agents and enhance the quality and quantity of the yield.

All the products used had to prevent accumulation, harmful agents' resistance, insure a good ripening both for grapes and wood.

INTRODUCTION

Pietroasele vinery has very good soil and climatic conditions to crop high quality wine varieties.

They are several advantages for wine growing in the area, but specific issues should be solved in order to get the appropriate results.

MATERIALS AND METHODS

The ICM programme was established based on the main problems identified in Pietroasele vinery, as follows:

- Thin fertile soil on slopes;
- Stony subsoil;
- Current erosion of the surface;
- Antagonisms and deficiencies of the nutrients and micronutrients due to the alkaline stones;
- Convection air circulation;
- Solar overexposure.

They are some important consequences due to the Pietroasele vinery positioning, as follows:

Advantages:

- Alkaline subsoil and pH slightly alkaline give good conditions for high quality wines;
- Air circulation during the mornings improve the higroscopicity, creating good conditions for flavours and acidity preservation;
- Good solar exposure as premises for fast sugar accumulation.

Disadvantages:

- Thin fertile layer;
- Fast downwards slopes running of the rainy water;
- Good microclimate for diseases evolution;
- Successive generations of insects and acariens, subject to the slope level;
- Good conditions for deficiencies and nutrients antagonisms.

The products used into ICM programmes took into account the following main aspects:

1. Protect and control the vines against the main harmful agents currently occurred;
2. Diminish or overcome the effects of the deficiencies and antagonisms (iron, magnesium and boron deficiency);
3. Stimulation of growing, soil fertility, bud fertility, wood maturation, through foliar fertilizes and specific biostimulators.
4. Maintaining the leaves active along the offshoots as an insurance for good accumulation and protection against infrared and UV rays as well.

RESULTS AND DISCUSSIONS

All the treatments made took into account the mode of action of the products, the direct effects (mentioned into the table), but side effects and secondary effects as well (not mentioned in the work paper).

A thorough look into the table 1, would show that they were several other aspects included, as follows:

- Alternation of the active ingredients and made of action in order to control the possible resistant strains or species;
- Chose of the compatible mixtures, but making mixtures to get complementary or synergetic actions;
- Avoid the normal physiological cicle disturbances, by using products with less negative interferences;
- Get a good balance between growing, ripening and long term development etc.

Although the winter 2005-2006 frosts affected partially the buds, through applying the right products at the right moments, the yield increased consistently the first year after the introduction of the ICM programme (table 1).

Other direct effects after ICM programme application:

- Diminishing of the frost effects of the 2005-2006 winter frost;
- Stopped the initial acariens and powder mildew heavy infestations;
- Diminished or disappeared iron chlorosis;
- Increased wood mass with 30-50%;
- Earlier grasses and wood maturation, by preserving flavour, acidity and improving dry matter in must;
- Enhanced new sprouts fertility.

By using the right mixtures and foliar fertiliser as well, the foliage activity was improved along the whole offshoots, so that the ripening was faster and better (figure 1).

CONCLUSIONS

Vines are very sensitive to the appropriate programmes applied. A good ICM programme need a thorough assessment of the main aspects which should be solved, but a good understanding of the inputs used.

Most of the inputs used have side and secondary effects which should be known, understood in case of mixtures and used correctly.

The whole programme should be conceived as part of a system which should cover as much as possible the vines needs, but the farmers' targets as well.

Tables

Table 1. Products used and main target Pietroasele 2006

PRODUCT	MAIN TARGET
DANIRUN	Insects and acariens control; acts at low temperatures
KARATHANE	Powder mildew; acts at low temperatures with very good preventive, curative and antisporulant effect. (contact)
POLYRAM DF	Downy mildew and traheomicosis (contact)
KUMULUS	Powder mildew, plus sulphur as micronutrient (contact)
MIKAL FLASH	Powder mildew control, Botrytis prevention, increase natural resistance (mixed systemic and contact)
BORDER	Flowering and fertility stimulation
VANTEX	Insects control
GLYPHOSAT	Total systemic weeds control
ECLAIR	Powder mildew, Downy mildew, Botrytis control, plus green effect (mixed systemic and pelicular)
BASAPLANT 18:12:18+TE	Photosynteshis, absorption stimulation; diminish deficiencies, increase stress resistance
FERRILENE; EDTA-Fe	Iron deficiency correction
FUNGURAN	Downy mildew, traheomicosis, slowdown growing, Copper as micronutrient (contact)
SYSTHANE FORTE	Powder mildew (systemic)
RELDAN	Insects control
MURTONIK	Ditto Basaplant
SELECT SUPER	Selective grasses control
BOUILLIE BORDELAISE	Downy mildew, improve maturation (contact)
FUNDAZOL	Botrytis control (systemic and cobtact)

Table 2. Yield/Vine on different Varieties Pietroasele 2006 v.s. 2005

Variety	Yield/Vine (kgs.)		% increases 2006 v.s. 2005
	2006	2005	
Tămâioasa românească	2,47	1,85	33,51
Grasa	2,18	1,60	36,25
Feteasca regală	3,55	2,80	26,78
Feteasca albă	2,90	1,75	65,71
Busuioacă de Bohotin	2,40	1,55	54,83

Figures

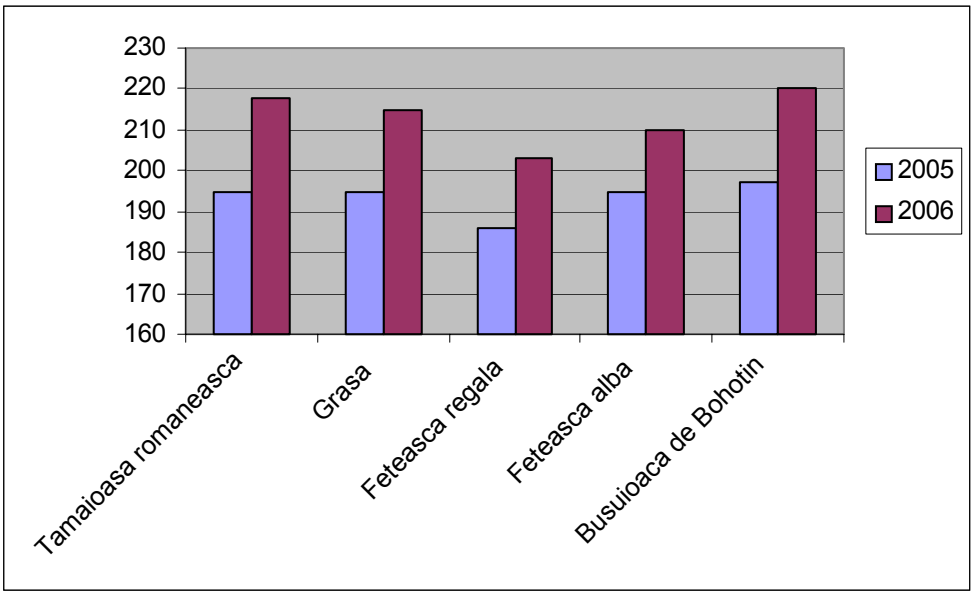

Fig. 1. Average sugar level in grapes at harvesting time Pietroasele 2006 v.s. 2005

Preliminary results concerning the biological control of some vine pest by using extracts of vegetable products

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INTRODUCTION

Obtaining grapes from a bio culture is a chance not at all to be neglected for Romanian viticulture and the small but natural productions which this type of technology guarantee them can be sustained by the prices which the occidental market offers them today.

