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PLENARY SESSION

IN MEMORIAM ELEFTERIE ELEFTERIU (1916-2006)

Pe rând, vechii dascăli ai Facultăţii de Horticultură din Bucureşti ne părăsesc lăsând în urmă amintirea personalităţii lor şi a ceea ce au reprezentat pentru zeci de generaţii de ingineri horticultori, dintre care astăzi încă mulţi sunt în activitate.

Numele Elefterie Elefteriu figurează în "cartea de aur" a profesorilor; deşi s-a pensionat ca şef de lucrări, titularul disciplinei de Arboricultură ornamentală şi Arhitectură peisageră a fost pentru studenţii săi un adevărat profesor.

Cu pasiune, talent pedagogic şi deosebit simţ practic, şi-a transmis ştiinţa şi interesul pentru horticultura ornamentală – domeniu în care mulţi absolvenţi au lucrat sau încă lucrează, fie în administraţia spaţiilor verzi, fie în pepinieristică, în învăţământul de profil, sau în cercetare. În şcoala superioară horticolă a avut o muncă de pionierat, iniţiind studenţii în proiectarea grădinilor şi parcurilor, într-o vreme când nicăieri în facultăţile de horticultură din ţară nu se pregăteau specialişti pentru amenajarea spaţiilor verzi.

Dar cine a fost şi cum a trăit acel bărbat înalt, deosebit de modest, plin de bunătate şi înţelegere şi care a iubit atât de mult florile, arborii, arbuştii, lucrul la planşeta de desen, munca în teren?

Modestia, seriozitatea şi disciplina muncii care îl caracterizau şi-au avut originea în educaţia din familie şi din şcoală.

Elefterie, al treilea fiu dintre cei patru ai comandantului de vas comercial Gheorghe Elefteriu şi al soţiei sale, Ana, s-a născut la 21 mai 1916 în Galaţi. A urmat şcoala şi liceul în perioada 1923-1935 la Galaţi, remarcându-se prin conştiinciozitate şi rezultate foarte bune.

După o perioadă în care, din motive familiale, a fost nevoit să muncească, în 1939 a fost încorporat şi a urmat pregătirea militară şi şcoala de ofiţeri de cavalerie la Sibiu. Datorită calităţilor sale a fost numit comandant de pluton la Regimentul 8 Călăraşi.

Activitatea de militar l-a adus pe scena celui de-al doilea război mondial din iulie 1943 până în august 1944 când, din nefericire, a fost luat prizonier. Această grea încercare a vieţii – prizonieratul în URSS, în zona oraşului Gorki până în iulie 1948– i-a adus multe suferinţe dar nu i-a înfrânt speranţa.

Repatriat, își mobilizează energiile şi devine student la Facultatea de Horticultură din cadrul Institutului Agronomic „Nicolae Bălcescu” din Bucureşti (promoția 1948–1952) având o înclinație deosebită pentru acest domeniu ca urmare a preocupărilor anterioare. Devenit inginer horticultor, domnul Elefterie Elefteriu, își începe activitatea profesională imediat după absolvire până la pensionare în 1977.

În primii ani a lucrat în peisagistică şi floricultură; se poate menționa participarea domniei sale la realizarea parcului de cultură şi sport „23 August” din Bucureşti - actualul Parc Național - amenajat pentru găzduirea manifestărilor din cadrul Festivalului Internațional al Studenților şi Tineretului din 1953.

A devenit şef de lucrări în cadrul Facultății de Horticultură, activând la disciplina de Floricultură, Arboricultură ornamentală şi Arhitectură peisageră. A lucrat inițial, până în 1960, pe lângă distinsul conferențiar Grigore Constantinescu şi având pentru o perioadă coleg pe asistentul Nicolae Şuster (1952-1962).

Devenit apoi titularul disciplinei de Arboricultură ornamentală şi Arhitectură peisageră, a avut o contribuție însemnată la dezvoltarea acestui domeniu horticol, nu numai prin predarea cursului şi a lucrărilor practice şi a conducerii lucrărilor de diplomă, dar şi prin activitatea aplicativă. A înființat pepiniere de arbori şi arbuşti ornamentali, mai întâi în incinta Institutului Agronomic, apoi în cadrul Fermei didactice Băneasa, pregătind astfel studenții pentru exercitarea meseriei în producție.

Ca dascăl, s-a apropiat de studenți cu multă simpatie şi înțelegere, i-a îndrumat cu o răbdare deosebită, mai ales la întocmirea proiectelor de spații verzi, pentru care rămânea ore în şir în facultate. Iar în teren, în pepinieră, lucrând alături de ei i-a învățat multe din „secretele” meseriei.

Ca fostă studentă şi colaboratoare a domnului Elefteriu, pot spune că avea cunoştinţe foarte vaste pe care le împărtăşea cu multă plăcere; sub o aparenţă puţin inabordabilă, era de fapt un om destul de timid, având în acelaşi timp o rezervă de umor fin, care încânta pe interlocutorii apropiaţi.

Cunoştinţele în domeniu şi le-a transmis prin publicaţii ştiinţifice privind tehnologii de înmulţire şi cultură la unele plante ornamentale (flori şi arbuşti foioşi) şi prin manuale pentru elevi şi studenţi, îndrumătoare pentru proiectele de an.

În viaţa privată s-a căsătorit în 1965; mariajul plin de armonie a durat până în 2006, când doamna Alexandrina Elefteriu s-a stins din viaţă cu câteva luni înaintea soţului.

Domnul Elefterie Elefteriu a dispărut dintre noi la 3 octombrie 2006. Foştii studenţi şi colaboratori îl vor păstra în amintire, aşa cum a fost, un om deosebit.

Un simbolic buchet de trandafiri pentru cel care a iubit atât de mult florile şi grădinile şi care a format cu dăruire multe generaţii de specialişti pentru spaţiile verzi ale României.

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PROBLEMS OF LANDSCAPE ARCHITECTURE HIGHER EDUCATION IN EUROPEAN VISION

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Keywords: ECLAS, Le-Notre, curricula, implementation, teaching and research

What are landscapes, why are they as important as to determine a complex profession and special academic studies?

According to the European Landscape Convention (Florence, 2000) a landscape means a part of a territory, as it is perceived by man, and which is the result of the action and interaction of natural elements and human activities.

Considered from ecologic, social, cultural and economic point of view, natural, semi-natural, and man-made landscapes contribute to the human life quality and offer condition for the integration of economic activities. Vegetation has a considerable role in the equilibrium of the environment, the main landscape component.

That is why landscape protection, conservation, improvement and management as new landscapes creation are very important for a sustainable development, based on harmonization of social needs, economy and environment.

At present, in the most countries, with an unprecedented level of industrialization and urbanization, having important environmental consequences, these problems concern more than ever governments, European and international organizations.

The European Council States took the initiative in elaborating the European Landscape Convention, which since 2000 became the basic document for the politics and strategies concerning the landscape protection, management and planning. In this context, landscape architecture, as professional activity, acquired a greater importance, having to answer new and complex requirements.

Landscape architecture is concerned with the conservation and development of the landscapes and their associated values, for the benefit of present and future generations. The main field of its activities is landscape planning, design and management but also it is involved in urban and territorial planning.

The implementation of landscape programs, require competent specialists, able to get through present and future problems facing the profession and having the capacity to collaborate with other specialists and public authorities. In consequence it is essential to develop higher education on new basis, ensuring a good performance of the graduates in exerting their profession.

An objective analysis of landscape education in Europe determined the necessity of exchanges of experience and cooperation of European universities for the purpose of improving the quality of teaching and research.

This mission was assumed by E.C.L.A.S. (European Council of Landscape Architecture Schools), responding to the European Landscape Convention and Bologna Convention requirements of increasing the education efficiency.

Focusing on this goal E.C.L.A.S. realized a first network thematic project funded by E.U. in the frame of ERASMUS program, entitled LE NOTRE (Landscape Education: New Opportunities for teaching and research in Europe). This 3 years project (2003-2005) joined as partners more than 80 European landscape universities from 30 countries, collaborating via e-mail and internet.

The project objectives were:

- to compare the process of landscape education in different schools;
- to identify the broadly agreed core elements of education programs according to the professional needs and the variety of landscapes issues within the different countries of Europe;
- to point out and develop improved teaching/learning and research methods education at European level;
- to improve communication with professional bodies and public authorities, landscape students and related disciplines (architecture, civil engineering, urban and regional planning, horticulture, environmental science, sociology etc.) at European level in order to identify predicted needs of the profession and the highest standards required of the professionals (graduates).

The efficient monitoring of the project and the interactive participation of the network member schools and their inputs in the LE NOTRE web page and annual meetings ensured the project goals achievement.

"LE NOTRE" implementation of the "tuning project" methodology (fig. 1) for the educational structures in Europe produced very relevant results. The most important of these is setting out the competences and abilities to be achieved by the bachelor and master graduates and asset of recommendations for doctorate program.

The dialogue and cooperation of landscape universities and also the communication with professional organizations at national level and public authorities in the frame of Le Notre project allowed outlining the harmonization and convergence modalities of European landscape education programs.

Academic study programs built up on common references basis and agreed competences will allow European recognition of the diplomas and facilitate future employment of the graduates all over Europe.

The success of LE NOTRE first project led to the approval of a second one (Le Notre II, 2006 – 2009), aiming the dissemination of previous project results with the view of their implementation in to European landscape schools, especially those concerning program quality assurances. LE NOTRE TWO, involving over 100 partner universities, continues the process of transforming landscape architecture into an open, outward-looking and dynamic European discipline.

Since the coming into force of European Landscape Convention in 2004 which calls for signatory states to educate and exchange specialists in the field, Le Notre has played a growing part in the activities surrounding its implementation and Le Notre Two seeks o reinforce this role.

Five distinct objectives have been identified:

1. Transforming 'Tuning' into an ongoing process.
2. Integrating individual members of stakeholder organizations into the project.
3. Strengthening links between teaching and research;
4. Reaching out to the context of landscape architecture education;
5. Broadening its basis within society as a whole.

Being a member of ECLAS and partner in these two "Le Notre" projects landscape school (department) of the Faculty of Horticulture – University of Agronomical Sciences and Veterinary Medicine Bucharest implemented in its activity most of the recommendations issued from these collaboration European universities.

Direct European cooperation our school is carrying on in the frame of another program ERASMUS – bilateral agreements (since 2003) with Haute Ecole Charlemagne, Liege, Belgium based on exchanges of students and teachers.

The improvement of teaching and research programs showed a continuous progress of the students results in the specialty. Among the achievements of the school are the students' participation in international workshops organized by the "Intensive Program Socrates" Bucharest, the International Summer University Sibiu, the Transylvania Trust in Bontida (restoration of Banffy palace gardens) and internationals workshops organized by our school together with French Cultural Centre (CCF) and Urban Transition Association (ATU) at Iasi. As well, last years students and teachers organized or participated in international project designs exhibitions (Bucharest, Iasi).

With the view of acquiring professional experience, landscape students are doing practical training in specialized firms and alone or together with teachers are involved landscape design projects for the public authorities and private companies. The most relevant success of the landscape school of Bucharest Faculty of Horticulture, established in 1998, is the professional employment of graduates amounting more than 63% of its first four series of graduates, taking in account that their profession is recently officially recognized in Romania.

CONCLUSIONS

1. The present and future generations of landscape engineers and architects of all Romanian landscape schools have the important mission to implement in practice the requirements of the European Landscape Convention, a challenge for a better life in our country and in Europe.

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Figures

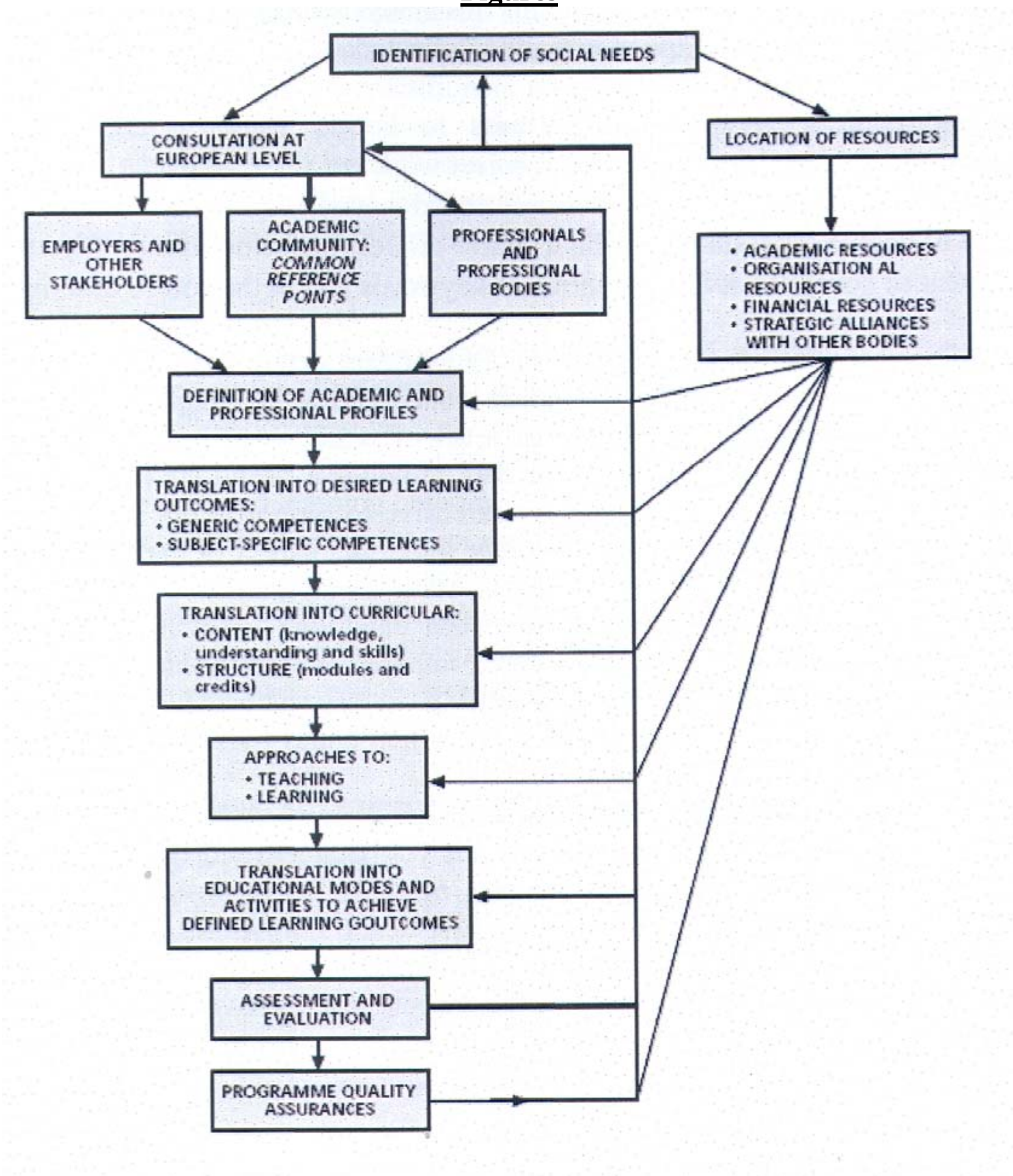

Fig. 1. The Tuning Model for European Comparable Degrees

Fig. 2. Students' work

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RESEARCHES REFERRING BIODIVERSITY OF APPLE ORCHARD FROM RESEARCH AND DEVELOPMENT ORCHARD STATION – BĂNEASA

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Keywords: Biodiversity, apple orchard, fauna, yellow sticky traps

ABSTRACT

Biological diversity represents a specific particularity of the earth life, which assure optimal functionality of ecosystems, existence and functionality of biosphere, in generally. But, in the last time, the problem of preserving biodiversity at the level of ecosystems, species, populations and genes, become more and more evident due to increasing of human activity on biosphere. In this respect, maintaining of biodiversity is necessary not only for actual life assurance, but even for the next generations, because it preserve the global and regional equilibrium, guarantee regeneration of biological resources and maintaining of a proper quality of environmental which is the guaranty of society evolution.

Purposes of the researches which are at the base of this presentation, is to: establishing of fauna structure on arthropod communities, at the epigeic level from tree level; grouping arthropod species in useful and damaging; characterising of invertebrate communities from point of view of abundance.

INTRODUCTION

Apple orchards are considered stable ecosystems, with precise interrelations between different trophic chains in which natural factors play an essential role. Disequilibrium between effectives of different populations, part of them being considered, by human as pest, part of them useful, usually named ”natural enemies of pests”, impose a change in strategy of pest control, which give importance to the maximizing natural control factors, and to orientation of control measures to the less polluted methods.