The insecticides of vegetable origin are fitopharmaceutic products extracted from plants, with contact and ingestion action causes the death of the insects through paralysis. It presents the advantage that the insecticide effect disappears quickly and it won't leave any residue being suitable very well for bio culture (Bobit Dana s. 2001; 2003).

Testing the effectiveness of some medicinal and aromatic plants extract and even some vegetable have like target, the reconsideration of the roles and recognition of their place in promotion of a healthy viticultures witch protects the environment in the vine plantation (Ciulei S. 1993; Dejeu S. 1997). These experiments demonstrate the possibility of resolving the problem of vine pest control with low costs.

MATERIALS AND METHODS

During 2008 at SCDVV Murfatlar, it was experienced watery extracts of piretrum (*Anthemis pyrethrum*), celandine (*Chelidonium majus*), wormwood (*Artemisia absinthum*) and garlic oily extract (Allium sativum), all with one percent of liquid soap without sodium, administrated simple or in mixture in the pest control of the moth grapes (*Lobesia botrana Den et Schiff*), vine leaves moth (*Sparganothis pilleriana Den et Schiff*) and hairy cankerworm mulberry tree (*Hyphantria cunea Drury*).

The varieties that had been experimented were: *Sauvignon Blanc* for the moth grapes, *Italian Riesling* for the vine leaves moth and *Columna* for the hairy cankerworm mulberry tree. The experiments contained a number of 30 vine plants each distributed on a surface of 70 m^2. The treatments were applied by hand with a Calimax pump, on the appearance of the 3 pests attack, the analysis been taken 1-2 days after the products administration.

For the extract preparation we used dust from the dry plants previous reminded using 25 g of dry powder product mixed with one litre of water, leaving in water for 24 hours at cold, after that the extract is immediately used for treatments administration. For garlic we used the same amount of garlic powder (25 g) without tegument, mixed with one litre of sunflower oil, leaving it at cold for 24 hours, after it we applied in plantation.

For the experiences we used two variants: one untreated and another one chemically treated with synthetically piretroid (*Karate Zeon* or *Viper = lambda cihalotrin*) in concentration of 0.015-0.02 %.

The efficacy of plant extracts against different vine pests was expressed through worm mortality rate and it was calculated through Abbott formula. Obtained data were statistically interpreted through variant analysis.

RESULTS AND DISCUSSIONS

Efficacy of some natural insecticide obtained from vegetable species (watery extracts of piretrum *Anthemis pyrethrum*, celandine *Chelidonium maju*, wormwood *Artemisia absinthium*, garlic oily extract *Allium sativum*, all with 1 ml liquid soap without sodium) administrated simple or in mixture in control for the mouth grapes (*Lobesia botrana* Den et Schiff) in the year 2008 at SCDVV Murfatlar on the Sauvignon variety.

According to table 1 results, the watery extract of natural piretrum, extracted from *Anthemis pyretrum* plant, mixed with liquid soap without sodium in dosage of only 7.5 mg/l, assured in the year 2008 in the control of the mouth grapes at the first generation an efficacy of 90.5 % superior to chemical insecticide, piretroid Karate Zeon (lambda cihalotrin) in dosage of 0.15 ml per litre of water obtaining a worm mortality efficacy of 85.6 % in comparison with the untreated variant.

According to results from table 2, on the Sauvignon variety the best efficacy against vine mouth leafs proved only the watery extract of pure natural piretrum with 1 ml liquid soap without sodium, in dosage of 7.5 mg/l of water, used immediately after the mixing obtaining a worm mortality rate of 80.2% in comparison with the untreated variant.

In table 3, the attack of hairy mulberry caterpillar was reduced very considerable in the condition of the year 2008 on the Columna variety from SCDVV Murfatlar. The efficacy obtained with the watery extract of naturally piretrum in dosage of 7.5 mg per litre water reaching almost 89.0% in comparison with untreated variant.

CONCLUSIONS

The preliminary results obtained certify the fact that water plant extract behaved differently in comparison with the variant chemically treated.

Thus, the piretrum extract (*Anthemis pyrethrum*) of 7,5 mg/l water used soon after preparation provided a comparable efficacy with the chemical product used in the control of the 3 vine pest previously specified, of 80-90 %.

A satisfactory efficiency approximately 50-60% had the oily garlic extract (*Allium sativum*) used without water addition.

The celandine extract (*Chelidonium majus*) and wormwood (*Artemisia absinthum*) achieved a small mortality of 30-40 % to all three vine pest: grape berry mouth (*Lobesia botrana Den et Schiff*), vine mouth leaves (*Sparganothis pilleriana Den et Schiff*) and hairy mulberry caterpillar (*Hyphantria cunea Drury*).

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Efficacy of some natural insecticide obtained from vegetable species (watery extracts of piretrum *Anthemis pyrethrum*, celandine *Chelidonium maju*, wormwood *Artemisia absinthium*, garlic oily extract *Allium sativum*, all with 1 ml liquid soap without sodium) administrated simple or in mixture in control for the mouth grapes (*Lobesia botrana* Den et Schiff) in the year 2008 at S.C.D.V.V. Murfatlar on the Sauvignon variety.

Table 1

Variant	dosage -1 litre extract as such /25 mp -1 litre diluted half with water /25m^2	% Inflorescence G1	E % Abbott		Leaves fitotoxicity
			% attack	% dead worms	
1	2	3	4	5	6
V1 – untreated variant	-	12,3	0,0	0,0	0,0
V2 – watery extract of celandine *Chelidonium majus* with liquid soap without sodium 1 ml	as such without water excess	7,8^{00}	36,5	40,2	0,0
V3 – watery extract of celandine *Chelidonium majus* with liquid soap without sodium 1 ml	diluted in half of water	10,6	13,8	15,0	0,0
V4 - watery extract of wormwood *Artemisia absinthium* with liquid soap without sodium 1 ml	as such without water excess	8,2^{00}	33,4	38,0	0,0
V5 - watery extract of wormwood *Artemisia absinthium* with liquid soap without sodium 1 ml	diluted in half of water	9,10	26,0	25,1	0,0
V6 - watery garlic extract *of Allium sativum* in oil with liquid soap without sodium 1 ml	as such without water excess	5,4^{000}	56,0	59,2	0,0
V7 – watery garlic extract *Allium sativum* in oil with liquid soap without sodium 1 ml	diluted in half of water	7,5^{000}	39,0	40,0	0,0

1	2	3	4	5	6
V8 - watery extract of piretrum *Artemisia absinthium* with celandine *Chelidonium maju* and liquid soap without sodium 1 ml	as such without water excess	$7,2^{000}$	41,5	43,0	0,0
V9 – watery extract of piretrum *Artemisia absinthium* with celandine *Chelidonium majus* and liquid soap without sodium 1 ml	diluted in half of water	$9,0^{00}$	26,8	25,7	0,0
V10 - watery extract of natural pure piretrum extracted from *Anthemis pyrethrum* with liquid soap without sodium 1 ml	7,5 mg/ 1 litre water used immediately after preparation	$1,5^{000}$	87,8	90,5	0,0
V11 – treated variant with piretroid Karate Zeon (lambda cihalotrin)	0,15 ml/ 1 litre of water	$1,6^{000}$	86,9	85,6	0,0

DL 5% = 2,4
DL 1% = 3,3
DL 0,1% = 4,6

Efficacy of some natural insecticide obtained from vegetable species (watery extracts of piretrum *Anthemis pyrethrum*, celandine *Chelidonium majus*, wormwood *Artemisia absinthium*, garlic oily extract *Allium sativum* all with one ml liquid soap without sodium) administrated simple or in mixture in control for the vine mouth leafs (*Sparganothis pilleriana* Den et Schiff) in the year 2008 at S.C.D.V.V. Murfatlar on the Sauvignon variety.

Table 2

Variant	dosage -1 litre extract as such /25 mp -1 litre diluted half with water /25m^2	% Inflorescence G1	E % Abbott		Leaves fitotoxicity
			% attack	% dead worms	
1	2	3	4	5	6
V1 – untreated variant	-	10,8	0,0	0,0	0,0
V2 - watery extract of celandine *Chelidonium majus* with liquid soap without sodium 1 ml	as such without water excess	$6,2^{00}$	42,6	45,0	0,0
V3 - watery extract of celandine *Chelidonium majus* liquid soap without sodium 1 ml	diluted in half of water	$8,0^{0}$	25,9	28,5	0,0

1	2	3	4	5	6
V4 - watery extract of wormwood *Artemisia absinthium* with liquid soap without sodium 1 ml	as such without water excess	8,9	17,6	21,0	0,0
V5 - watery extract of wormwood *Artemisia absinthium* with liquid soap without sodium 1 ml	diluted in half of water	9,7	10,2	12,8	0,0
V6 – garlic extract *Allium sativum* in oil + liquid soap without sodium 1 ml	as such without water excess	$4,8^{000}$	55,6	60,2	0,0
V7 – garlic extract of *Allium sativum* in oil with liquid soap without sodium 1 ml	diluted in half of water	$7,2^{00}$	33,4	35,8	0,0
V8 - watery extract of wormwood *Artemisia absinthium* with celandine *Chelidonium majus* and liquid soap without sodium 1 ml	as such without water excess	$7,5^{0}$	30,6	30,0	0,0
V9 - watery extract of wormwood *Artemisia absinthium* and celandine *Chelidonium majus* with liquid soap without sodium 1 ml	diluted in half of water	9,5	12,0	14,1	0,0
V10 - watery extract of natural pure piretrum extracted from *Anthemis pyrethrum* with liquid soap without sodium 1 ml	7,5 mg/ 1 litre of water used immediately after preparation	$2,3^{000}$	78,7	80,2	0,0
V11 – treated variant with piretroid Karate Zeon (lambda cihalotrin)	0,15 ml/ 1 litre of water	$1,9^{000}$	82,4	85,0	0,0

DL 5% = 2,6
DL 1% = 3,5
DL 0,1% = 5,0

Efficacy of some natural insecticide obtained from vegetable species (watery extracts of piretrum *Anthemis pyrethrum*, celandine *Chelidonium majus*, wormwood *Artemisia absinthium*, garlic oily extract *Allium sativum* all with one ml liquid soap without sodium) administrated simple or in mixture in control for hairy mulberry caterpillar (*Hyphantria cunea* Drury) in the year 2008 at S.C.D.V.V. Murfatlar on the Columna variety.

Tabel 3

Variant	dosage -1 litre extract as such /25 mp -1 litre diluted half with water /25m^2	% Inflorescence G1	E % Abbott		Leaves fitotoxicity
			% attack	% dead worms	
1	2	3	4	5	6
V1 – untreated variant	-	5,7	0,0	0,0	0,0
V2 - watery extract of celandine *Chelidonium majus* with liquid soap without sodium 1 ml	as such without water excess	$3,1^{00}$	36,8	40,2	0,0
V3 - watery extract of celandine *Chelidonium majus* with liquid soap without sodium 1 ml	diluted in half of water	4,2	26,3	25,0	0,0
V4 - watery extract of wormwood *Artemisia absinthium* with liquid soap without sodium 1 ml	as such without water excess	$3,7^{0}$	35,0	33,2	0,0
V5 - watery extract of wormwood *Artemisia absinthium* with liquid soap without sodium 1 ml	diluted in half of water	4,9	14,0	16,8	0,0
V6 – garlic extract *Allium sativum* in oil with liquid soap without sodium 1 ml	as such without water excess	$2,5^{00}$	56,1	55,0	0,0
V7 – garlic extract *Allium sativum* in oil with liquid soap without sodium 1 ml	diluted in half of water	$3,9^{0}$	31,5	34,7	0,0
V8 - watery extract of wormwood *Artemisia absinthium* and celandine *Chelidonium majus* with liquid soap without sodium 1 ml	as such without water excess	$3,8^{0}$	33,4	35,0	0,0
V9 - watery extract of wormwood *Artemisia absinthium* and celandine *Chelidonium majus* with liquid soap without sodium 1 ml	diluted in half of water	4,9	14,0	16,5	0,0
V10 - watery extract of pure natural piretrum extracted from *Anthemis pyrethrum* with liquid soap without sodium 1 ml	7,5 mg/ 1 litre of water used immediately after preparation	$0,7^{000}$	87,7	89,0	0,0
V11 –treated variant with piretroid Karate Zeon (lambda cihalotrin)	0,15 ml/ 1 litre of water	$0,5^{000}$	91,2	95,4	0,0

DL 5% = 1,8
DL 1% = 2,5
DL 0,1% = 3,5

Morphological and anatomical changes at several horticultural plants when are attacked by aphids

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Key words: mesophyll, aphids, epidermis, tissue, spongy

ABSTRACT

In order to track down and identify the leaf aphids that attack the horticultural plants samples were taken and observations were made in the tree plantation of U.S.A.M.V.-Bucharest. The pests have been identified in the Genetics, Plant Improvement and Protection Department, Entomology Subject, and the study of the morphological and anatomical changes that followed the attack of several pests was realized in the Botanics and Plant Physiology Department, Botanics Subject. A part of the material was directly scanned or photographed with a digital camera. We mention that there are few data in the speciality literature regarding the morphological and anatomical modifications caused by the presented pests.

INTRODUCTION

Knowing the pests of the horticultural plants and the mutations produced by these are very important in order to limit the damage they cause. In all the developed countries it exists the preoccupation to create a microclimate favourable to human health, to embellish the exterior spaces, the streets and the constructed areas, to diminish the atmospheric pollution, to create an environment good for relaxation. The cultures of wooden species (with nutritional and ornamental value) constitute the base skeleton of the green areas. In this paper we will present several examples of horticultural plants attacked by leaf aphids and the changes that follow the attack.