MATERIALS AND METHODS

Researches were done during April-June 2006, at Research and Development Orchard Station – Băneasa, in a 7 year apple orchard with rows without weeds which alternate with rows with grass. In the period of vegetative repose, were done autumn plowing on rows without weeds. Cutting branches for forming and growing apples were done early in the spring before vegetation starting.

Variants have 3/4/2 m distance and 60-76 trees/row, in principal composed by varieties: Florina, Prima, Ionagored, Surprase, and Pionier.

Purposed objectives:

- Establishing fauna captured in yellow sticky traps type Pherocone AM/72 cm^2, traps which were putted in tree (fig. 1);
- Establishing fauna captured in Barber traps for fauna at the soil level (fig. 2);
- Establishing the most important diseases or apple trees (fig. 3).

Collected material was carried in the laboratory, preserved in 70^0 ethylic alcohols and identified.

Quantitative and qualitative evaluation of epigeic fauna, was done by capturing, in pitfall traps (Barber), in 5 replicates, opened for 7 days, during May –September, resulted area was de 136,0248 cm^2 or 0,0136024 m^2 . The distance between traps was 50 m and traps were filed 2/3 with formalin 3-4%. Also were installed yellow sticky traps (Pherocone AM), 3 traps/variant, traps were replaced after a week, captures were determined and registered. At the same date (once/week), was done a visual counting of the main pest and diseases, taking in account their evolution in orchard.

Taking in consideration that no all the specimens could be identified till the species level, this was done till the level of genus, family, order or classes.

RESULTS AND DISCUSSIONS

Abundance of invertebrate fauna from samples collected in Barber traps

In April from collected material of epigeic fauna, were identified 24 species or groups of arthropods which belong to: *Myriapoda*, *Crustacean*, *Insect* and *Arachnids* (table 1). The biggest part of the entomofauna present la the soil level belongs to *Insect*. From these the biggest relative abundance was registered by the species of *Carbides* family (73%), followed by *Lycosides* (60%), *Trombiculides* (54%), *Staphylinidae* (37%), *Iulidae* and *Formicidae* (27%).

In May from collected material of epigeic fauna, were identified 22 species or groups of arthropods which belong to: *Myriapoda*, *Crustacean*, *Insect* and *Arachnids* (table 2). From these the biggest relative abundance was registered by the species of *Iulidae* family (45 specimens), *Formicidae* (45 specimens) and *Carabidae* (33 specimens).

In June from collected material of epigeic fauna, were identified 32 species or groups of arthropods which belong to Myriapoda (*Scolopendra* sp.), Chilopoda (*Porcelio scaber*), Arachnida (*Lycosidae*), and Insecta (*Collembola*, *Orthoptera*, *Homoptera*, *Heteroptera*, *Coleoptera*, *Hymenoptera*, *and Diptera*). (table 3). From these the biggest relative abundance was registered by the species of *Formicidae* family (119 specimens) followed by *Carabidae* (39 specimens) and *Diptera – Brachicera* (89 specimens).

Abundance of invertebrate fauna from samples collected in Yellow Sticky Traps (type Pherocone AM)

Fauna collected in yellow sticky traps (Pherocone AM) in April was formed by 226 invertebrates (table 4), belonging to the following orders: *Orthoptera* – 2 (0.8%); *Heteroptera* – 9 (3.9%); *Thysanoptera* – 41 (18.1%); *Homoptera* – 25 (11%); *Neuroptera* – 3 (1.3%); *Coleoptera* – 28 (12.3%); *Hymenoptera* – 31 (13.7%); *Lepidoptera* – 29 (12.8%); *Diptera* / *Nematocera* – 37 (16.3%); *Diptera*/*Brachicera* – 21 (9.3%).

Fauna collected in yellow sticky traps (Pherocone AM) in May was formed by 488 specimens, useful and damaging (table 5). The biggest absolute abundance belong to the following orders: *Diptera* (281 specimens), *Homoptera* (85 specimens), *Coleoptera* (80 specimens).

Fauna collected in yellow sticky traps (Pherocone AM) in June was formed by 2,135 specimens, useful and damaging (table 6). The biggest absolute abundance belong to the following orders: Thysanoptera, Homoptera (*Aphididae, Cicadellidae*). Useful fauna has increased, most common being predator species (*Orius* sp, *Stethorus punctillum*, *Lycosidae*) and parasites species (*Calcidoidae*, *Braconidae*, *Ichneumonidae* and *Sciaridae*).

Observations referring to the diseases identifications

Taking into consideration the diseases which appeared in studied variants, observations were carried in different phonological stages of apple orchard (in spring), when all the buds were started to grow, from each varieties, from all cultivars, were analysed 1 tree from 5. Studied cultivars are resistant to powdery mildew and apple scab, excepted cultivar Ionagored where it was observed that there is a reserve of infected leaves with symptoms of apple scab (*Venturia inequalis*). At observed cultivars it was registered that exist a reserve of stone fruits (*Monilinia fructigena*, formed by diseased fruits on the soil surface, bat in this stage of vegetation didn't arise problems for the future fruits.

Taking into consideration that was done the cutting of diseased branches, in orchard, there were no identified sources of spreading of fire blight (*Erwinia amylovora*).

CONCLUSIONS

1. Fauna captured in apple orchard in Barber traps and yellow sticky traps, type Pherocone AM, was rich and diversified, in April, 573 specimens, in May, 743 and in June, 2742 specimens, most abundant belonging to the classes: *Myriapoda*, *Crustacea*, *Arachnida* and especially *Insecta*, it has to be underline that number of captured specimens arise with tree vegetation and of course with time;
2. Comparing the total fauna captured at the soil level in Barber traps with those captured in yellow sticky traps, at the leaves level, the last was more numerous with many predator and parasite specimens;
3. The most common predator species were spiders from *Lycosidae* family, at the soil level and species of *Coccinellidae*, at the leaves level;
4. Parasites insect species were well represented being captured only in the yellow sticky traps, belonging, especially to the order *Hymenoptera*, superfamily *Chalcidoidea*.

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Table 1. Species of invertebrate fauna from samples collected in Barber traps during 5-12 April 2006

No.	Systematic (species, family, order, class)		Numeric abundance (no.)	Relative abundance (%)
1.	*Scolopendra* sp.	*MYRIAPODA*	2	0.6
2.	*Lithobius forficatus* Gem.	*Chilopoda*	5	1.4
3.	*Tachypodoiulus niger* Fran.	*Iulidae/Diplopoda*	27	7.7
4.	*Porcellio scaber* Latr.	*Porcellionidae/Isopoda/ CRUSTACEA*	10	2.8
5.	*Alopecosa pulverulenta* Dunk.	*Lycosidae/ Araneae/ARACHNIDA*	60	17.3
6.	*Trombidium holosericeum* Sam.	*Trombiculidae/Acari*	54	15.5
7.	*Collembola*	*INSECTA*	4	1.1
8.	*Carabidae*	*Coleoptera/INSECTA*	73	21.9
9.	*Bembidion properans* Steph.	*Carabidae /Coleoptera*	1	0.2
10.	*Amara aenea* De Geer.	*Carabidae /Coleoptera*	2	0.6
11.	*Staphylinidae*	*Coleoptera*	37	10.6
12.	*Coccinella 7-punctata* L.	*Coccinellidae/Coleoptera*	1	0.2
13.	*Longitarsus parvulus* Payk	*Chrysomelidae/ Coleoptera*	1	0.2
14.	*Sitona cachecta* Gyll.	*Curculionidae/ Coleoptera*	1	0.2
15.	*Ceuthorrynchus* sp.	*Curculionidae/ Coleoptera*	1	0.2
16.	*Opatrum sabulosum* L.	*Tenebrionidae/Coleoptera*	2	0.6
17.	*Scarabeus* sp.	*Scarabeidae/Coleoptera*	1	0.2
18.	*Hyalesthes obsoletus* Sign.	*Cixiidae/Homoptera*	5	1.4
19.	*Javesella pellucida* Fabr.	*Delphacidae/Homoptera*	2	0.6
20.	*Calcidoidea*	*Hymenoptera*	11	3.2
21.	*Braconidae*	*Hymenoptera*	1	0.2
22.	*Formicidae*	*Hymenoptera*	27	7.7
23.	*Brachicera*	*Diptera*	14	4.0
24.	*Itonididae*	*Diptera*	5	1.4
	TOTAL		**347**	**100**

Table 2. Species of invertebrate fauna from samples collected in Barber traps during 3-10 May 2006

No	**Systematic (species, family, order, class)**	**Probe 1**	**Probe 2**	**Probe 3**	**Probe 4**	**Probe 5**	**Total**
1.	***VERTEBRATA/Reptilia/ Squamata/ Lacertidae*** / *Lacerta agilis* L.	0	0	3	0	2	**5**
2.	**CHILOPODA /** *Lithobius forficatus* Gem.	2	0	0	0	0	**2**
3.	**DIPLOPODA/*Iulidae/****Tachypodoiulus niger* Fran.	9	4	8	17	7	**45**
4.	**ARACHNIDA/*Araneae/ Lycosidae/****Alopecosa pulverulenta* Dunk.	8	0	5	6	3	**22**
5.	***Trombiculidae/Acari/*** *Trombidium holosericeum* Sam.	2	4	3	5	9	**23**
	INSECTA						
6.	**COLLEMBOLA**	4	0	0	0	4	**8**
7.	**ORTHOPTERA/***Gryllotalpa gryllotalpa* Latr.	1	0	0	0	2	**3**
8.	***HOMOPTERA/****Javezela pelucida* Fabr.	2	0	0	1	0	**3**
9.	***HEREOPTERA/ Cydmidae*** *Tritomegas bicolour* Schw.	0	0	2	1	0	**3**
10.	***Carabidae*** /*Carabus* sp (larvă)	1	0	0	0	0	**1**
11.	*Harpalus distinguendus* Dftsch.	2	5	15	6	0	**28**
12.	*Harpalus cupreus* Duft.	0	0	0	1	0	**1**
13.	*Amara aenea* De Geer.	0	0	0	1	0	**1**
14.	*Bembidoin properans* Steph.	1	0	0	1	0	**2**
15.	***Curculionidae/*** *Anthonomus* sp.	0	1	0	0	0	**1**
16.	***Staphylinidae***	2	0	3	3	3	**10**
17.	**HYMENOPTERA/*Formicidae***	16	8	9	6	6	**45**
	DIPTERA						
18.	***Brachicera***	4	7	2	0	6	**19**
19.	***Itonididae***	3	0	0	0	0	**3**
20.	***Chironomidae***	0	0	0	3	2	**5**
21.	***Sciaridae***	0	0	2	2	0	**4**
22.	***Culicidae***	0	0	0	0	2	**2**
	TOTAL						**255**

Table 3. Species of invertebrate fauna from samples collected in Barber traps during 7-13 June 2006

No.	Systematic (species, family, order, class)	Probe 1	Probe 2	Probe 3	Probe 4	Probe 5	Total
1.	**MYRIAPODA**/*Scolopendra* sp.	0	1	1	0	0	**2**
2.	**CRUSTACEA**/ *Porcellionidae/Isopoda Porcellio scaber* Latr.	2	0	2	0	0	**4**
3.	**DIPLOPODA** / *Iulidae/Tachypodoiulus niger* Fran.	10	6	4	7	12	**39**
4.	**ARACHNIDA**/ *Araneae/ Lycosidae Alopecosa pulverulenta* Dunk.	13	32	9	6	7	**67**
5.	*Trombiculidae/Acari Trombidium holosericeum* Sam.	9	3	3	1	7	**23**
	INSECTA						
6.	**COLLEMBOLA**	10	1	3	2	2	**18**
7.	**NEUROPTERA*/ Chrysopidae*** *Chrysopa carnea Steph*	0	1	0	0	0	**1**
8.	**THYSANOPTERA**	5	0	0	0	0	**5**
9.	***HETEROPTERA/Tingitidae*** *Stephanitis pyri* Fabr.	1	0	0	0	0	**1**
10.	**HOMOPTERA** ***Delphacidae/****Javezela pelucida* Fabr.	6	4	2	10	3	**25**
11.	***Aphididae***	25	2	7	3	13	**50**
12.	***Cicadellidae/****Cicadella viridis* L.	0	0	0	1	0	**1**
13.	***Heteroptera/*** *Myridae/Lygus pratensis* L.	1	0	1	0	0	**2**
	COLEOPTERA						**135**
	Carabidae						**99**
14.	*Carabus* sp (larvă)	5	1	5	4	4	**19**
15.	*Harpalus distinguendus* Duft.	13	4	3	6	10	**39**
16.	*Harpalus aeneus* L.	9	11	5	4	2	**31**
17.	*Amara aenea* De Geer	6	1	2	0	1	**10**
18.	**Nitidulidae**/*Meligethes aeneus* Fabr.	1	0	0	0	1	**2**
19.	**Curculionidae**/*Anthonomus* sp.	1	0	0	2	0	**3**
20.	**Pseliphidae**/*Pselaphus* sp.	0	1	0	0	0	**1**
21.	**Coccinellidae**/*Coccinella 7-punctata* L.	1	0	0	0	0	**1**
22.	**Silphidae**/*Siplha* sp.	3	0	0	0	0	**3**
23.	***Staphylinidae***	8	3	4	10	1	**26**
	HYMENOPTERA						
24.	***Formicidae***	28	18	35	22	16	**119**
25.	***Ichneumonidae***	0	2	1	0	0	**3**
26.	***Chalcididae***	4	1	0	3	1	**9**
27.	***Braconidae***	1	0	0	1	0	**2**
	DIPTERA						
28.	***Agromyzidae***	7	23	20	18	15	**83**
	Chloropidae						
29.	***Itonididae***	1	0	0	0	2	**3**
30.	***Sciaridae***	3	4	0	1	0	**8**
31.	***Culicidae***	1	1	0	1	4	**7**
	TOTAL						**607**

Table 4. Species of invertebrate fauna from samples collected in Yellow Sticky Traps (type Pherocone AM) during 5-12 April 2006

ORDER	Var. 1	Var. 2	Var. 3	Var. 4	Var. 5	TOTAL
Orthoptera	1	0	1	0	0	**2**
Heteroptera	2	1	0	5	1	**9**
Thysanoptera	5	7	8	10	11	**41**
Homoptera	6	3	7	4	5	**25**
Neuroptera	1	2	0	0	0	**3**
Hymenoptera	8	5	6	5	7	**31**
Coleoptera	8	6	5	5	4	**28**
Lepidoptera	5	7	2	8	7	**29**
Diptera /Nematocera	6	7	7	9	8	**37**
Diptera/ Brachicera	5	3	2	6	5	**21**
TOTAL	***47***	***41***	***38***	***52***	***48***	**226**

Table 5. Species of invertebrate fauna from samples collected in Yellow Sticky Traps (type Pherocone AM) during 3-10 May 2006

No.	Systematic (species, family, order, class)	Probe 1	Probe 2	Probe 3	Probe 4	Probe 5	Total
	HOMOPTERA						**85**
1.	***Aphididae***	10	12	1	1	8	**32**
2.	***Cicadellidae/*** *Empoasca* sp.	8	0	1	0	0	**8**
3.	***Delphacidae/****Javesella pellucida* F.	0	0	0	1	0	**1**
4.	**THYSANOPTERA**	7	12	4	10	11	**44**
	COLEOPTERA						**80**
5.	***Lariidae*** *Spermophaeus sericeus* Geof	3	0	2	0	0	**5**
6.	**Cantharidae**	1	0	0	0	0	**1**
7.	**Coccinellidae**						
8.	*Stethorus punctillum* Weise	23	15	14	8	9	**69**
9.	*Halyzia sedecimguttata* L.	1	0	1	0	0	**2**
10.	*Propylea 14-punctata* L.	0	2	0	0	0	**2**
11.	***Elateridae/*** *Adrastus* sp.	0	0	0	0	1	**1**
	HYMENOPTERA						**42**
12.	***Tenthredinidae*** *Hoplocampa testudinea* L.	1	2	0	1	0	**4**
13.	***Calcidoidea***	1	8	14	3	10	**36**
14.	***Braconidae***	1	0	0	1	0	**2**
	DIPTERA						**281**
15.	***Brachicera***	17	28	23	21	23	**112**
16.	***Sciaridae***	3	1	2	0	0	**6**
17.	***Chironomidae***	14	4	10	13	13	**54**
18.	***Itonididae***	10	15	29	32	23	**109**
	TOTAL						**488**