MATERIALS AND METHODS

The observations were made in the tree plantation of U.S.A.M.V. Bucharest, in the period 2007-2008. For the monitoring of the pests observations were made in the tree plantation and in the University. Samples of attacked plants were taken and the pests were identified. Tracking down and identification of the pests were made in the Genetics, Plant Improvement and Protection Department, Entomology Subject. The collected material was photographed directly on the field or in the laboratory using a Sony digital camera. Transverse sections were made in the leaves of the studied plants, in the Botanics and Plant Physiology Department, Botanics Subject. The sections were clarified with chloral-hydrate for 24 hours (Şerbănescu – Jitariu et. al., 1983; Tudose et al., 2003).

The microscopically concoctions were fixed in jellified glycerine and the observations and photos were made at the optical microscope type MC-7, having attached the Sony digital camera. Observations of the anatomical structures in healthy and plagued tissues in order to identify the mutations caused by the mentioned pests.

RESULTS AND DISCUSSIONS

Plants like: *Malus domestica* Borkh., *Persica vulgaris* Miller, *Prunus cerasifera var. cerasifera* Ehrh were investigated.

In the apple tree orchard the species *Aphis pomi* De Geer (Paşol, 1991) was tracked down – the apple tree green aphids that attacks the twigs and the leaves forming pseudoceccidia on the leaves (fig. 1). The seriously attacked trees have small twigs, with twisted tips, the formed fruits are small and there are no fruit branches formed for next year. In figure 2 it can be observed that the median vein of the leaf has dimples (compared to the vein of the healthy leaves that have a semicircular outline). In figure 3 the normal structure of the leaf can be observed and in figure 4 it can be observed that the mesophyll of the attacked leaf of *Aphis pomi* has both the palisade tissue and the spongy tissue with necrosis. Also the inferior epidermis has necrosis. At the peach tree the species *Myzus persicae* Sulz. – peach tree green louse (fig. 5) was tracked down, that causes the leaves to twist, turn yellow and dry, the productions to decrease and the plants to become sick (Miles ,1990; Peter et.al., 1992; Pickett and Woodcock, 1992). In figure 6 we can observe a transverse section in the unattached peach tree leaf compared to figures 7 and 8 where we can notice the mutations that followed the attack of *Myzus persicae*. Both the inferior epidermis and the leaf mesophyll are affected and in the area of the median vein the tissues are separated from each other. At the mirobolam tree the species *Hyalopterus pruni* Geoffr.- plum tree ashen lice was tracked down, that recorded high densities. Also in the case of this plant necrosis in the area of the mesophyll and of the median vein can be observed in the attacked leaves (fig. 9).

CONCLUSIONS

1. In the spring of 2007-2008 there were attacks on the studied plants; hereby observations were made regarding the species or the gender of the present pests.

2. The climatic conditions specific to the years 2007 and 2008 were favourable for the development in high densities of the leaf aphids in horticultural plants.

3. It is known that the epidermis is a defence tissue of the leaf, formed by cells without spaces between them, covered by a cuticule that protects the living tissues of the leaf against various environment factors. From the conducted studies, it was ascertained that the leaf louse cause the destruction of the cuticule and the necrosis of the epidermis, therefore this tissue fails to do its job, not allowing the adjustment of perspiration and the gas exchange between the living tissues and the environment.

4. The assimilation tissues of the leaf (palisade and spongy tissues), because of the mutations produced under the influence of the leaf aphids, stop the synthesis of organic substances through photosynthesis because the chloroplasts are destroyed; decrease of production and small fruits in the case of fruit trees, changes in the microclimate due to the reduction of photosynthesis, respiration and perspiration.

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Fig. 1 – Pseudocecidia caused by *Aphis pomi* at apple tree on leaves (original).

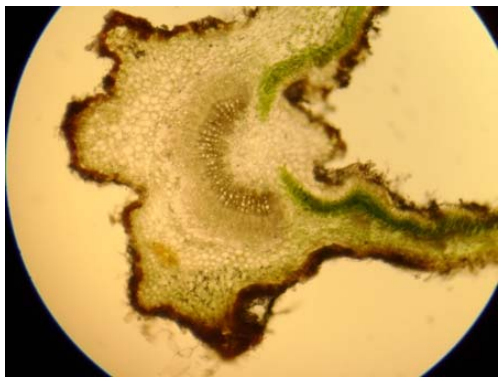

Fig. 2 – Median vein of the apple tree leaf attacked by aphid the apple tree green (original)

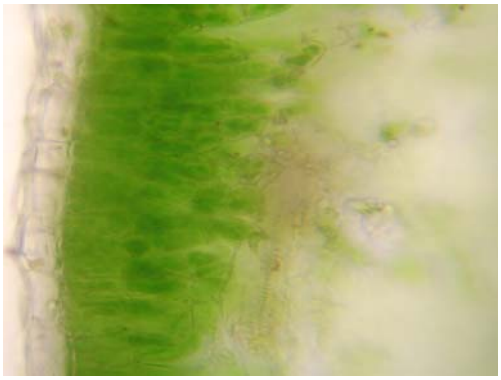

Fig. 3 – Healthy apple tree leaf – transverse section (original)

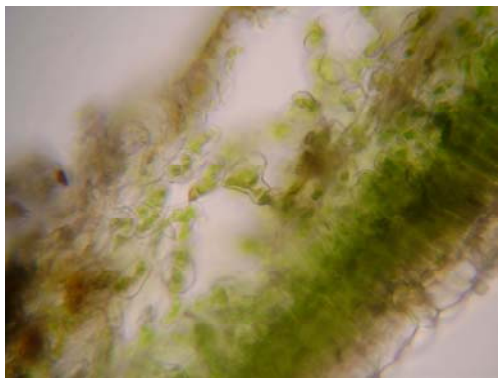

Fig. 4 – Transverse section of apple tree leaf attacked by the apple tree green aphid (original)

Fig. 5 – Colony of *Myzus persicae* at the peach tree (original)

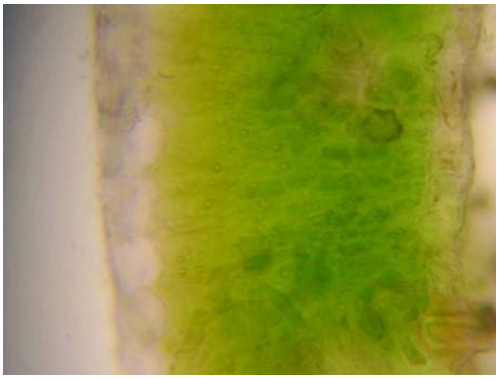

Fig. 6 – Transverse section in the unnattacked peach tree leaf (original)

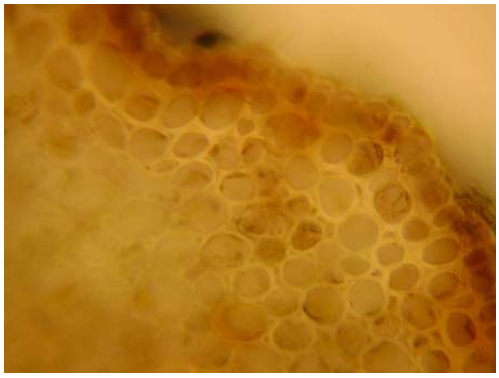

Fig. 7 – Epidermis and surrounding tissues with necrosis at the peach tree attacked by the peach tree green aphid (original)