Table 6. Species of invertebrate fauna from samples collected in Yellow Sticky Traps (type Pherocone AM) during 7-13 June 2006

No.	Systematic (species, family, order, class)	Probe 1	Probe 2	Probe 3	Probe 4	Probe 5	Total
1.	**ARACHNIDA/** *Araneae/ Lycosidae*	10	10	2	1	2	**25**
2.	**COLEMBOLLA**	33	0	0	5	0	**38**
	HETEROPTERA						
3.	*Orius* sp.	0	0	0	2	0	**2**
4.	**MECOPTERA/*Panorpidae*/** *Panorpa* sp	0	1	2	0	0	**3**
	HOMOPTERA						
5.	***Aphididae***	189	240	57	37	31	**554**
6.	*Psylla* sp.	3	9	6	5	2	**23**
7.	***Cicadellidae***	6	8	2	5	1	**22**
8.	*Empoasca solani* Curtis	11	8	2	6	2	**29**
9.	*Trialeurodes vaporariorum* West.	1	3	0	3	0	**7**
10.	**THYSANOPTERA**	118	112	82	36	33	**381**
	COLEOPTERA						
11.	**Staphylinidae**	0	3	1	2	0	**6**
	Coccinellidae						
12.	*Stethorus punctillum* Weise	3	1	0	1	2	**7**
13.	*Coccinella bipunctata* L.	1	0	0	0	0	**1**
14.	***Buprestidae/*** *Anhtaxia sp.*	2	0	2	1	0	**5**
15.	***Nitidulidae /*** *Meligethes aeneus* Fabr.	8	4	6	2	0	**20**
	LEPIDOPTERA						
16.	***Tortricidae***	0	0	0	3	0	**3**
	HYMENOPTERA						
17.	***Calcidoidea***	24	17	24	13	11	**89**
18.	***Braconidae***	1	2	1	3	2	**9**
19.	***Ichneunomidae***	0	4	0	2	0	**6**
20.	*Apis melifica* L.	1	0	0	0	0	**1**
	DIPTERA						
21.	***Agromyzidae***	25	22	31	38	33	**149**
22.	***Chloropidae***	71	27	169	41	79	**387**
23.	*Sciaridae*	61	35	35	113	24	**268**
24.	*Chironomidae*	2	2	0	0	0	**4**
25.	*Itonididae*	19	13	22	21	10	**85**
26.	*Culicidae*	3	0	1	2	0	**6**
27.	**EPHEMEROPTERA**	3	0	0	1	0	**4**
	TOTAL						**2135**

Figures

Fig.1. Installing yellow sticky traps (type Pherocone AM)

Fig.2. Installing Barber traps

Fig. 3. Observations of diseases

SISTEME DE PLANTARE ŞI FORME DE COROANĂ ÎN POMICULTURA MODERNĂ

PLANTING SYSTEMS AND TREES CANOPY IN MODERN FRUIT GROWING

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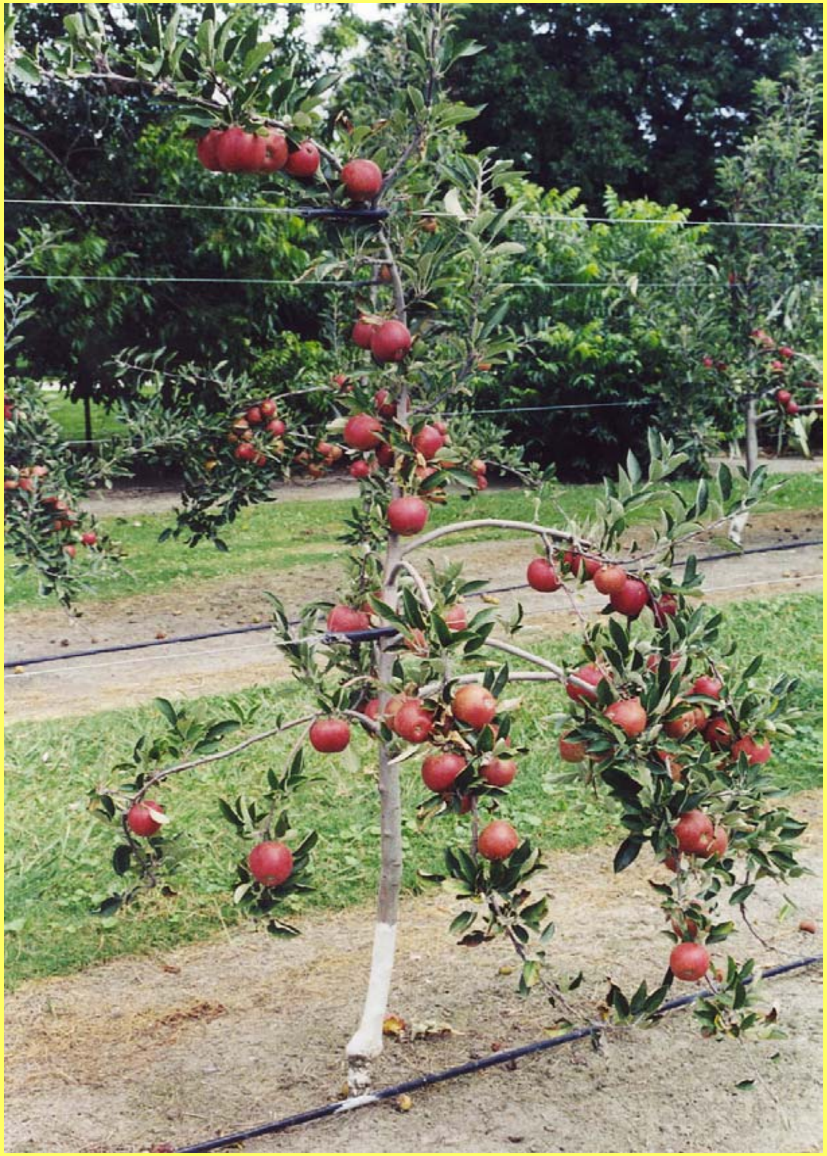
Pal Spindle - Vertical Axis

Pillar



Gala/M 9

Hedgerow Systems

- Central leader
- Italian palmette
- Parallel ‘V’
- Vertical hedge

Good for picking platforms, training problems, poor light distribution, 4-5 m tall.

SuperSpindle

Italian palmette

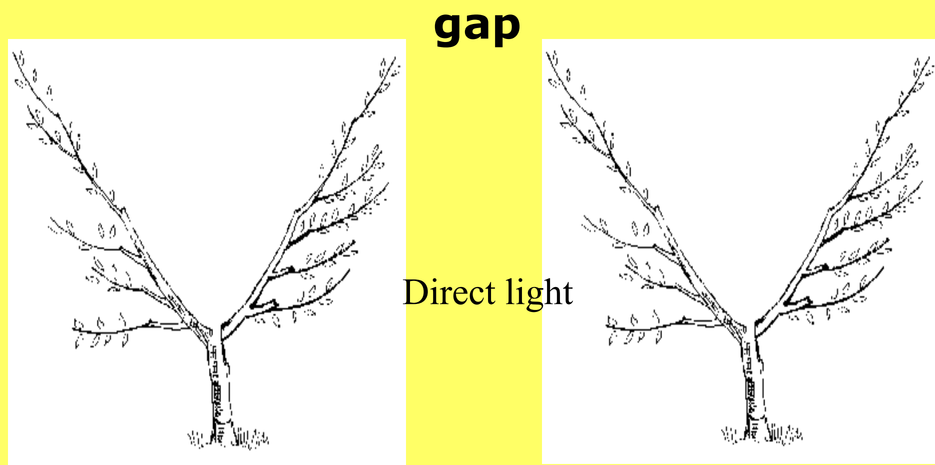
Parallel V

Cordon System

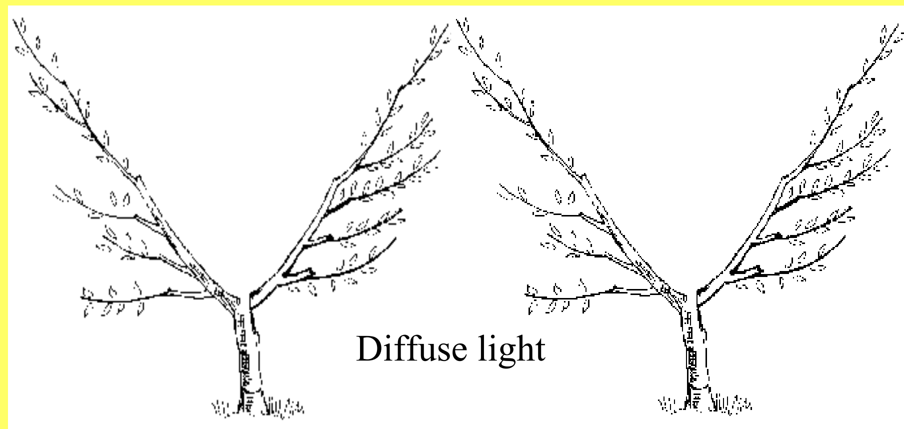
2.0-2.5 m tall, heavy pruning stimulates too much vegetative growth, poor fruit set, difficult to manage.

Bush vase →Tatura

Open ‘V’ systems: Tatura trellis, Perpendicular ‘V’, 4-5 m tall



Tatura, KAC V



Sibari Y – single tree

Sibari Y – double tree

Tatura

Sibari Y

The inclined double walls: a family of planting systems

Planting system	Spacing (m)	Density (trees/ha)	Tree height (m)	Gap width (m)	Arms angle	Trellising
KAC-V	**5-6 x 2**	**833 - 1000**	**4**	**2**	**25°**	**No**
Tatura trellis	**5-6 x 1**	**1666 - 2000**	**4**	**2**	**30°**	**Yes, heavy**
Sibari Y	**4.5 x 2**	**1100**	**2.8**	**0**	**40-50°**	**Yes, light**

V System

Y System

Traditional Open Vase System

good light, good access, 4-5 m tall

Delayed vase
Bush vase

Second – third leaf

First leaf

Adult tree

Horticultural aspects (delayed vase):

(+) Higher productivity than traditional vase

(+) Low investment costs and easy canopy management

(+) Suitable for a “low-inputs” (sustainable and organic) peach culture

(-) low potential of light interception (LAI: 1.5 – 2.2)

Horticultural aspects

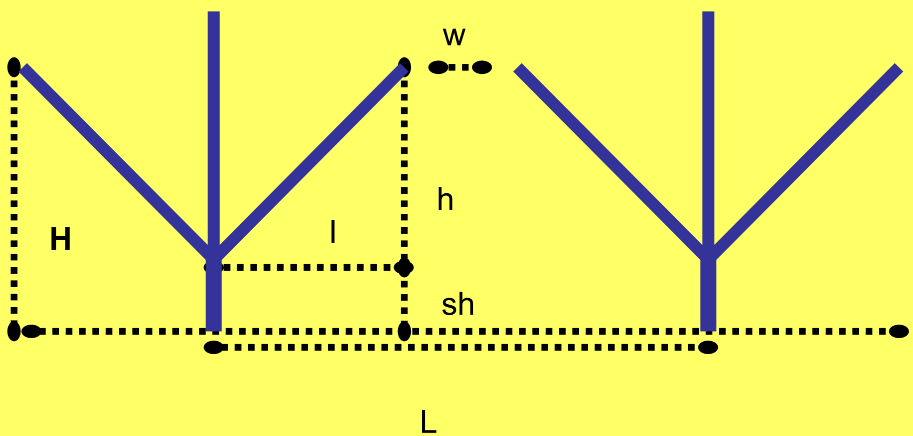
Sibari Y vs. Delayed Vase

	Mid-season ripening varieties	Sibari Y (1111 trees/ha)	Delayed vase (416 trees/ha)
Highest yields observed in peach orchards in South Italy	(t/ha)	50	32
High handlabour requirements	(hrs/ha)	1113	519
	(hrs/ton)	22	16

Trident

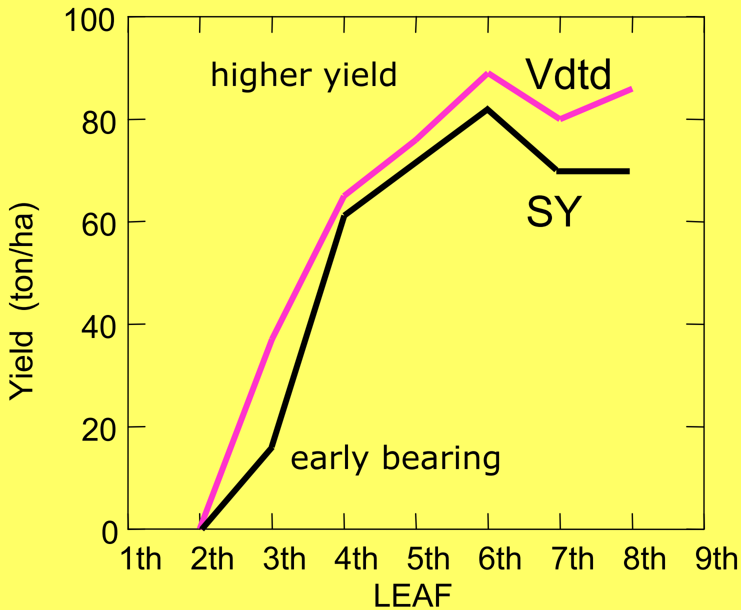
low investment costs for trellising

low pruning at 1-3 leaf
early bearing

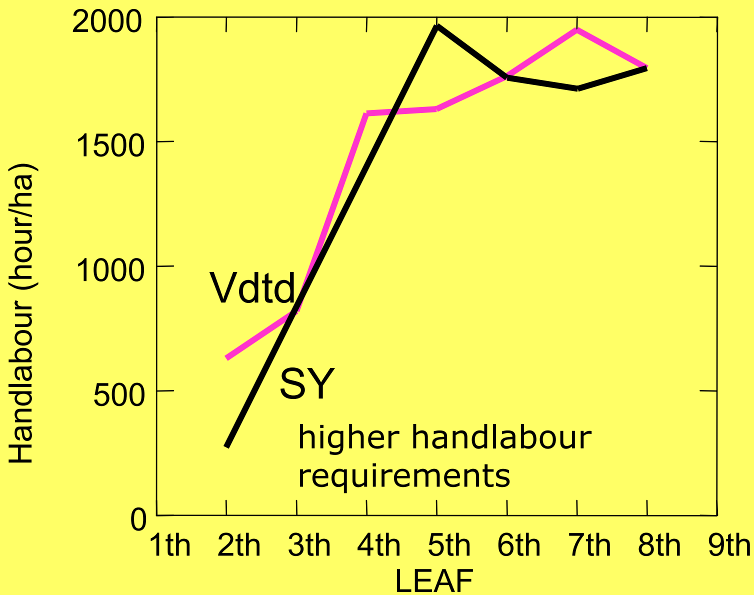


5 x 3m, 670 trees/ha
tree height: 2.3m
Gap width: 1.5m
Branch angle: 45°

V double tree (Vdt) vs. Sibari Y (SY) *cv Venus*



V double tree density
4.5 x 1.0 m, 2222 trees/ha
Tree height: 2.8 m
No gap
Branch angle: 50°
Trellising: yes



Handlabour (%) for canopy management

(4th-8th leaf orchard)

Planting system	Pruning	Thinning	Harvesting
Vdt (2222 trees/ha)	30	22	47
SY (1111 trees/ha)	23	19	58


V double tree density


V - Quad

SOLAXE

6-year-old 'Fuji'/M.9

Bush Cordon

Bush Vase

Drilling system

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VEGETABLE GROWING

RESULTS CONCERNING THE INFLUENCE OF PROTECTION WITH AGRIL ON EARLY POTATO CROP

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Keywords*:* Impala, Aladin, Cosmos, protection with agril, potato crop

INTRODUCTION

Potato crop for early consumption is one of the most lucrative ones for the Romanian farmers; they use it both as an aliment for their own consumption and as goods for sale on the internal market (Berindei M., 1984, Draica C-tin., 1998).

The potato crop has a high productivity potential and a great adaptability to various ecological demands; in Romania the total growing field area is of 280 thousand hectares and the total production rises to about 4 thousand tones per year. The locality of Brezoaele, lying in the Dambovița County at 30 km from Bucharest, is one of the most important early potato-growing areas in our country.

Paralleling the major changes in economic conditions, equipment, scientific advance the technology to be applied should be continuously updated in order to reduce production costs and to attain a sensible resource use (Ianoşi, 2002).