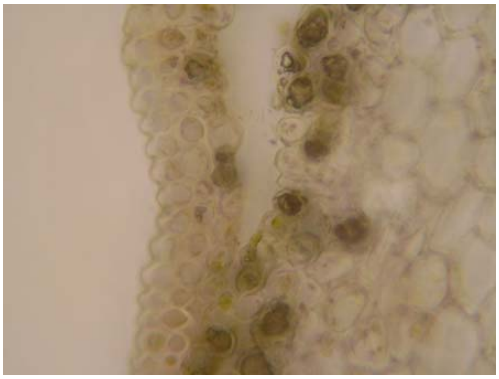

Fig. 8 – Necrosis and separation of tissues from the median vein at the peach tree attacked by the peach tree green aphid (original)

Fig. 9 - Transverse section in the mirobolam tree leaf attacked at the median vein level by the plum tree ashen grey aphid (original)

Behavior of several varieties of *Vitis vinifera* L. to the attack caused by *Colomerus vitis* Pagst. and *Tetranychus urticae* Koch

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Keywords: mesophyll, mites, epidermis, *Colomerus vitis* Pagst.

ABSTRACT

In order to detect and identify mites which attack *Vitis vinifera* L. plants, samples have been taken from twenty-one varieties of vine and observations have been performed as well in the vine plantation at USAMV - Bucharest. The Department of Genetics, Amelioration and Plant Protection, through its Entomology Section - has identified the mites species. The Department of Botany and Plant Physiology- trough its Botanical section – has followed and performed analyses on the morphological and anatomical changes resulting from the attack of certain mites' species. Part of the material has been scanned or photographed with a digital camera. Morphological and anatomic analyses of the leaf have been performed so as to see what happens to the foliar limb when attacked by mites.

INTRODUCTION

From the group of eriophyid mites, the *Colomerus vitis* species is the most known in most of the countries that cultivate vine, both through the frequency of its dispersion and mostly through the damages it causes (Manson, 1984). The ecological plasticity of the mite, its strong affinity towards the main ecological factors, determine in some years large multiplication with favourable consequences over the efficiency and quality of the attacked crops. Eriophyid mites represent a group less studied on international level, compared to other groups and especially to tetranichyid mites. Also there are less data in the speciality literature regarding the morphological and anatomical changes that happen in the folicular limb of the vine attacked by mites.

MATERIALS AND METHODS

The observations were made in the vine (*Vitis vinifera* L.) (Săvulescu Elena, 2007) plantation inside USAMV Bucharest in the period 2005-2007. To monitor the mites observations were made periodically in the vine plantation. Samples of attacked plants (types of damage) and the respective pests were taken in order to be detrmined in the laboratory. Tracking and identifying the mites was made inside the Genetics and Plants Improvement and Protection Department, Entomology subject. Microscopical concoctions were made in order to determine the mites' species. The collected material was photographed, directly on the field or in the laboratory using the camera or a digital camera. A part of the material was directly scanned. Transverse sections were made in the vine leaves attacked by mites, inside the Botanics and Plant Physiology, Botanics Subject. The sections were clarified with chloral-hydrate for 24 hours and washed with water (Şerbănescu - Jitariu et al., 1983; Georgescu et al., 2001). The microscopical concoctions were fixed in jellified glycerine and the observations and photos were made at the optical microscope type MC-7, having attached the Exakta Varex

camera or a digital camera. Observations of the anatomical structures in healthy and plagued tissues in order to identify the mutations caused by mites.

RESULTS AND DISCUSSIONS

In order to track down the mites species in the spring of 2005, before the beginning of the vine vegetation (temperature < 10^0C), branches from 21 varieties of vine were harvested and forced in the laboratory. After the swelling of the buds these were opened under the binocular and the presence or the absence of the hibernating stages and their density were noted. As a result of te researches regarding the tracking of the mites on the vine branches forced in the laboratory two mites species were found *Colomerus vitis* Pagst. and *Tetranychus urticae* Koch. The hibernating stages are represented by adult females under the scales of the buds for both species. The varieties were the hibernating stages are: V1-Arcaş, V2-Azur, V3-Şarba, V4-Pandur, V 5-Riesling, V 6-Muscat de Hamburg, V 7-Afuz-Ali, V8-Fetească regală, V9- Grasă de Cotnari, V10- Pinot Gris, V 11-Greaca, V12- Novac, V13- Purpuriu, V 14-Triumf, V15-Aligote, V16- Merlot, and to those who not are identified mites are: V 17-Pinot Noir, V 18-Chardonay, V 19-Muscat Ottonel, V 20-Brumăriu, V21- Mamaia.

The average values of the number and frequently of galls/leaf for the studied varieties in the spring of 2005 and 2006 are presented in figure 1 and figure 2.

A high number of galls/leaf can be observed: attack that is being directly connected to the characteristics of the variety (leaves pilosity).

From the analysis of figure 2 results a high frequency of galls on leaves at the varieties: Azur, Donaris, Mamaia, Arcaş and Petit Sauvignon with values between 55.55% and 37.50%. Figure 2 presents graphically the galls frequency at the studied varieties. This thing is correlated with the average number of galls on leaves recorded in the previous years. The adults and larva of *Tetranychus urticae* Koch colonize the inferior part of the leaves. The leaves show specific shiny grey or reddish spots, slightly curved. After strong attacks the leaves dry up and fall and the plants don't make fruits in a normal way. The leaves attacked by *Colomerus vit*is Pagst show on the inferior side spots of various sizes with fealty aspect (Figure 3 and 4). The fealty formations are caused by the hypertrophy of the plurycellular hairs from the inferior epidermis). On the superior part of the leaf, connected with these spots, specific swellings appear. If the attack takes place in the inflorescence before it blooms numerous flowers suffer an abortion (Boguleanu, 1994; Tudose, 2000).In the transverse section it can be observed that the folicular limb suffered morphological and anatomical changes. The superior epidermis got wrinkled and the hairs from the inferior epidermis suffered a hypertrophy. The mesophyll suffers disorganization; the cells of the palisade and spongy tissue get necrosis (figure 5). Due to these morphological and anatomical mutations the physiological processes don't take their normal course anymore. In a transverse section in the leaf with an advanced mites attack it can be observed that the spongy tissue begins to get disorganized and the inferior epidermis gets wrinkled.

CONCLUSIONS

1. The following mites species were found on ***Vitis vinifera* L.**: *Colomerus vitis* Pagst., *Tetranychus urticae* Koch.

2. In the spring of 2005 the galicol vine mite showed a strong attack, presented in this study through the average number of galls/leaves and the frequency of galls/leaves.

3. The studies made on laboratory forced branches allow the tracking of the hibernating stages of the mites, establishing their density and choosing the control methods at the right moment.

4. Following the observations concerning the behaviour of several vine varieties to the attack of the galicol vine mite – *Colomerus vitis*, the following varieties proved to be sensitive: Azur, Arcaş, Fetească albă, Mamaia, Fetească regală, Donaris and Muscat Ottonel, with an average number of galls on leaves of over 20. Also a high frequency of the galls on leaves was noticed at the varieties: Azur, Donaris, Mamaia, Arcaş and Petit Sauvignon with values between 55.55 % and 37.50 %.

5. The high sensitivity of these varieties to the attack of the galicol vine mite – *Colomerus vitis* is correlated to the degree of leaves pilosity, fact mentioned in the entomological literature.

6. Following the transverse sections made in the leaves of different plants varieties (vine, linden tree, pear tree and nut tree) attacked by eriophyid mites, anatomical and morphological changes were shown through suggestive images: wrinkling of the superior epidermis, disorganization and necrosis of the mesophyll, hypertrophy of the hairs from the inferior side of the leaves, chaotically multiplication of the mesophyll cells.

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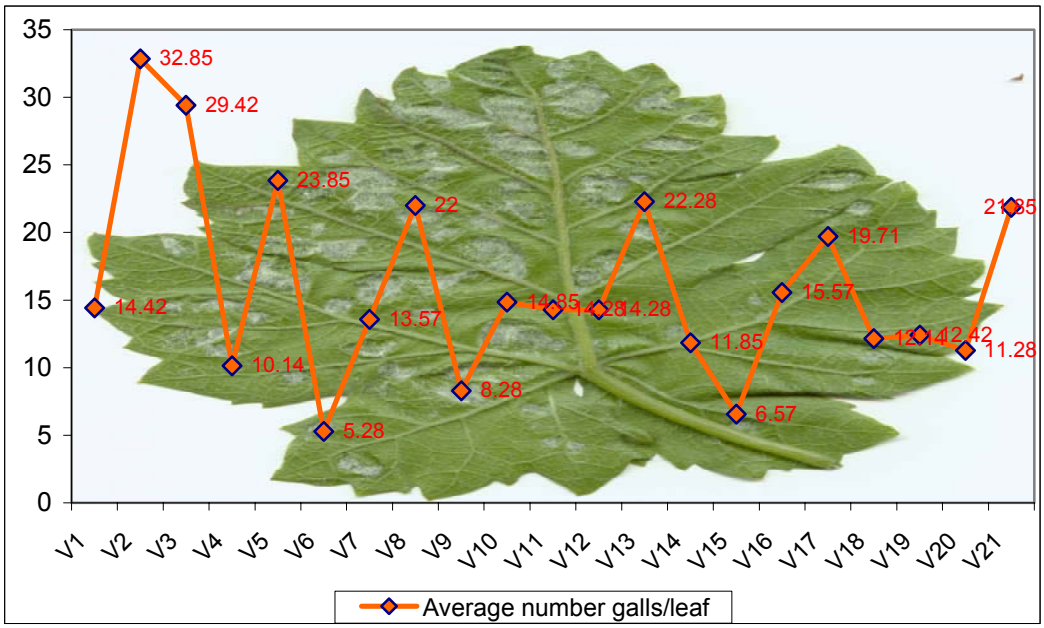

Fig. 1 - Behaviour of several vine varieties to the attack of the galicol vine mite - *Colomerus vitis*, in the spring of 2005.

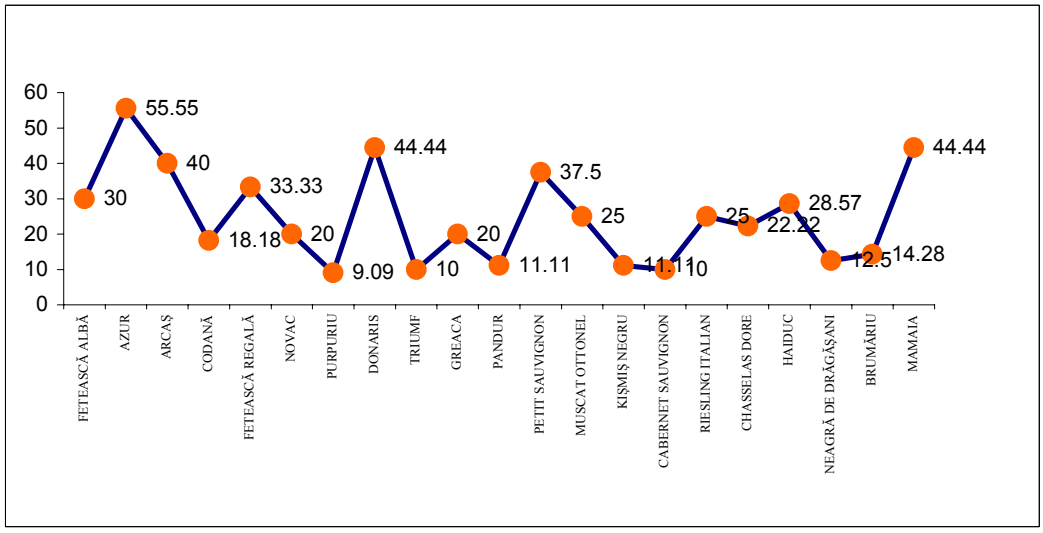

Fig. 2 – Frequency of galls/leaf in the spring 2006

Fig. 3 – Attack produced by *Colomerus vitis* on leaves, Azur (original).

Fig. 4 – Attack produced by *Colomerus vitis* on leaves, Fetească regală (original)

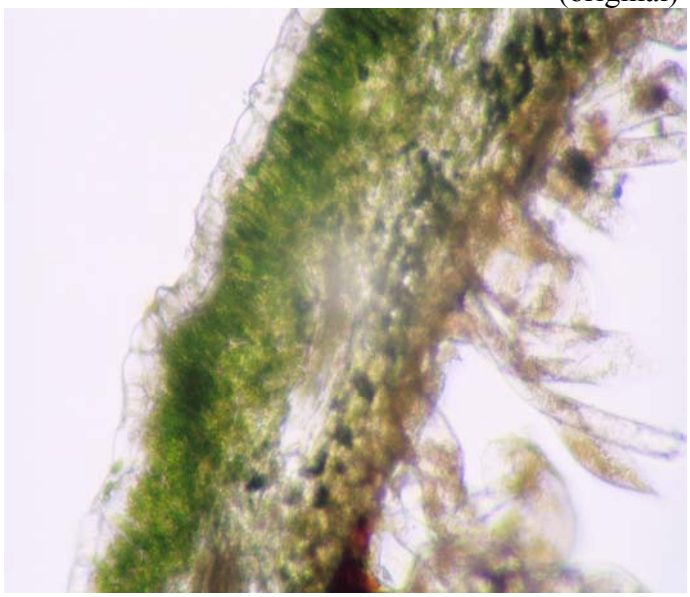

Fig. 5 – Transverse section in the leaf of *Vitis vinifera* attacked by *Colomerus vitis* (original).