Among the measures taken to enhance the economic efficiency of the potato crop, the AGRIL polyethylene sheet protection is the easiest and less costly; it allows reaping the crop at least 15 days in advance and it favours a production rise of 10-25% (Ciofu R. şi colab., 2004).

The present research paper lays the overview of the results of an experiment focused on establishing the influence which the AGRIL sheet protection has on certain potato variety in early crop in the southern Romania.

MATERIAL AND METHOD

The experiment took place in the locality of Brezoaele with early potato crop, on a mixed clay and sand soil; it was organised according to the stored-block method, in 4 subsequent crops on a total surface of 2000 mp.

The experiment has a fundament on two factors, as reads below:

The A factor, the crop system, had two stages:

a1 – the traditional unprotected crop, and

a2 – the AGRIL sheet protected crop

The B factor, the varieties, consisting of three stages:

b1 – Impala

b2 – Aladin

b3 – Cosmos

The combination of the 2 factors resulted in 6 variants which were subject to a comparison exercise with the means of the two crop systems.

The agrotechnics which was applied was in accordance with the indications regarding the early potato crop technology, with the following characteristics:

Planting 47 thousand tubers per hectar on the 24.03. Fertilisation procedures with Polifid were applied on the planting and during the vegetation period (100 kg/ha); mildew and the Colorado beetle control measures were taken (Calipso 0.1l/ ha and Equation 0.4 kg/ ha) as well as erbicidation with Sencor – 0.7 kg/ ha.

OBSERVATIONS AND DETERMINATIONS

- the sproutin percentage – on every decade, at each crop and varieties;
- plant growing by measuring 10 plants per each crop;
- the production was determined by weighing every 5 check-rows per crop per hectar;
- the mathematic interpretation of the results was processed by the multiple comparison method – the Tukey test;
- the profitability was analyzed by means of specific indicators: the profit as an absolute indicator in RON/ha; the profit per unit (per kg) and the profit rate as a relative indicator in percentage. The total expenses include the expenses incurred by the AGRIL sheet and the manual work.

RESULTS OBTAINED

Within 2 weeks from planting the protected field had 20-65% sprouting, as compared to 15-50% sprouting of the unprotected field (table 1).

During the next 10 days the differences between the two crop systems were maintained (80-100% as compared to 60-100%)

The Impala variety showed the quickest sprouting pace both in the protected field and in the unprotected one (65% and respectively 50%), as compared with the Aladin variety which was the slowest to sprout (7.5-10% in the two crop systems).

As a rule, the number of days needed from planting to full 100% sprouting was smaller with the plants on the protected field (25-31), as opposed to the 25-35 on the unprotected field.

The Impala variety was the quickest in sprouting (25 days), with no influence from the protection system, whereas with the Cosmos variety the AGRIL sheet led to a 5 days reduction of the sprouting period. The biggest number of days from planting to full sprouting was recorded with the Aladin variety, with a difference of 4 days in favour of the protected crop field.

The protection system resulted in a rise of the growing pace. At the beginning of the vegetation (18.04) the protected plants were as an average 9.76 cm high, as compared to the unprotected ones which were 7.03 cm. (table 2)

During April and May, the differences between the protection variants were maintained between 2.73 cm – 6.87 cm; due to a better course in the weather conditions, from the beginning of June these differences were considerably reduced (0.24 – 0-86 cm), and rendered the protection of the crop fields unnecessary.

With a view to an extra-early profitability (after 67 days from planting), on the first reaping there was an average production of 0.423 kg/plant, as compared to 0.342 kg/plant with unprotected crop field (table 3)

The earliest variety was the Impala, which yielded 0.242 kg/plant and respectively 0.191 kg/plant more than the average in the two systems. By comparison the Aladin variety was the slowest one.

The advantage of the AGRIL protection was rendered obvious during the reaping for an early profit (at 77 days from planting), when the production rose to 1.580 kg/plant, with 0.373 kg/plant more than with the unprotected crop fields.

There is a significant production difference between the two crop systems (16.55 t/ha).

With the unprotected crop fields the production rises which were recorded with the Impala (6.61 t/ha) and Cosmos (15.16 t/ha) as compared to the system average are not significant; with the Aladin variety the production was considerably lower (with a difference of - 21.76 t/ha).

By comparison, the protected crop fields yielded a more consistent production with all varieties, with significant differences from the system average with the Impala (24.87 t/ha) and Cosmos (27.17 t/ha) varieties, and unsignificant with the Aladin variety.

The potato varieties have a specific reaction to the AGRIL protection. Therefore, with respect to the extra-early production, the Impala variety proved the least sensitive to the AGRIL protection, whereas the Aladin variety had the most consistent reaction to it.

At the early crop, having been subject to the AGRIL protection for a longer period of time, the differences recorded between the two crop systems were more consistent with all the varieties under research.

The AGRIL protection had a favourable influence on the technical and economic indicators of the early potato crop (table 4).

On the protected fields, the rise in the production with 16.55 t/ha led to an extra income of 9.930 Ron.

The profitability indicators at the early potato production were higher when the AGRIL protection technique was applied than those of the traditional crop fields: the profit rose to 4.530 Ron/ha, the profit per unit increased to 0.02 and the profit rate went up to 7.7%.

CONCLUSIONS AND RECOMMENDATIONS

1. The AGRIL protection of the field after sowing had a favourable influence on the sprouting of the potato plants; the Impala variety records the highest sprouting percentage (65%)
2. The number of days needed from sowing to full sprouting was 4-10 days smaller on the protected fields as compared with the unprotected ones.
3. The AGRIL protection resulted in a rise of the growing pace, more intensely at the beginning of the vegetation period (April-May).
4. There is a significant production difference recorded between the two crop systems (16.55 t/ha). As compared to the unprotected fields, there were significant differences with the Impala and Cosmos varieties, and insignificant differences with the Aladin variety.
5. The potato varieties under research proved a specific reaction to the AGRIL protection, the Aladin variety being the most sensitive to this influence.
6. The AGRIL protection triggered a rise of profitability of the early potato crop: the rise of the profit with 4.530 RON/ha and the profit rate with 7.7%.
7. It is advisable to use the AGRIL sheet to protect early potato and achieve the best results in cultivating potato varieties.

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Table 1. The Variety influence and the AGRIL sheet protection influence on sprouting

Crop system /variety	**08.04**		**18.04**	
	Plant no.	**%**	**Plant no.**	**%**
V1 unprotected-Impala	2	50	50	100
V2 unprotected- Aladin	7.5	15	30	60
V3 unprotected- Cosmos	15	30	45	90
V4 protected- Impala	32.5	65	50	100
V5 protected- Aladin	10	20	40	80
V6 protected-Cosmos	25	50	50	100

Table 2. Plant Growing Dynamics

Variant /Variety	18.04		28. 04		06.05		16.05		26. 05		05. 06		15. 06	
	cm	**diff**	**cm**	**diff**	**cm**	**diff**	**cm**	**diff**	**cm**	**diff**	**cm**	**diff**	**cm**	**dif**
unprotected V1-Impala	11.4	4.37	15.4	-3.76	24.6	1.16	41.1	1.6	51.2	0.44	62.3	-4.1	69.9	-17.26
V2- Aladin	3.6	-3.43	20.1	0.94	22.1	-3.66	36.6	-2.9	48.9	-1.86	74.4	8	98.1	10.94
V3- Cosmos	6.1	-0.93	22.0	2.84	30.6	4.84	40.8	1.3	52.2	1.44	62.5	-3.9	93.5	6.34
mean	**7.03**	**-**	**19.16**	**-**	**25.76**	**-**	**39.5**	**-**	**50.76**	**-**	**66.40**	**-**	**87.16**	**-**
protected V1-Impala	13.0	3.24	15.3	2.1	30.2	0.04	48.2	4.94	56.6	-1.03	62.9	-4.36	78.7	-7.7
V4- Aladin	6.5	-3.26	9.4	-3.8	26.4	-3.76	37.2	-6.06	62.4	4.77	74.1	6.84	86.4	0
V3- Cosmos	9.8	0.04	14.9	1.7	33.9	3.74	44.4	1.14	53.9	-3.73	64.8	-2.46	94.1	7.7
mean	**9.76**	**-**	**13.20**	**-**	**30.16**	**-**	**43.26**	**-**	**57.63**	**-**	**67.26**	**-**	**86.40**	-

Table 3 The Influence of the Variety and of the AGRIL Protection on the Early Potato Production

Crop system /variety	05.06.2006		15.06.2006	
	Kg/pl	**Difference**	**Kg/pl**	**Difference**
Unprotected V1 - Impala	0.584	0.242	1.340	0.133
V2 - Aladin	0.225	-0.117	0.765	-0.442
V3 - Cosmos	0.218	-0.124	1.505	0.298
mean	**0.342**	**-**	**1.207**	**-**
AGRIL Protected V4 - Impala	0.614	0.191	1.757	0.177
V5 - Aladin	0.375	-0.048	1.177	-0.403
V6 - Cosmos	0.281	-0.142	1.806	0.226
mean	**0.423**	-	**1.580**	**-**

The TUKEY test- signification level 0,05% DL 5% = 15,24 t/ha
* the values followed by the same letter do not differ significantly between one another

Table 4. The State of the Technical and Economic Indicators - early potato crop – 1 ha

Specification	UM	Unprotected crop	Protected crop	Diferences
Total production	Kg	57710	74260	16550
Total expenses	Ron	24500	29900	5400
Total income	Ron	34626	44556	9930
Production cost	Ron/kg	0.42	0.40	0.02
Price on sale 15.06.06	Ron/kg	0.60	0.60	-
Profit	Ron	10126	14656	4530
Profit per unit	Ron/kg	0.180	0.200	0.02
Profit rate	%	41.33	49.02	7.69

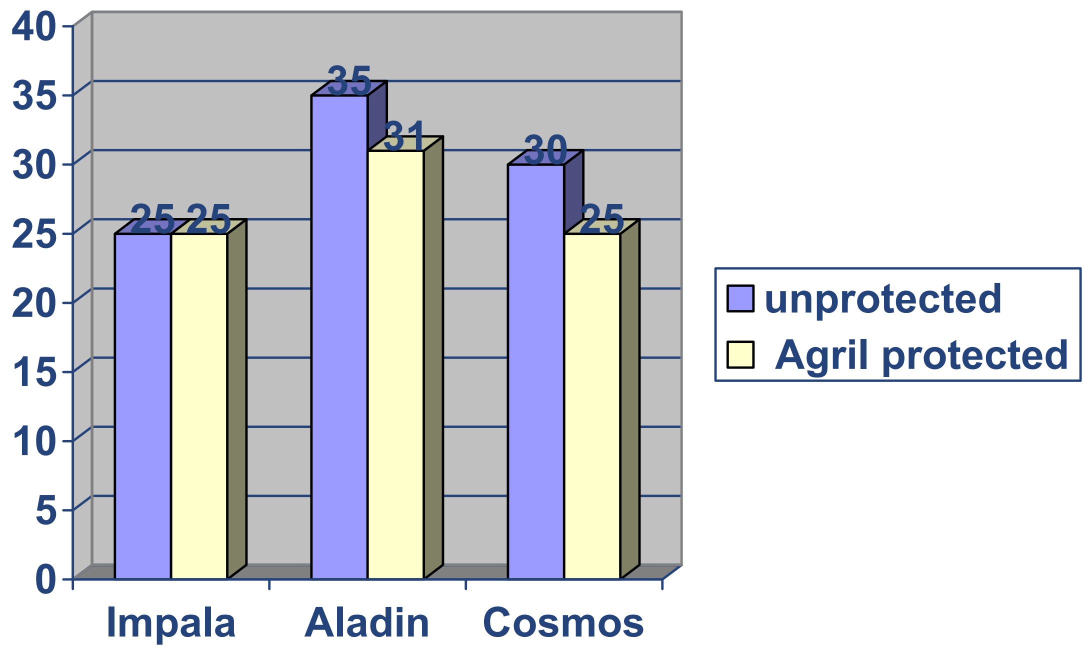


Fig. 1 The number of days needed from plantation to full sprouting

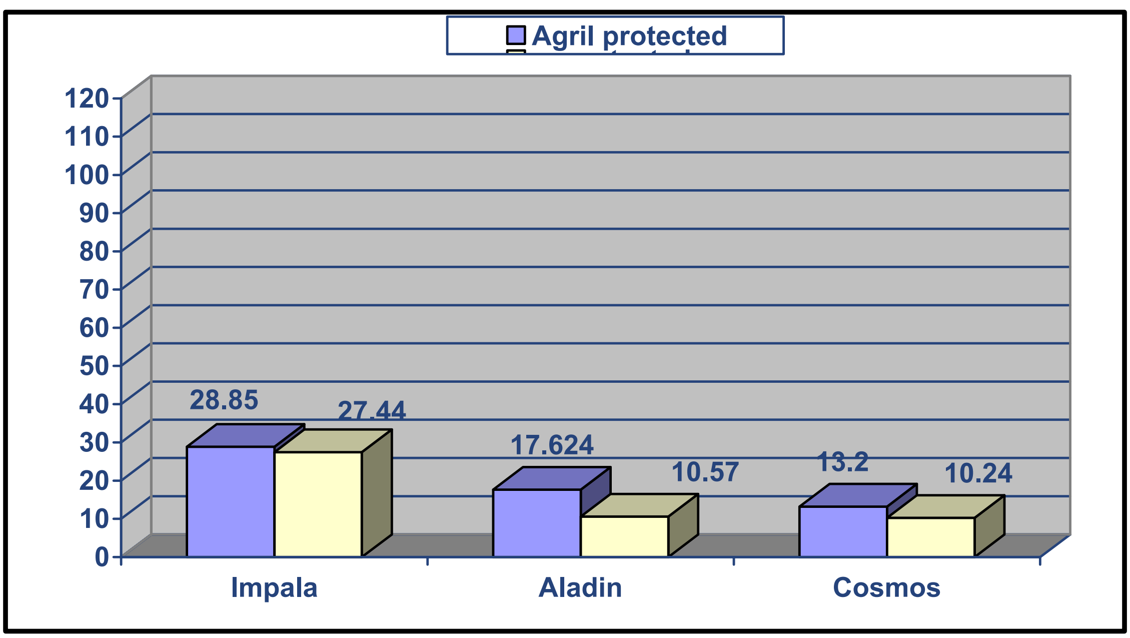


Fig. 2. Extra-early Production - 05.06.2006

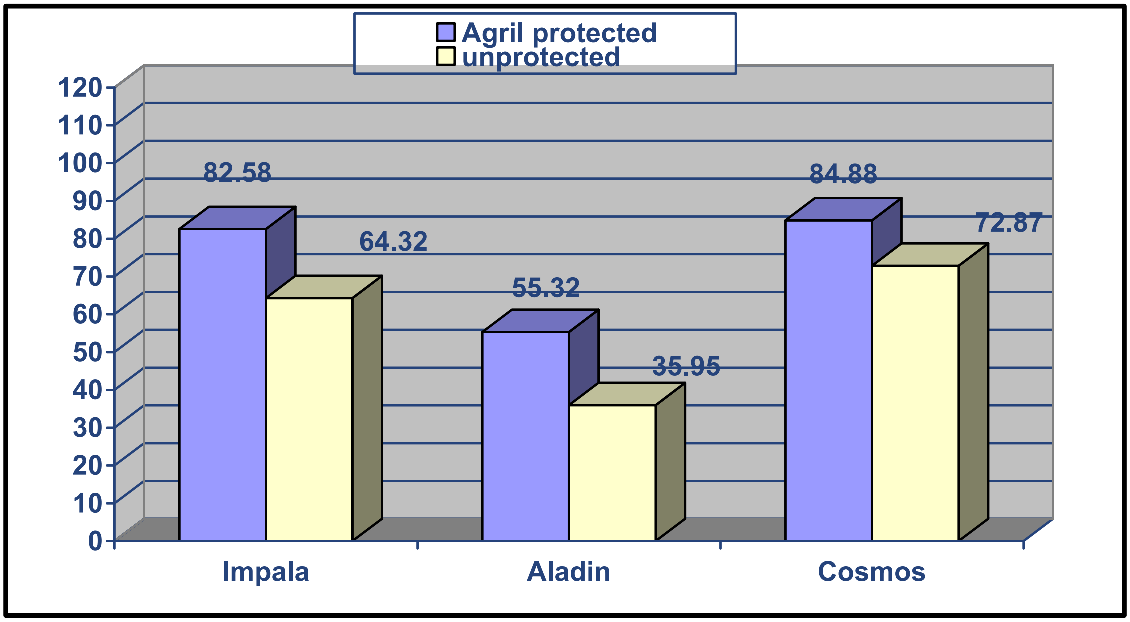
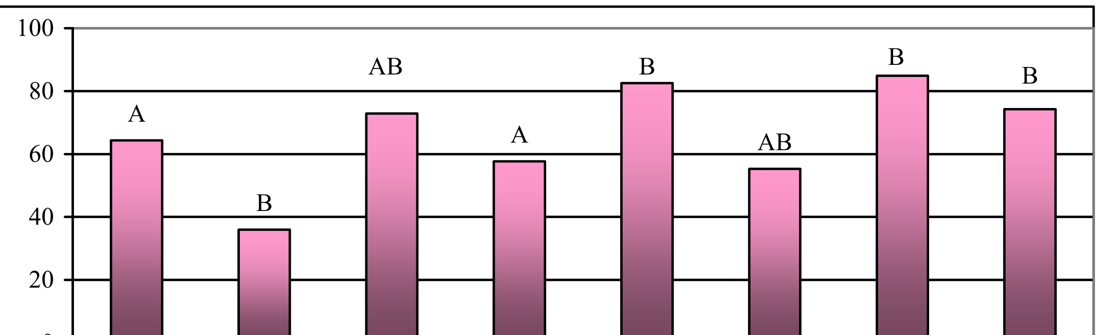


Fig. 3. Early Production – 15.06.2006



	V1 neprotejat	V2 neprotejat	V3 neprotejat	average	V4 protejat-Impala	V5 protejat-Aladin	V5 protejat-Cosmos	average
t/ha	64.32	35.95	72.87	57.71	82.58	55.32	84.88	74.26

Fig. 4. The Influence of the Variety and of the AGRIL Protection on the early potato production – 2006-

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BEHAVIOUR OF MARATHON BROCCOLI HYBRID IN EARLY AND AUTUMN CULTURE

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Keywords: *Brassica oleracea subvar. Cymosa, Marathon F1, early and autumn culture*

INTRODUCTION

Broccoli (Brassica oleracea L. var. botrytis, subvar. cymosa) is a vegetable belonging to the Brassicacea family, resembling the cauliflower but less known in our country. It is mainly grown for the inflorescences which are used in human food production (1,3).