Grape dieback in Romania induced by pathogenic lignicoulus fungi

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Keywords: grapevine, biological decline, lignicoulus fungi

ABSTRACT

Biological decline of grapevine is determined under the pedoclimate conditions prevailing in Romania by the lignicolous fungi parasiting the trunk and branches:: *Eutypa lata, Phomopsis viticola, Stereum hirsutum, Cytospora vitis, Verticillium dahliae, Phoma uvicola, Diplodia viticola, Pestalozzia vitis, Sphaeropsis malorum* and telluric fungus which found on drying roots *Roesleria hypogea, Roesellinia necatrix.*

Micromyceta involved in grapevine decline can attack during the autumn-spring period, when grapevine are in dormancy and temperatures are low for a more prolonged period. Evolution of the progress of early drying of grapevine, as a result of the pathogenic action of lignicoulus fungi is influenced by the age of plants, pruning system and cultivar behaviour.

INTRODUCTION

The cryptogamic diseases are almost entirely of multi-factorial etiology, the etiological agents are grouped in two large categories that are connected with the genetically or raised at the host plant level particularities and are influenced by external factors, among which are the ecological elements, the applied agrophytotechnical measures, so this means man's intervention over the plant in the created eco-system.

Early drying is a disease usually affecting grapevine, with the most obvious damaging. There is an wide information in the scientific literature of this field: in Australia (Adam, 1938; 1952; Carter 1952, 1957, 1960, 1991; Uyemeto et Goheen, 1985; Boubala, 1982; Pearson 1983; Ramos, 1980, Moor et Anderson, 1988; Tarboh, 1986), SUA (English, 1976, 1985); Franța (Castelain, 1964, Bonifaces,1980: Bonea, 1980; Dubos et all., 1983), Elveția (Boley, 1977, 1985, 1986), Rumbos, 1981), Italy (Cristianizo, 1978), Hungary (Lehoszky, Roznyai, 1981), Germany (Gartel, 1980), Greece (Chritzanidis, 1976), Portugalia (Da Costa, 1984), referred by Pearson and Goheen, 1990.

In Romania, grapevine early drying has been described by Crişan 1963, Mărmurean et all. 1990, Rafailă et Oprea, Podosu et all. (1990, 1995), Tică et all. 1994, Ulea 1997. During the decade 1983-2006 the disease turned in calamity, leading to drying of more than 50% grapevine occurring in this country. This phenomenon subsequently diminished, due to resistant cultivars and to superior culture technologies, the extent of early of grapevine being 5-35%.

MATERIALS AND METHODS

The researches regarding the apricot biological dieback in the Romanian ecological conditions were extended over a period of 10 years, including orchards from all crop zones. Biological samples were taken from the grapevine about to

dry, out of which the lignicoulus fungi that play a role in the dieback process were isolated in lab conditions.

The biological parameters (temperatures, U%) were observed at the identified species by the current lab techniques (Tuit, 1968), regarding the fungi: *Eutypa lata, Phomopsis viticola, Cytospora vitis, Stereaum hirsutum, Roesleria hypogea*

RESULTS AND DISCUSSIONS

From investigations performed in vine plot of the country during 1996-2006, it was recorded that trees sensitive to early drying, 1-2 years before drying exhibited slight vegetation, sometimes leaves appeared before flowering or simultaneously, an abnormal fact in this species; leaves remained small, getting brown and drying, without falling. Fruits remained small, with sponging pulp. Sometimes wilt occurred in full season or a huge defoliation took place. Cross section in branches affected revealed browning of ligneous and cambium tissues.

From branches of trees starting decline, pathogenic fungi with lignicoulus behaviour have been isolated, such as: *Eutypa lata* (42,7%), *Phomopsis viticol* (24,8%), *Cyrospora vitis* (8,4%), *Phoma uvicole* (4,8%), *Diplodia vitis* (4,8%), *Stereum hirsutum* (3,8%), *Verticillium dahliae* (3,6%%), *Sphaeropsis malorum* (4,7%), *Roesleria hypogea* (1,2%), *Pestalozzia vitis* (1,2%).

The vine infested by fungi, beside a diminished crop, up to the vine perish, are not recommended to be used as graft because of the high risks of spreading the disease and shortening the young grape vine life.

In the area where have been signalled the grape dieback, the inauspicious pedoclimatic conditions for the plant development showed to be, a clay soil (Blaj, Jidvei, Sard vineyards in Alba, Minis in Arad, Valea Călugărească, Cotnari) a weak fertilization soil with strong erosions (Diosig and Siria in Arad), chlorites phenomena showed in almost all observation stations, the replace of the classical vine pruning with raised stump one, sandy soil structure favoring an insufficient watering condition, industrial pollution, (Valea Călugărească), prolonged drought (Murfatlar and Cotnari vineyards), vicinity of the forest (Sard in Alba, Gaiceanca in Bacău).

The inadequate phytosanitary measures also favoured the vine weakening process. By the classical vine pruning named “ardelean circle” replaced with the “raised stump”, have produced large arm wounds (perfect enter gates for lignocolous fungi), and on the other hand eliminating the autumn buried labours, the grape vine remained exposed to the cold temperatures during the winter. The repeated overproductions and the heavy loaded fruits on vine arms, as well as the wrong application of phytosanitary treatments against leaves diseases (blight, mildew, rot) have also weakened the vine.

On these ecologic backgrounds the vine becomes vulnerable to the lignicoulus fungi contamination, especially to *Eutypa lata.* Once entered into the vine wood, the fungus has a bad influence on the plant metabolism, determining a premature vine arms drying.

The disease is greatly disseminated in almost all vineyards from the country, and associated with ecological weakening factors finished up the drying

process. As a result of the observations carried on between 1983-1993 in the main vineyards, the disease was found present in the following regions: Transilvania plateau, Chrish hills, Dobrogea hillock, Danube terraces, Muntenia, Oltenia and Moldova hills.

The percentage of infested vine arms was between 3-96%; the disease was set up on the vine older than 6 years of age, especially on the vine in 10-15 years of age. The most damaged vine varieties (sorts) were the beverage ones, especially Italian Riesling (Diosig – Bihor and Gaiceanca - Bacău vineyards) where on the certain lots, all vine arms showed specific symptoms of eutipoze. Other varieties very much damaged of the disease include: in proportion of 60% Cabernet Sauvignon, over 30% White Feteasca, between 10-89% Black Băbească (much severe in Nicoreşti - Galaţi vineyard), about 63% Royal Feteasca, 30% Muscat Ottonel (especially in Minis vineyard) and between 3-33% the native varieties: Grasa de Cotnari, Galbena de Odobesti and Sarba,

The grape vine desert fruit varieties most damaged were Chasslas doree (68% in Valea Călugărească vineyard) and Afuz Ali (in south country vineyards).

The fungus *Phomosis viticola* have been found present on all observed dieback vines. The most frequent presence of this fungus was found on the varieties like: Fetească albă (20%), Chasslas doree (38%), Cabernet Sauvignon (26), Italian Riesling (15,6%), Cardinal (50%), Clairete (21,6%), Merlot (7,8%), Pinot Noir (11,2%), in the following vineyards: Odobeşti, Coreteşti – Vrancea, Valea Călugărească, Pietroasele Drăgăşani. The grape vine affected by excoriose was growing on the lots presenting a clay compact acid soil, watered in excess and industrially polluted.

The fungus *Cytospora vitis* was found in proportion of 8,4% especially in Alba country vineyards (Sard and Bucerdea).