Broccoli has a special nutritive value (glucoses 1.6%, nitrogen 7%, mineral salts as Ca, P, Fe, vitamin A and C), widely-known anti-cancerous therapeutic qualities, a simple growing technology, it resembles all the species of the cabbage-like vegetable group. These qualities plead that this vegetable should be introduced in the vegetable-growing range in our country, as soon as possible and on the most extensive areas as can be.

The international type of this vegetable comprises a great number of varieties and hybrids which can be differentiated by the vegetation period and the productive potential, morphological characteristics, the way how the edible parts grow.

Taking into account that the broccoli hybrids behave differently as to the growing process, the productive potential and the inflorescence quality (2), the present research exercise is focused on the Marathon hybrid of American provenance, in early and autumn crop in the southern area of our country.

MATERIAL AND METHOD

The experiment was organised in the locality of Brezoaele, with the early and autumn broccoli crop on a mixed clay and sand soil; it was organised according to the stored-block method and in 4 subsequent crops. The crop surface was of 1 000 square meters for each crop system.

The biological material – the ***Marathon F1*** hybrid – from the Sakata company the USA- is characterised as reads: widely known in the vegetable growing, excellent for processing. Uniformity, a high degree of compactness, heavy and finely textured blue-green inflorescences. High resistance to coldness, big yields, short vegetation period, ideal for wrapping and processing.

As long as it was possible, the applied agrotechnics observed the specialised indications regarding broccoli growing, with certain specific adjustments entailed by the subsequent crop scheme which is the basic farm procedure. The transplants produced on cold drills, protected with Agril sheet, were pricked out in nutritive check-rows of 5cm and were subsequently planted on the 22 April for early crop and 27 July for the autumn crop at a density of 47.000 and respectively 28.570 plants/ha. The keeping work consisted in: manual weeding, irrigations, fertilizations and phyto-sanitary treatments.

OBSERVATIONS AND DETERMINATIONS

- the development of the pheno-phases was determined in number of days elapsed during the main vegetation stages with the two crop systems;
- the growing dynamics of the plants was determined by decadal measurements on a number of 15 plants per subsequent crop ;
- the production was determined by weighing 10 inflorescences per crop on the hectare;
- the profitability was analysed by specific indicators: the profit as an absolute indicator in RON/ha; the gross profit per piece and the profit rate as a relative indicator in percentage.

RESULTS

Under the production conditions provided in the Brezoaele vegetable farm, the development of the pheno-phases had the following characteristics as shown in table 1.

Regarding the early crop, the lack of warm spaces led to cold drill transplant production and consequently to a delay in the planting procedures.

Although the plants had normal vegetation, prolonged until July, no inflorescence could be reaped as, because of the long hot days, the plants passed directly to the generative stage, started to bloom and turned inappropriate for consumption.

Regarding the autumn crop, though the transplant had been apt for planting for 28 days, the work was delayed because the field was covered by a previous early potato crop; the preparation of the field for a new crop took 10 days.

During the autumn crop, the Marathon hybrid had a vegetation period of 77 days.

During the autumn crop, due to better light and temperature conditions in the production period, the broccoli transplant had a more vigorous growth (fig 1,2).

When cultivated under different temperature and light conditions specific to the two systems the Marathon F1 broccoli hybrid had a specific reaction as to the vegetative growing.

In early crop, the dynamics of the height growing proves a direct relationship between temperature level and the acceleration of the vegetative growing. In comparison with the end of April, May and the firs decade of June, when decadal differences of 2-8 cm were recorded, beginning with the second decade of June and July these values grew to 8-20 cm.

In the autumn crop, the differences between months and decades were smaller, as regarding the early crop ones. Thus, at the beginning of the vegetation period (end of July and August), the decadal growing was of 8-11 cm, and of 9-11 cm in September and October.

In autumn crop, the Marathon F1 hybrid recorded a slightly bigger growing pace (0.9-1.5 cm/day), but more even as compared with the early crop (0.5-1.4 cm/day) (fig 3).

Both the number of inflorescences reaped when fully-developed (18-28 cm diameter, compact inflorescences), and their average mass had bigger values in the third decade of October as compared to the previous decade.

The evaluation of the yield obtained in October at the Marathon F1 hybrid provides the following data: a number of over 9 thousands inflorescences per hectare, which makes a 4.256 tones yield, of a high quality (0.420 g/piece average mass) (table 4).

As compared to the estimated biologic potential (28.570 inflorescences/ha), 34% of the inflorescences were reaped in October.

The reaping grew in intensity at the same extent as the plants entered the vegetation period; a bigger share was recorded in the third decade of October (71% of the monthly total and 24% of the estimated total), as compared to the previous decade.

While cultivated in autumn, the Marathon F1 broccoli hybrid yields favourable economic results.

Taking into account the piece selling of the broccoli at an average price of 2.5 Ron a piece and the production rises to 28.570 pieces/ha, the value of the total profit is very consistent.

The profit rate of 39.32% proves the profitability of this type of crop (table 5).

CONCLUSIONS AND RECOMMENDATIONS

The number of days needed to produce Marathon F1 hybrid sprouts was of 31 days for the early crop and 28 for the autumn crop.

In the autumn crop the Marathon F1 hybrid had a vegetation period of 77 days.

The crop system had an influence on the plant growing which was more intense and more even during the autumn crop, as opposed to the early crop.

Any delay in the planting procedure in the early crop, makes inflorescence reaping impossible, because long and hot days trigger the blooming of the plants, which are thus inappropriate for consumption.

During the month of October a number of over 9 thousand inflorescences was reaped per hectare of the Marathon F1 hybrid which makes 34% of the estimated total number of inflorescences; this represents a production of 4.256 tones of a high quality (0.420 g/piece average mass).

In the autumn crop the Marathon F1 hybrid yields fruitful economic results, triggering a profit rate of 39.32%.

It is recommended that the broccoli crop should be done on extensive areas and the good results use of the Marathon F1 hybrid in the autumn crop. As to early crops, they should be set up in March and hot days during the vegetation periods should be avoided.

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Table 1 Development of the Main Pheno-Phases at the Marathon F1 Hybrid

Specification	Early crop		Autumn crop	
	Date	Day No.	Date	Day No.
Sowing	22 March		20 June	
Sprouting	2 April	11	28 June	
Planting	22 April	31	27 July	38
Reaping	-	-	13 October	85

Table 2 Morphologic Characteristics of the Broccoli Transplants

Variant	Hybrid	Crop System	Transplant Age (days)	Aerial part height cm	Transplant Length cm	Leaf No.
V1	Marathon	Early	31	12.6	15	6.0
V2	Marathon	Autumn	28	13	16	6.6

Table 3 The Influence of the Crop System on the Growth of the Marathon F1 Broccoli

Early Crop	Height cm	Differences cm		Autumn Crop	Height cm	Differences cm	
		decadal	whole			decadal	whole
22.04.06	13	-	-	27.07.06	5	-	-
02.05.06	15	2	2	06.08.06	16	11	11
12.05.06	20	5	7	16.08.06	24	8	19
22.05.06	28	8	15	26.08.06	32	8	27
01.06.06	36	8	23	05.09.06	43	11	38
11.06.06	42	6	29	15.09.06	56	13	51
21.06.06	54	12	41	25.09.06	65	9	60
01.07.06	66	12	53	03.10.06	83	18	78
11.07.06	74	8	61	13.10.06	95	12	90
21.07.06	94	20	81				

Table 4 The Production Results with the Marathon F1 Hybrid- autumn crop, 2006 -

Specification	UM	October 2006		Total October
		Decade II	Decade III	
No pieces/ha	Thousand pl/ha	2857.0	6856.8	9713.8
Average mass	g/piece	0.374	0.465	0.419
Production	t/ha	1.068	3.188	4.256

Table 5 The Situation of the Technical and Economic Indicators with Broccoli - the Marathon variety, autumn crop - 2006

Specification	UM	Value
Total production	pieces	28.570
Total expenses	ron	28.085
Total income	ron	71.425
Production cost	ron/piece	0.98
Price on sale	ron/piece	2.5
Total profit	ron	43.340
Profit per unit	ron/piece	1.52
Profit rate	%	39.32

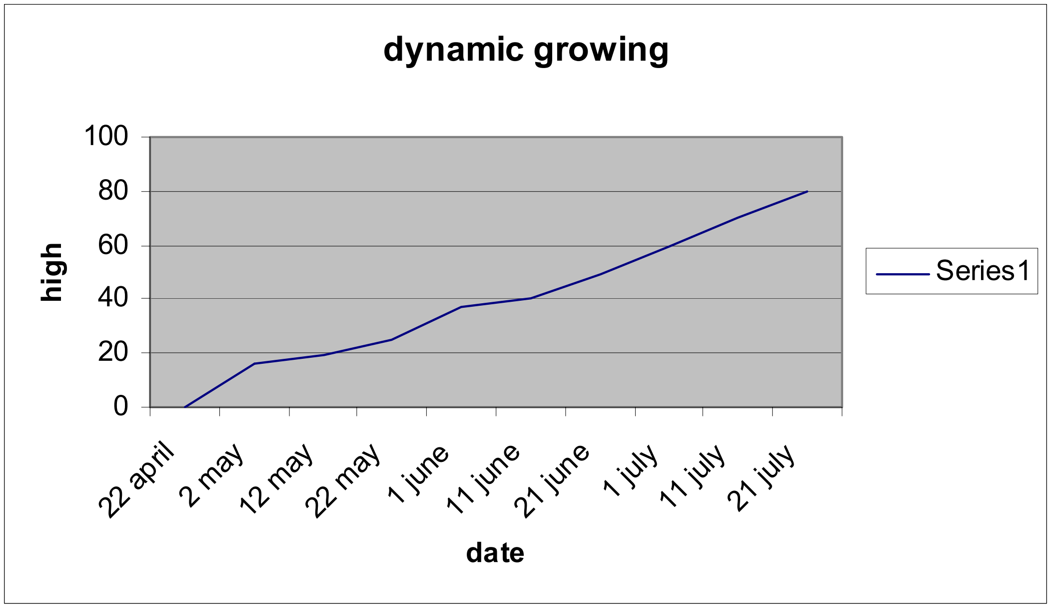

Fig. 1. Plant growing dynamics during the early crop

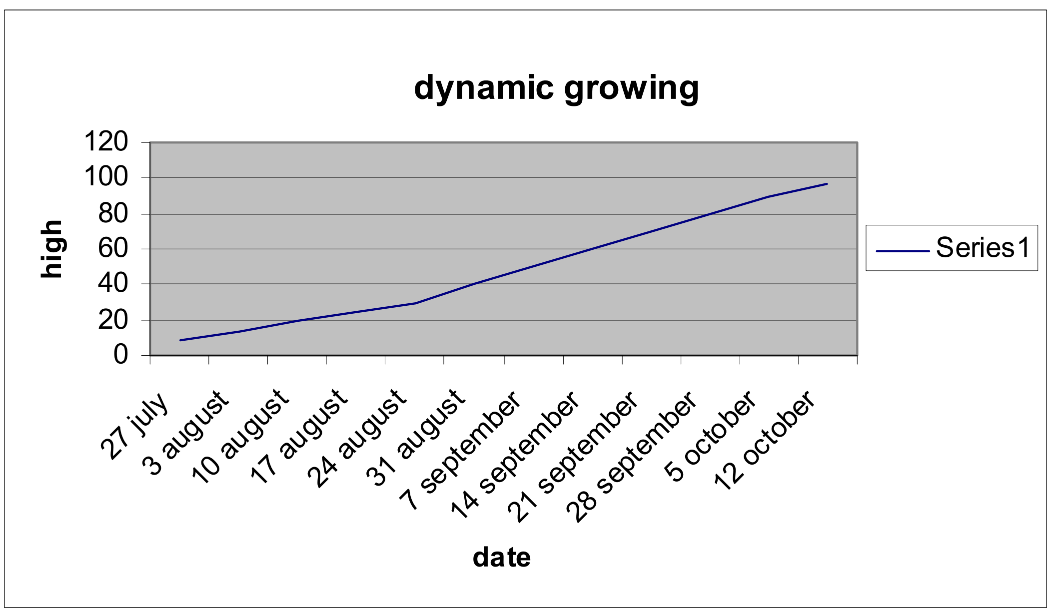

Fig. 2. Plant growing dynamics during the autumn crop

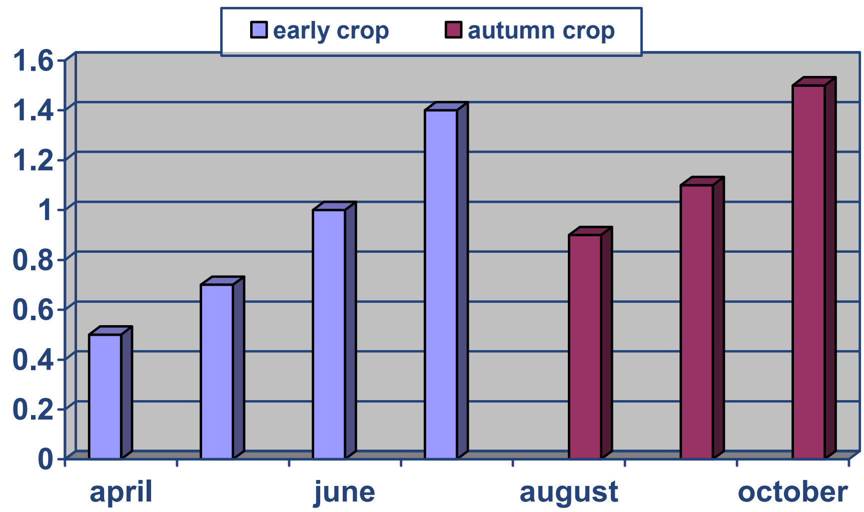

Fig. 3. The influence of the crop system on plant growing

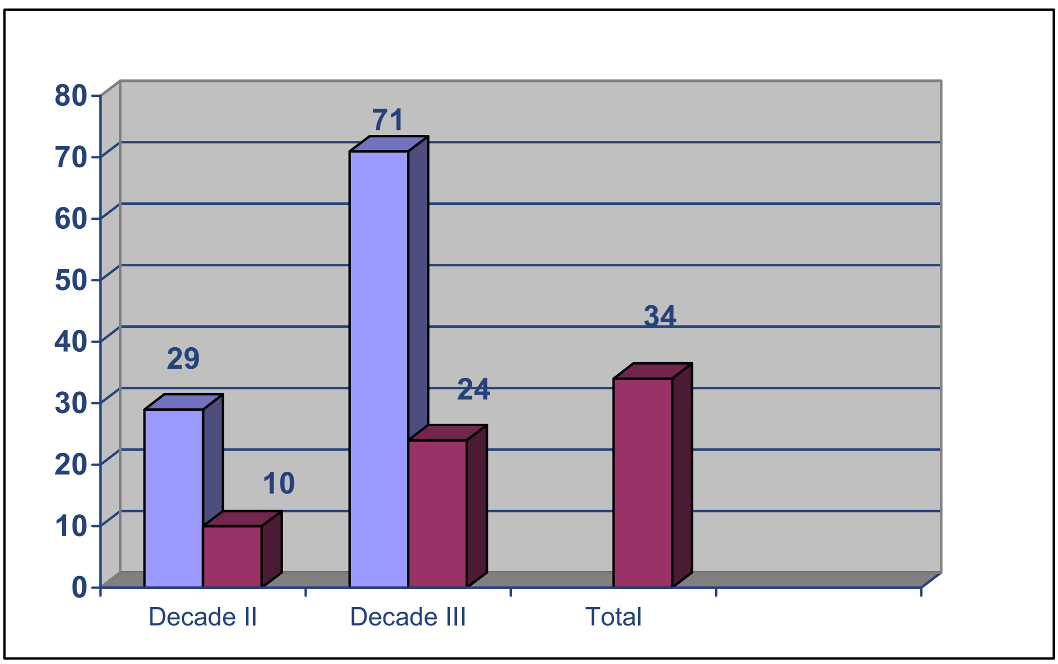

Fig. 4. The percentage of reaped inflorescence number

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THE INFLUENCE OF THE KIND AND OF THE FERTILIZATION TECHNOLOGY REGARDING THE PRODUCTION OF THE GREEN PEPPER CULTIVATED ON THE FIELD

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Keywords –green peppers, cultivar, fertilization.

ABSTRACT

During the last years, new cultures of pepper appeared on the Romanian market, either created at ICDLF Vidra, or imported. Also, the production materials offer for the vegetable market includes granulated complex fertilizers that slowly eliminate nutritive elements and soluble complex fertilizers used for fertilization and irrigation.
This work is a description of certain new cultivations on two agro funds, performed by traditional means – manure applied to the hole and pellicle granulated complex fertilizers.

INTRODUCTION

The pepper, originally from Central America where it was used in alimentation by the local population, it was then brought to Europe by the Spanish people who introduced it in agriculture in the Iberian Peninsula at the end of the 15th century and beginning of the 16th century.

The pepper is a vegetable species used especially in alimentation for the high level of Vitamin C that it contains. It can be consumed fresh, cooked or used in the preservation industry.

Due to its need for heat, the pepper can be successfully cultivated on the field and in solariums in the south and west of Romania where it is the most significant vegetable from the point of view of the cultivated area as well as regarding the production.

MATERIALS AND METHODS

Experimental alternatives

The experiment was performed in Stoenesti Town, in Caracal vegetable area, Olt County. This area was selected due to its good conditions for the green pepper culture on the field. The features of the area are the very good thermal regime, well-structured fertile soil (cernosiom, with good natural drainage and irrigation possibilities).
In the experimental protocol there were enclosed variants presented in Table 1.

As we can see form this table, the 12 variants of this two-factorial experiment were performed by combining the following levels of the experimental factors:

The experimental factor of the fertilization technology, with two levels:

a_1- basic fertilization with Agroblen 50g/sqm+3 stages of fertilization.

a_2- manure fertilization 2,5 kg/sqm

The experimental factor b- cultivar, with the following 6 level:

b_1-Export
b_2-Victoria
b_3- Opal
b_4-Ceres
b_5-Orion

b_6-Piquillo

The research objectives

- To test the productivity of the used cultivars and of the obtained fruit quality;
- To determine the fertilization technology influence on the production of cultures used in the experiment.

Material used in the experiment

The biologic material (Cultivars)

Export

Early cultivar (vegetation period 105-110 days), with fruit having a conical pyramidal form, weighting between 80 and 130 grams, production 40-43 t/ha.

Victoria

Early cultivar (vegetation period 109-112 days), with fruit having a conical form, weighting between 95 and 120 grams, production 40-43 t/ha.

Opal

Early cultivar, (vegetation period 110-115 days), with big fruit, of 110-130 grams, conical pyramidal form; production 42-44 t/ha.

Ceres

Early cultivar, (vegetation period 100-110 days), with medium fruit of 100-100 grams, with a prism form; production 35-40 t/ha.

Orion

Early cultivar, (vegetation period 118-120 days), with big fruit of 120-130 grams, conical pyramidal form, with 3-4 lobes, becoming yellow when mature enough to be consumed and shiny red when mature physiologically; production 40-42 t/ha

Piquillo

Half-belated cultivar (vegetation period 125-130 days), with small fruit of 45-50 grams, conical elongated form, becoming red when physiologically mature, recommended to be consumed; production 25-30 t/ha.

Materials used for fertilization

The *manure*, having 0,7% N, 0,5% P2O5, 0,8% K2O was applied to the hole before the seeding with a dose of 0,35-0,40 kilos/plant.

Agroblen 20+10+10+ 4 MgO is a basic fertilizer for the vegetable cultures from which the fruit are especially harvested. The main macro elements (N, P, K) are partially covered in organic resin, assuring a long effect of these fertilizers. The elimination of the nutritive elements is made gradually, within a period of 5-6 months and depending on the soil temperature.

Blue Universol 18+11+18+2 MgO and *Violet Universol 9+9+27+3MgO* fertilizers with a very good permeability and solubility and can be applied in foliation as well in the soil, by all the irrigation means. Universol contains all the necessary nutritive elements that a plant needs: *N,P,K,Mg* and microelements.

The specific technology applied for the experiment

The cultivars were planted on May 19 with nursery transplant of 50 days, produced in flowerpots with a diameter of 6 cm and with a capacity of 200 ml.

The plantation scheme that was used was of 50+70/25 cm, the culture density being of 6,6 plans/sqm.

The following works were applied in the culture:

- The completion of the holes made on may 25;

- Two pieces of manual weeding;
- The irrigations applied at an interval of 5-6 days in the periods with no precipitations with 30-35 l water/sqm;
- Two phases of fertilizations with Blue Universol and one with Violet Universol with a dose of 1 gram/plant; applied by fertilization and irrigation;
- A phyto sanitary treatment for combating the aphids, with the Sumi-alpha insecticide with a concentration of 0.03%
- Five harvestings in the period July 27 – October 18.

Observations and determinations

In this experiment there were carried out the followings observations and determinations:

- apparition and manifestation date of the main phenophases;
- plants height;
- leaves number;
- plants shoot diameter;
- branches levels number;
- offshoots number;
- harvested fruits number/plant;
- mean fruits weight;
- early and total yield ;

RESULTS AND DISCUSSIONS

The obtained results are presented in the followings tables. As we can see in Table 2, the highest yields have been registered for the chemically fertilized variants, between them there were remarkable Export and Ceres cultivars, with early yields of 3.49 and respectively 2.93 kg/m^2. In the case of organically fertilized variants, the highest early yield was noticed for Opal and Ceres, with 2.56 and respectively 2.28 kg/m^2. According to Table 3 data, for the early yield there were registered the highest values for the fruits mean weight, being 140.50 g for Export and 125 g for Orion in the case of chemically fertilized variant. The mean fruits weight at the total yield varied between 36.75 g at Piquillo and 131.75 g at Orion for chemically fertilized variants and 36.75 g at Piquillo and 112.6 g at Opal for the organically fertilized variants.

As it results from Table 4, the highest total yield has been noticed at V_4 - Ceres cultivar, with 6.99 kg/m^2, for the chemically fertilised variants and at V_{11} - Orion cultivar, with 6.52 kg/m^2, at organically fertilized variant. Between these two variants yield, it is pointed out a difference of 0.47 kg/m^2 in advantage of V_4- Ceres cultivar, chemically fertilised. The best early yield has been registered at V_1 (3.49 kg/ha with a proportion of 54.87% from the total yield) on an agro funds realised by chemically fertilization.

CONCLUSIONS AND RECOMMENDATIONS

- Green pepper cultivars used in the experiment in the Caracal area during the year 2006 had remarked by very good yields and a higher quality.
- Green pepper height has been influenced mainly by the cultivar, especially at Piquillo cultivar shoot height and the fructification points numbers surpassed the similarly parameters determined for others cultivars that were used in the experiment.
- The highest early yield of 3.49 kg/m^2 was registered at V_1 (Export with chemically fertilized).

- Ceres cultivar was remarked by the highest total yield – 6.99 kg/m^2 at the chemically fertilized variant and Orion cultivar 6.52 kg/m^2 at the organically fertilized variant.
- From the viewpoint of fruits mean weight it was noticed Orion cultivar with 125 g/fruit at the chemically fertilized variants and 140, 2 g/fruit at the organically fertilized variant.
- Very good results as regard as yield there were obtained for the variants group fertilized with granulate complex fertilizers (Agroblen) applied at the soils preparing time and with soluble complex fertilizers (Universol) in steps applied permit us to recommend extending this fertilization technology for the field green pepper culture, in Caracal area.

Tables

Table1 Studied variants, Green pepper on the field, Stoeneşti – Olt, 2006

<table>
<tr><th>Var.</th><th>Fertilization (a)</th><th>Cultivars (b)</th><th>Origin</th></tr>
<tr><td>V 1 (Mt$_1$)</td><td rowspan="6">Essential fertilization with Agroblen 50g/m^2 + 3 phases fertilization with Universol (a$_1$)</td><td>Export(b$_1$)</td><td>ICDLF Vidra</td></tr>
<tr><td>V 2</td><td>Victoria(b$_2$)</td><td>ICDLF Vidra</td></tr>
<tr><td>V 3</td><td>Opal(b$_3$)</td><td>ICDLF Vidra</td></tr>
<tr><td>V 4</td><td>Ceres(b$_4$)</td><td>UNISEM</td></tr>
<tr><td>V 5</td><td>Orion(b$_5$)</td><td>ICDLF Vidra</td></tr>
<tr><td>V 6</td><td>Piquillo(b$_6$)</td><td>Spania</td></tr>
<tr><td>V 7 (Mt$_2$)</td><td rowspan="6">Essential fertilization with manure (a$_2$) 2,5 kg/m^2</td><td>Export(b$_1$)</td><td>ICDLF Vidra</td></tr>
<tr><td>V 8</td><td>Victoria(b$_2$)</td><td>ICDLF Vidra</td></tr>
<tr><td>V 9</td><td>Opal(b$_3$)</td><td>ICDLF Vidra</td></tr>
<tr><td>V 10</td><td>Ceres(b$_4$)</td><td>UNISEM</td></tr>
<tr><td>V 11</td><td>Orion(b$_5$)</td><td>ICDLF Vidra</td></tr>
<tr><td>V 12</td><td>Piquillo(b$_6$)</td><td>Spania</td></tr>
</table>

Table 2 Early yields till August 15, Green pepper on the field, Stoeneşti – Olt, 2006

Variant nr.	**Cultivar**	**Fruits Nr. /plant**	**Fruits mean weight (g)**	**Yield**	
				kg/plant	**kg/m^2**
V 1 (Mt$_1$)	Export	3,75	140,50	0,52	**3,49**
V 2	Victoria	3,10	117,75	0,36	2,43
V 3	Opal	2,90	124,50	0,36	2,40
V 4	Ceres	4,20	105,00	0,44	2,93
V 5	Orion	2,40	152,00	0,36	2,42
V 6	Piquillo	4,00	47,00	0,18	1,25
V 7 (Mt$_2$)	Export	3,15	104,00	0,32	**2,18**
V 8	Victoria	2,95	102,50	0,30	2,01
V 9	Opal	2,75	140,25	0,38	2,56
V 10	Ceres	3,10	110,50	0,34	2,28
V 11	Orion	3,20	104,00	0,33	2,21
V 12	Piquillo	3,60	50,00	0,18	1,19

Table 3 Mean fruits weight variability, Green pepper on the field, Stoeneşti – Olt, 2006

Variant No.	Fertilization	Cultivar	Fruits mean weight (g)la:		
			Early yield	Yield for the last harvesting	Total yield
V 1Mt	Essential fertilization with **Agroblen** 50g/m^2 + 3 phases fertilization with **Universol**	Export	140,50	95,22	117,75
V 2		Victoria	117,75	62,86	90,37
V 3		Opal	124,50	117,00	120,75
V 4		Ceres	105,00	97,20	100,75
V 5		Orion	152,00	111,50	131,75
V 6		Piquillo	47,00	50,12	36,75
V 7 Mt	Essential fertilization with **manure** 2,5 kg/m^2	Export	104,00	72,60	88,50
V 8		Victoria	102,50	67,73	85,00
V 9		Opal	140,25	85,30	112,60
V 10		Ceres	110,50	91,79	101,75
V 11		Orion	104,00	95,40	99,87
V 12		Piquillo	50,00	48,50	36,75

Table 4 Early and total yield, Green pepper on the field, Stoeneşti – Olt, 2006

Variant No.	Cultivar	Early yield		Total yield		Differences	
		kg/m^2	% from the total yield	kg/plant	kg/m^2	kg/m^2	%
V 1 (Mt$_1$)	Export	3,49	54,87	1,01	6,36	-	100,00
V 2	Victoria	2,43	35,84	1,06	6,78	+0,42	106,60
V 3	Opal	2,40	36,03	1,06	6,66	+0,30	104,71
V 4	Ceres	2,93	41,91	1,11	6,99	+0,63	109,90
V 5	Orion	2,42	35,02	1,08	6,91	+0,55	108,64
V 6	Piquillo	1,25	45,12	0,44	2,77	-3,59	43,55
V 7 (Mt$_2$)	Export	2,18	43,68	0,78	4,99	-	100,00
V 8	Victoria	2,01	33,27	0,96	6,04	+1,05	121,04
V 9	Opal	2,56	41,89	0,97	6,11	+1,12	122,44
V 10	Ceres	2,28	40,07	0,89	5,69	+0,70	114,02
V 11	Orion	2,21	33,89	1,02	6,52	+1,53	130,66
V 12	Piquillo	1,19	48,57	0,39	2,45	-2,54	49,09

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STUDIES REFERRING TO DIFFERENT EGG-PLANT CROP TECHNOLOGY IMPACT ON THE SEEDS QUALITY/QUANTITY PRODUCTION

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Keywords: crop density, Lucia, Contesa, limitation

ABSTRACT

The aim o the present research was to find the optimal plantation distance and optimal fruit number on the plant for obtaining a better quantity of eggplant seeds on the predefined quality. There were made studies of different plantation distance, looking for plants height, number of leafs, number of flowers, number of fruits and in final, the number of seeds obtained per plant.

INTRODUCTION

A member of the nightshade family, eggplant counts tomatoes, potatoes and peppers as cousins. The only member of the "*Solanum melongena"* family to come from the eastern hemisphere, eggplant was probably first cultivated in India 4000 years ago. The plant probably developed from one with tiny egg-shaped fruits and large spikes.

The eggplant family is one of the largest and most diverse of the vegetable plant families. The size and shape of the plants and the size and shape of the fruits vary tremendously, but all eggplants were originally tropical. They love and require heat. It can almost be said, "hotter, the better". We believe it is this requirement for heat that makes eggplants an ideal container vegetable.

MATERIALS AND METHODS

These researches, performed on the U.S.A.M.V. Bucharest, vegetables greenhouses, use the experimental data registered during 2005 study years.

The biological material was represented by two eggplant species, *Lucia* and *Contesa,* organized on 4 repetitions, each of them consisting of 10 mature plants. The plants ware developed on ICDLF Vidra research institute 5 years ago and the strong points are that the two species are very tolerant to the vegetal diseases.