The fungus *Cytospora vitis* was found present on the lots in the vicinity of the forest, in a soil fall short of humus, and very humid conditions during the whole vegetation period. The damaged varieties were: Royal Fetească (Transilvania plateau), Italian Riesling (Arad), Merlot (Minis), Cabernet Sauvignon (Drăgăşani), Pinot noir (Iaşi).

The fungus *Stereum hirsutum* was present in two vineyards: Blaj, Prahova Iaşi and Ostrov – Constanţa in proportion of 8%, in a soil showing a high concentration of calcium carbonicum, ferric chloroses and strong erosions. The disease of the vine was identified by carpophores apparition, or the specific leaves colour.

SYMPTOMS

Due to the ecologic weakening and biological drying of grape vine, the aspect of the infested vine show specific aspects for the pathogenic action of each lignicoulus fungi.

"Dead arm" induced by *Eutypa lata* fungus are developed on the vine infested in the previous spring, at the beginning of the vegetation period, which was 10-14 days delayed compared with the healthy vines period.

Vine arms in the draying process showed longitudinal splits, ulcers surrounding the wounds produced by cuttings. Into a longitudinal section were observed xilem necroses, at the primary infection places. The infested areas edges

turn to brown-red up to purple. The damaged wood showed well defined limits. In an advanced developed stage, the secondary libero-ligneous vessels walls were destroyed, the tissue becoming very frail. This aspect can be proved, by a very easy broking the tendril of vine, without remaining fibbers around the broken section.

Excoriose produced by the *Phomopsis viticola* was present at the beginning of the vegetation period in the observed vineyards. In Valea Călugărească vineyard, before the budding period, the tendrils of vine showed dark colour spots, isolated or associated, about 0,5-2 cm x 0,3-1,0 cm, usually placed at the base of tendril. The budding period was 12-14 days delayed, and the buds placed at the tendril of vine base were dyed. A thorough observation on the damaged tendrils of vine revealed that the first 3-4 basal buds were withered, and only the buds placed on the top of the tendril of vine being viable.

Roesleria hypogea infested Merlot grape vine variety, in Oltenia sandy soil vineyard, lead to the plants weakening until dying. The next spring the vegetation period for the infested vine were weak, the development of tendrils of vine was limited, the diameter of the limb leaf was lesser than 5 cm; at the flowering period the sterile flowers percentage was greater than usual and the clusters (bunches) aspect were denudate and the yield diminished. The dieback aspect of vine progressed year by year. At a thorough observation on a transversal section in the stock-vine it was revealed brown necrotic areas in the libero-ligneous tissue. In an advanced disease stage the roots dried, and in the excessive humid conditions the stock-vine developed apothecia.

BIOLOGICAL PARAMETERS

Temperature

The development of the *Eutypa lata* colonies on CGA medium, were strongly influenced by the level of temperature. The fungi colonies start to grow at +8^{o}C, showing a white, lax mycelium, yellow on reverse. After 15 days the colonies reach 20 mm diameter. In these conditions were not formed fructifications. By temperature rising, the colonies diameter increase, the mycelium become dense and takes a felt like aspect. The optimal temperature for fungi development was between 18-26^{o}C. At the mycelium surface appeared black crusts, where due to the abundant hyphen appeared the gray pycnidia. The pycnidium maturation takes 12-14 days long, and was included in a gelid mass that is eliminated via ostiols. Some of the cultures kept at 18^{o}C formed perithecium.

The maximum temperature for the development of *Eutypa lata* showed to be 34^{o}C. For this fungus 36^{o}C may be considered the lethal level. The Petri plates colonies moving from 36^{o}C to the 22^{o}C, seized to develop the mycelium. The temperature level is determining the *Eutypa lata* germination of spores. In the amorphous stage pycnospora do not germinated on the medium culture (water, agar or malthoza 5%), unless were not exposed to the UV radiation for 15 minutes. Germination started two hours after irradiation, in a low percentage (2%), the length of the germination tube was 1,5-2 μ. The germination percentage increased with the length of the irradiation exposure time, and as the result, after 24 hours the spores germination was 46% and germination tube length reached 52-65 μ.

Ascospora present in the teleomorph stage germinated in the usual conditions of water-agar medium. The germination starts at 10°C and kept going till 30°C, the optimum temperature was between 18-28°C. The maximum germination temperature may be considered 32°C, and lethal temperature 34°C.

Relative atmospheric humidity

The observations carried on "in vitro" experiments, showed that the development of *Eutypa lata* fungi colonies are influenced by the levels of the relative atmospheric humidity. The values under 30,5 RH seized the mycelium development. The increased RH values between 39% RH to 74% RH, without fructification showed that mycelium become abundant. Morphological changes occur at humidity level greater than 80%. The fungus fructified, and after 4 weeks showed picnidia, maturing after 7-11 days.

pH values

The observed lignicoulus fungi (*Eutypa lata, Phomosis viticola, Cytospora vitis, Roesleria hypogea*) developed in acid (4) to basic (11) pH growing medium. At the acid level (4) the fungi showed limited growth colonies with a low vegetative mass. From the low acide up to strong basic pH (5,5-11) the fungi developed colonies with an abundant vegetation mass, specific for each species. Some of them fructified forming pycknidia (*Eutypa lata, Phomosis viticola, Cytospora vitis*) .

THE ENERGETIC RESOURCES

Carbon source influence

The results obtained „in vitro" experiments, established that the carbon was the most important element for the lignicoulus fungi colonies development. Component of the molecule carbohydrates, this element can be assimilated in deferent ways, depending on the source, and the carbon chemical link (connection) in that molecule. The carbon is slighty hydrolised from the monosaharides like: glucosis, fructosis, trehalosis, ribosis, arabinosis, levulosis and rhamnosis. Among disaharides are melobiosis and zaharosis and from polysaharides are celulosis and lignine. The colonies growth medium including these carbon resources developed at greatest dimensions and fructified well. *Eutypa lata, Phomosis viticola, Cytospora vitis* showed a weaker development on sorbosis growth medium, also *Eutypa lata* and *Roesleria hypogea* on galactosis medium, all fungi on maltosis, *Cytospora vitis* on celulosis, and *Eutypa lata* and *Cytospora vitis* on inulinae. *Eutypa lata* grows well on manitosis, galactosis, levulosis, melobiosis, and starch culture medium, but do not fructify. *Phomosis viticola* fructified on all culture medium were fungus mycelium developed.

In the absence of carbon, the development of *Eutypa lata, Phomosis viticola* fungi colonies were inhibited, *Roesleria hypogea* and *Cytospora vitis* showed a lax mycelium, in 13 and respectively 30 mm diameter, without fructifying.

Light influence

The influence of light on the lignicoulus fungi development was tested „in vitro" experiments. The CGA growth medium on Perti plates with fungi colonies were exposed to a permanent source of light, to light/dark alternate (8 hs with 16 hs or 12 to 12 hs) and to continuous dark. The fungi colonies in permanent dark

condition developed the best vegetation mass; the colonies showed a dense, felt like aspect. But were developed weak fructifications. *Eutypa lata* and *Phomosis viticola* fructified very well in light dark alternate of 8 to 16 hs.

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