Those ten experimental variants were made different plantation distance for both eggplant species, as it can be seen in the following description:

V_1 – Lucia specie, plantation distance 70/20-71 000 pl/ha
V_2 – Lucia specie, plantation distance 70/30-41000 pl/ha
V_3 – Lucia specie, plantation distance 70/40-36 000 pl/ha
V_4 – Lucia specie, plantation distance 70/45-32 000 pl/ha
V_{5Mt} – Lucia specie, plantation distance 70/35-48 000 pl/ha
V_6 – Contesa specie, plantation distance 70/20-71 000 pl/ha
V_7 – Contesa specie plantation distance 70/30-41 000 pl/ha
V_8 – Contesa specie plantation distance 70/40-36 000 pl/ha
V_9 – Contesa specie, plantation distance 70/45-32 000 pl/ha
V_{10Mt} – Contesa specie plantation distance 70/35-48 000 pl/ha

Main characteristics of the two species are: *Lucia* (figure 1) is a half-early species, recommended for field crop and it is tolerant to Verticilium and Soil Manna diseases; *Contesa* (figure 2) is a early species, recommended for field crop and it is tolerant to Verticilium and Soil Manna diseases.

RESULTS AND DISCUSSIONS

Experimental data ware extracted on two weeks bases, for all variants on both species. Data includes average plant height, average number of leafs, number of fruits per plant, average fruits weight and number of seeds from fruits, all those computed for each variant. (see table 1). Experimental results were statistically processed, using graphical representation.

The experimental data presented in table 1 & 2 showed the influence of plantation distance is the same for both eggplant species.

Considering V_5 and V_{10} as a reference for a usual culture, the maximum seed productivity influence can be seen on variants V_2 and V_7 (where plantation distance was 70/30 with 41000 pl/ha) and the minimal production was obtained for V_1 and V_6 (where plantation distance was 70/20 with 71000 pl/ha).

Seeds production directly depends of the three factors: number of fruits per plant, plantation distance and fruit weight. From the actual experiments result that the main factor that have to be considered for seeds production is the optimal plantation distance – in figure 3 & 4 can be seen most important values for the analyzed parameters.

In normal climatic conditions, based on the STASS recommendation for V_3-V_8 distance (36.000 pl./ha) with four fruit limitation per plant, Lucia specie has the maximum productivity with 113.2 Kg seeds / ha and Contesa specie has the maximum productivity with 110.5 Kg seeds/ha, representing the better field crop productivity (see table 2).

CONCLUSIONS

Based on the experimental results above presented there can be extracted the following conclusions:

- plantation distance have a big influence on the seeds production (optimal distance is 70/30)
- fruit per plant limitation influence the quantity of seeds weight (optimal limitation is 3 eggplant fruit per plant)
- germination stimulation of the seeds will increase the production quality

Experimental results shows that the plants with more four fruits per plants can conduct to a lower seeds quantity production, because of the late fruit maturing on the unfavorable vegetation condition resulting a diminution of the culture density.

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Tables

Table 1. Experimental data regarding eggplant fruit parameters

Experimental variants	Fruit no.	Fruit dimension (cm)				Fruit weight (g)	Seeds weight per fruit (g)	Seeds no.
		Length	Ø Base	Ø Centre	Ø Top			
V_1 - (70/20)	2	18,7	6,1	8,9	8,5	660	6,3	1282,5
V_2 - (70/30)	3	19,6	7,6	10	7,9	833,3	9,9	1908,7
V_3 - (70/40)	4	16,7	6,5	8,9	7	537,5	6,6	1293,8
V_4 - (70/45)	5	19,8	6,8	9,8	7,1	810	6,8	1227
V_5 - (70/35)	unlimit	18,4	7,5	9,8	8,2	446,7	9,4	1674,7
V_6 - (70/20)	2	25,4	4,5	4,9	4,1	310	1,9	287,5
V_7 - (70/30)	3	22,7	5,5	6	5,4	513,3	5,4	1123,7
V_8 - (70/40)	4	25,2	4,3	5,2	4,7	480	3,5	477,5
V_9 - (70/45)	5	22,4	4,8	5,8	5,1	381	1,5	515,8
V_{10} - (70/35)	unlimit	25	5,5	6,7	5,8	506,7	1,1	328,7
Total:	40	-	-	-	-	24.344	227,6	44.166
Min:	2	16,73	4,33	4,85	4,1	310	1,07	287,5
Max:	5	25,4	7,63	10,03	8,5	833,3	9,8	1908,6

Note: Variants V_5 and V_{10} is considered to be the references STASS variants.

Table 2. Experimental data regarding eggplant fruit parameters

Ex. no	Fruit no.	Initial seeds										STASS	
		grams of seeds/plant				Aver (g/pl)	Kg seeds/ha				Average (Kg /ha)	% (*	Kg/ha
V_1	2	7,5	10,2	7,3	7,6	8,15	91,5	82,9	89,0	92,7	89,03	106,4	83,70
V_2	3	6,8	9,3	10,6	9,5	9,53	122,4	101,2	122,4	115,9	115,48	111,1	103,90
V_3	4	7,3	10,0	10,2	10,8	9,41	139,3	127,4	112,2	124,4	125,84	111,2	113,20
V_4	5	7,6	8,5	10,3	10,4	8,74	141,5	136,6	129,3	133,7	135,27	126,5	106,90
V_5	unlimit	7,2	10,5	7,3	7,6	8,15	91,5	82,9	89,1	92,7	89,05	106,4	83,72
V_6	2	6,6	9,3	7,5	6,8	7,54	80,5	89,6	91,5	83,0	86,14	106,6	80,84
V_7	3	7,3	8,5	8,2	7,9	8,94	112,8	102,6	99,4	96,4	102,80	111,1	92,52
V_8	4	7,5	8,2	9,8	10,8	9,07	112,9	112,8	119,9	131,8	119,34	108,0	110,50
V_9	5	6,8	7,9	8,2	10,9	7,94	128,1	117,7	123,8	125,7	123,82	131,0	94,53
V_{10}	unlimit	6,6	9,3	7,5	6,8	7,54	80,5	89,1	91,5	82,1	85,79	106,1	80,84

* percent of obtain production reported to the standard production (aver_prod_on_ha / STASS prod * 100)

Figures

Figure 1. Lucia species

Figure 2. Contesa species

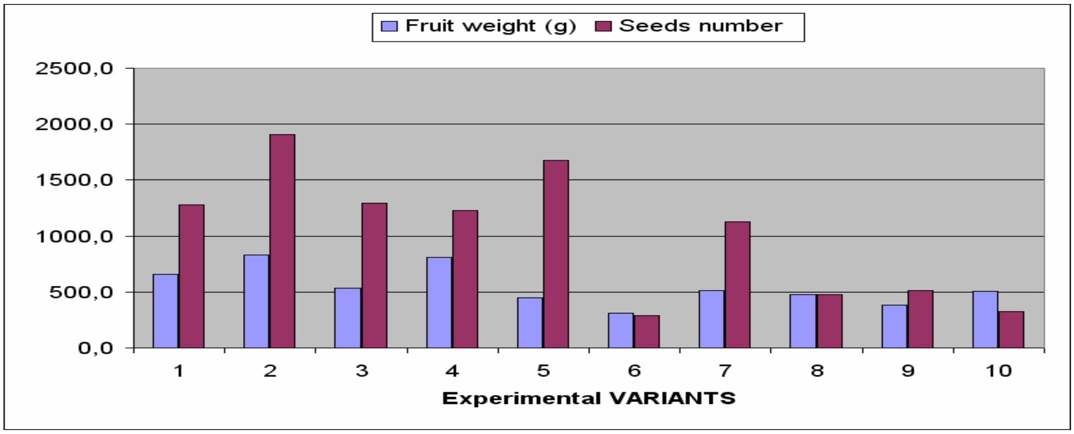

Figure 3. Graphical representation of fruit and seeds number

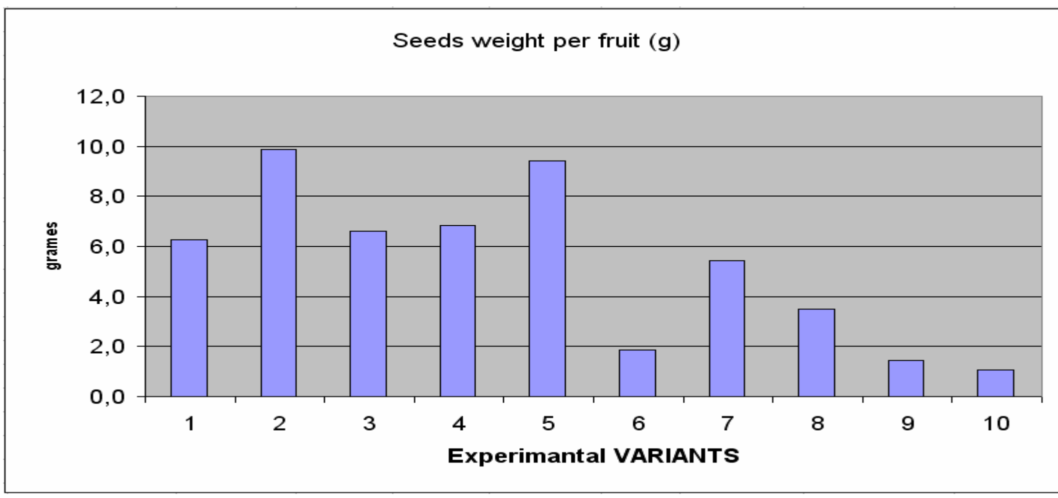

Figure 4. Graphical representation of seeds weight per fruits, for different plantation distance

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RESEARCH CONCERNING THE USE OF THE PHOTOSELECTIVE FOILS FOR THE LETTUCE SEEDLINGS PROTECTION

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Keywords: *Lactuca Sativa, Ilona variety, high tunnels, seedlings quality.*

INTRODUCTION

In the process of producing vegetable seedlings, the protection with polyethylene film having photoselective properties has an effect on changing one of certain vegetation factors specially the quantity and the quality which the plant benefice, together with the modification of the thermic conditions at that of the relative humidity of the air.

The action of the vegetation factors under the conditions necessary for the protection of the seedlings, determines both morphological and physiological modification, which contribute to a different growing and developing rate that of seedlings obtained under normal conditions.

The quantity of radiations being absorbed depends on the nature of the pigments in the leaves and the intensity of their colour (the dark-green laves absorb the most radiations; the next leaves in line are the light green and the yellowish ones which absorb 12-50% less), the vegetable species react differently when being covered with colour photoselective plastic materials (Ciofu Ruxandra, Dobrescu Aurelia şi colab., 1996, 1999).

MATERIAL AND METHOD

The aim of the research was the rendering evident of the behaviours of the lettuce seedlings produced in the cold greenhouse, and protected with minitunnels covered with on layered photoselective foils, made in Romania. The foils studied are prototype photoselective polymeric films designed, made and tested in our country by SC Incerplast SA, SC Prointermed SRL Pitesti and USAMV Bucharest, within the Relansin Research programme.

The photoselective foils were made through the processing of low pressure polyethylene, in their polymeric matrix being introduced certain special chemical additives, such as: pigments, UV stabilizers, UV protectors. These were added to the additive white foils

The experiment teak place in the didactic and research department of th USAMV Vegetable Bucharest.

The biological material experimented was the lettuce soil, Ilona. The sowing was done in small wooden boxes filled with mixture of nutritive soil (40% fermented manure, 30% celery ground, 20% peat, 10% sand).

The replanting was done in 5.5/4.5 cm plastic cups, filled with nutritive mixture (40% fermented manure, 40% peat, 10% celery ground, 10% sand)

The experiment teak place in the cold greenhouse ona 9m^2 area, on which there were built wooden rocks covered with various photoselective foils. The experiment was realized according to the method of the blocks in a linear setting.

The treatments were:

V1 control – PE film transparent
V2 – light yellow foil
V3 – dark yellow foil
V4- light green foil
V5 – dark green foil
V6 – light pink foil
V7 – dark pink foil
V8 – transparent foil additives
V9 – control non protecting

The surface of each variant was 1m^2, the number of plants per repetition being 20 (image no 1)

For each repetition there were analyzed 10 plants, the results being analyzed as their mean.

During the vegetation period the agrotechnics specific to production the maintenance works were applied uniformly to all the variants studied.

OBSERVATIONS AND DETERMINATIONS (RESULTS)

In order to notice the modifications of the microclimate created under the photoselective foils, there were registered in the dynamics the evolutions of the temperatures, of the light intensity, of the atmospheric humidity. The determinations were done once at 2 days both on the outside and under the foils, using specific devices (electronic termohigrometers, luxmeter, combitester)

The quantification of the microclimate parameters was calculated with the following synthetic indicators:

Σ_1 – the amount of the temperature degrees of the surface of the foil;
Σ_2 –the amount of the temperature degrees underneath the foil at plants level
Σ_3 – the amount of the temperature degrees under the foil at plants level
D- Σ2- Σ1 (the difference)
M1 – the illumination mean registered in the dynamic t the surface of the foil
M2 - the illumination mean registered in the evolution at the surface of the foil, at seedlings level
ΔM = M1-M2
Gtr= M1/M2*100 – the transparency degree
U – the relative humidity mean of the air in the tunnel

In order to notice the growing and the developing of the seedlings protected with photoselective foils, certain measuring concerning the height of the plants and the number of leaves were effectuated during the whole time of the protection with photoselective foils in order to determine the optimum age of the seedlings in view of calibrating the plantings for obtaining lettuce depending on the market demands (requests).

Certain measuring concerning the mass of the seedlings and the volume of the radicular system were effectuated before the planting.

THE RESULTS OBTAINED

The results concerning the modification of the microclimate created under the photoselective foils (Diagram no 1).

From the temperature global accumulations point of view one can notice that the greatest amount of the temperature degrees above the foils was realized at the V7 and V8 variants (213.5-213.6 ºC); while at the plants level, under the foils, at V2, V6 and V7 variants (211.1-212.4 ºC). The lowest temperature accumulations were achieved at V5 and V8, variants at which the differences towards the surrounding environment were -4.5 ºC

The variation of the atmospheric humidity under various types of photoselective foils Diagram no. 2.

Show a 0.36-3.2 growth of the atmospheric humidity under the photoselective foils, except in the case of the light yellow foil, at which the atmospheric humidity under the foil is 1.09% lower then it, is the control. The highest values of the relative humidity were registered under the treated white and light red foils.

The global variation of the illuminating (diagram no 3), show the fact that at all the variants studied M1>M2, there fore, at the level of the plants a smaller quantity of light reaches.

The differences varied between 1836.37 lux. at V1- normal transparent foil and 5345.46 lux at V4- the dark yellow foil, this parameter helping as to determine orientatively the foils capacity to transmit light.

The transparency degree (diagram no 4) determined after the measuring and calculated with the Gtr= M1/M2*100 formula, at all the photoselective foils studied was inferior to the control normal foil, the smallest difference being seen in the case of the light yellow foil (4.01%) and the biggest difference at the dark green foil (20.4).

The use of various types of photoselective foils in the production of the lettuce seedlings determined a different evolution of the seedlings during this technological link.

The number of leaves formed by the lettuce seedlings (image no 5) was influenced by the treatment applied.

At the beginning of the treatment being applied, one or notice the treated transparent foil (V8) by a positive influence, the seedlings realizing the greatest number of leaves 6.1 respectively 6.6 leaves, while, at the light pink foil (V6), the values of this parameter were inferior (5.6 respectively 5.9 leaves).

The influence of the foil utilized in the protection manifests it self much more intensely at the lost check, the differences between the variants being important. One can notice the seedlings protected with a light green foil (V4) which strongly recovers under this aspect and achieves the greatest number of leaves (7.5) while, under the light pink foil (V6) the situation remains the same, the lettuce seedlings protected with this foil having the smallest number of leaves (6.6).

By comparison with all the protected variants, regardless of the types of foil being used, the unprotected seedlings formed a smaller number of leaves during the entire growing period, except on 17.04 when it has the some number of leaves (6.6) as V6 – the light pink foil.

The height of the plants (diagram no.6) was also influenced by the use of different types of foils used for the protection of the seedlings. Under this aspect the light pink foils distinguishes itself. Under it, at all the checkups, the seedlings had the greatest height and the treated transparent foil (V8) under which the seedlings constantly had the smallest height.

By comparing the seedlings protected with photoselective foils with the unprotected seedlings, one can notice that, regardless of the date, these are inferior from the height point of view.

Looking at the big picture of the experiment (Diagram no 6), one can notice the positive effect given by the protection realized with treated transparent foil (V8) of the lettuce seedlings, under this, the plants having the smallest height but, almost always, the greatest number of leaves. At the seedlings protected with the light pink foil (V6) it can constantly be noticed an elongation tendency given by the fact that under this foil the plants achieve the greatest height, but with the lowest number of leaves, effect unwanted in practice.

CONCLUSIONS

1. A growth of the atmospheric humidity under the photoselective foils is rendered evident, except in the case of the light yellow foil at which the atmospheric humidity under the foil is lower than that of the controls.
2. The temperature accumulations are the results of the factors complex and photoselectivity reaching maximum values at the light yellow foils, light pink foils and minimum values at the dark green and treated while foils.
3. The global variation of the illuminating show the fact that at all the variants protected with foils at the plants level, a smaller quantity of light reaches depending on the photoselectivity of each of them.
4. The lettuce seedlings protected with light foil constantly manifest an elongation tendency given by the fact that under this foil the plants achieve the greatest height, but the lowest number of leaves, an effect which is rot wanted in the practice.
5. We notice positive effect given by the protection with treated transparent foil of the lettuce seedlings at which the plants had the smallest height but a grater number of leaves.

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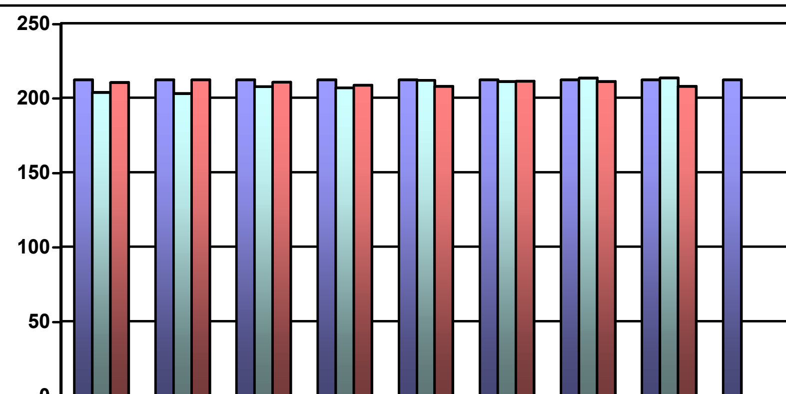
Table 1. The experimental receiving and the optical properties of the photoselective foils

Treatments	**Control – PE foil transparent**	**Light yellow foil**	**Dark yellow foil**	**Light green foil**	**Dark green foil**	**Light pink foil**	**Dark Pink foil**	**Transparent additivated foil**
PEJD 150	100	X	X	X	X	X	X	X
UV stabilizer	-	X	X	X	X	X	X	X
UV barrier	-	-	-	-	-	-	-	X
Light transmittance UV-VIS %	80	73	68	76	65	70	62	82
Opacity %	29,30	34,23	48,84	37,12	47,14	39,72	49,97	23,46



	V1	V2	V3	V4	V5	V6	V7	V8	V9
Σ 1	212.3	212.3	212.3	212.3	212.3	212.3	212.3	212.3	212.3
Σ 2	203.9	203.1	207.8	207	212	211.2	213.5	213.6	0
Σ 3	210.5	212.4	210.8	208.7	207.9	211.3	211.1	207.9	0

Σ_1=the amount of the temperature degrees registered in the greenhouse
Σ_2 =the amount of the temperature degrees at the surface of the foil
Σ_3 = the amount of the temperature degrees under the foil at plants level

Diagram 1. The variation of the amount of the temperature degrees depending on the type of photoselective foil

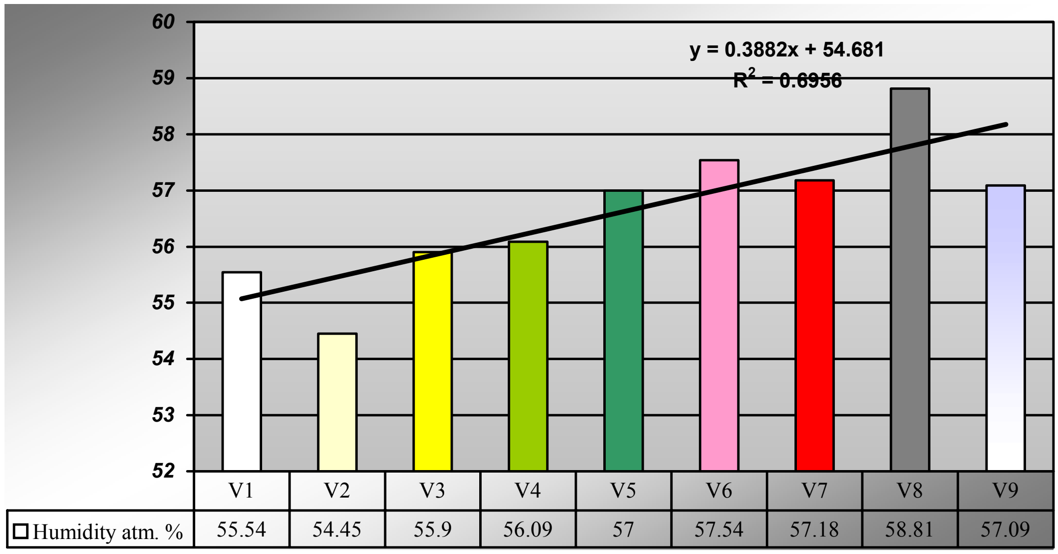
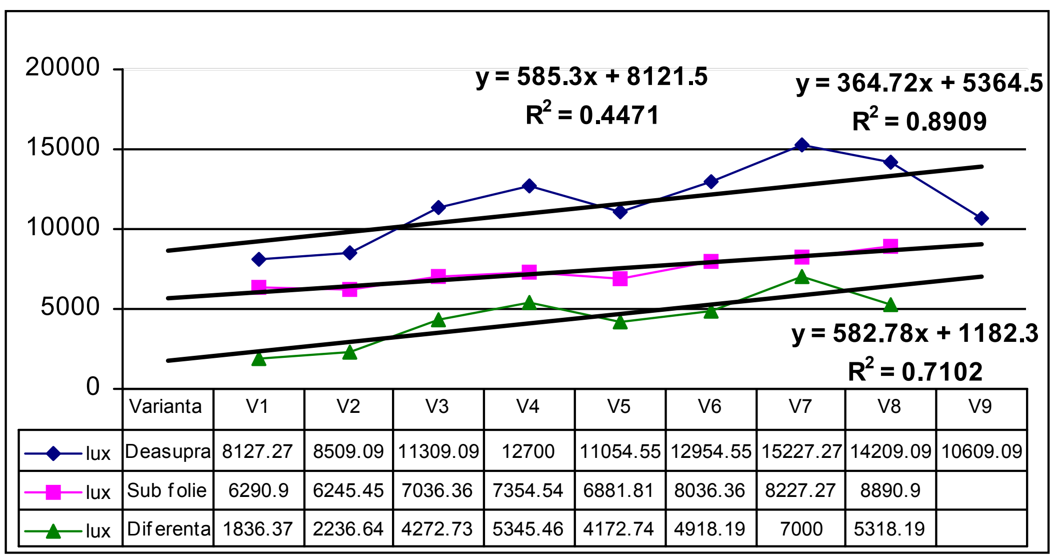


Diagram 2. The global variation of the atmospheric humidity depending on the colour of the foil used for the protection of the seedlings



M1 = the sum of the illuminating registered at the surface of the foil
M2=the mean of the illuminating registered under the foil at plants level
ΔM = M1-M2

Diagram 3. The global variation of the illuminating depending on the type foil used for the protection

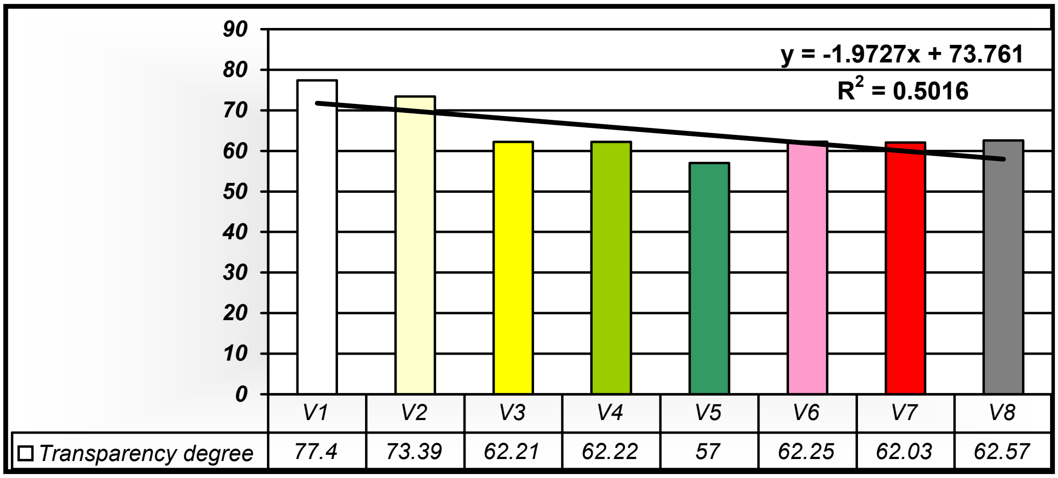
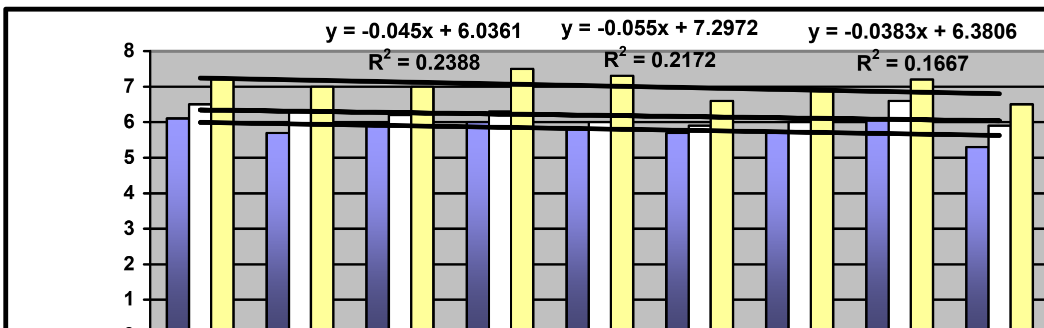
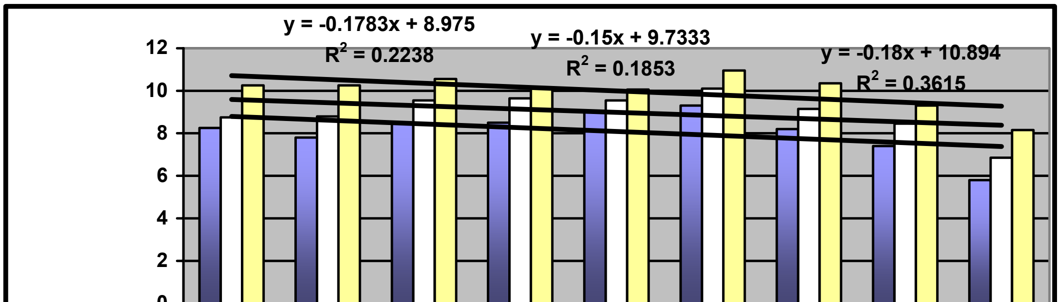


Diagram 4. The variation of the transparency degree of the foils used for the protection of the seedlings



	V1	V2	V3	V4	V5	V6	V7	V8	V9
13.04.06	6.1	5.7	5.9	6	5.8	5.7	5.7	6.1	5.3
17.04.06	6.5	6.3	6.2	6.3	6	5.9	6	6.6	5.9
21.04.06	7.2	7	7	7.5	7.3	6.6	6.9	7.2	6.5

Diagram 5. The influence of the photoselective foils on the number of leaves at the lettuce seedlings



	V1alb martor	V2 galben	V3 galben	V4 verde deschis	V5 verde inchis	V6 roz deschis	V7 roz inchis	V8 alb tratat	V9 neprotejat
13.04.06/cm	8.25	7.8	8.45	8.5	9.05	9.3	8.2	7.4	5.8
17.04.06/cm	8.75	8.8	9.55	9.65	9.55	10.1	9.15	8.45	6.85
21.04.06/cm	10.25	10.25	10.55	10.1	10.05	10.95	10.35	9.3	8.15

Diagram 6. The influence of the photoselective foils
on the height sowing of lettuce seedlings

Image 1. The protection of the lettuce seedlings
with photoselective foils


F_1
F_2
F_3
F_4
F_5
F_6
F_7
F_8

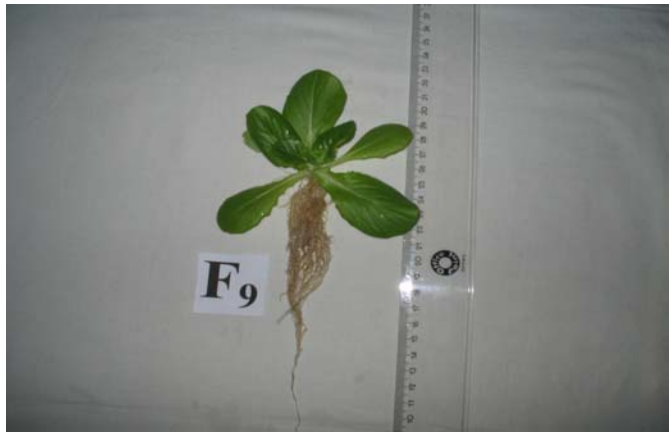


Image 2. The experimental variants

Lucrări ştiinţifice U.S.A.M.V.B., Seria B, Vol. XLIX, 2006

STUDY REGARDING THE INFLUENCE OF FERTILIZATION OVER THE OBTAINED PRODUCTION AT SOME AROMATIC AND SPICY PLANTS CULTIVATED IN ORGANIC SYSTEM

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Keywords: fertilization, spicy, aromatic, biologic

ABSTRACT

In biologic agriculture polygon from V.R.D.S. Bacau seven fertilisation variants were tested for the biologic cultivation of four spicy and aromatic species: savory *(Satureja hortensis* L.), sweet basil (*Ocimum basilicum* L.), salvia (*Salvia officinalis* L.) and brotherwort (*Thimus vulgare* L.). For all the studied crops, the best results were obtained on the variants in which the fertilisation was made with: - decoct from coriander fruits–2% + sesame oil (0,2%) (V6) and Cropmax (0,2%), (V8). The obtained production overcame the witness variant (untreated) with: 4,3t/ha at savory crop, 2,1 t/ha at sweet basil, 2,8 t/ha at salvia and 3t/ha brotherwort.

INTRODUCTION

The biologic agriculture is a viable alternative to conventional agriculture, in which chemical synthesis product are not utilised.

In the present paper seven fertilisation variants for the biologic cultivation of four spicy and aromatic species: savory *(Satureja hortensis* L.), sweet basil (*Ocimum basilicum* L.), salvia (*Salvia officinalis* L.) and brotherwort (*Thimus vulgare* L.) are presented.

MATERIALS AND METHODS

The biological material utilised for the establishment of the experience are the varieties DARIA for savory, VERT for sweet basil, local population De Răsmiereşti for salvia and De Dolj for brotherwort.

The researches were made during 2004-2006 period of time in the biologic agriculture polygon at V.R.D.S. Bacau.

Seven fertilisation recipes, which are approved by biologic agriculture regulation, were studied:

V1 – untreated witness
V2 – nettle macerate –2%
V3 – wood fern macerate–10%
V4 – conduras infusion–2%
V5 – macerate from tomato leaves–2%
V6 – decoct from coriander fruits–2% + sesame oil- 0,2%
V7 – comfrey macerate –5%
V8 – Cropmax - 0,2%

RESULTS AND DISCUSSIONS

The experimental results were statistically interrelated utilising the variance analysis. In table 1 are presented the dates concerning the obtained production at savoury – variety Daria (in t/ha) and relative (in %), as well as the difference found to exist between the obtained production when comparing with the witness variant.

The graphical presentation of the dates obtained at savoury Daria underline the fact that the highest productions were obtained on the variants V6 (decoct from coriander fruits–2% + sesame oil- 0,2%) and V8 (Cropmax 0,2%). Comparing with the witness variant – V1, where no fertilising was applied, the production increases were distinctively significant, obtaining a difference of 4,3 t/ha. Significant increases were obtained also on the variants V2 , V3, V4, V5 and V7, the differences outrun the witness with 2-2,7 t/ha.

In table 2 are presented the dates concerning the production obtained at sweet basil – variety Vert (in t/ha) and relative (in %), as well as the difference that were found between the obtained production when comparing with the witness variant and its significance.

The graphical presentation of the dates obtained at sweet basil, variety Vert underline the fact that the highest productions were obtained on the variants V6 (decoct from coriander fruits–2% + sesame oil- 0,2%) and V8 (Cropmax 0,2%). Comparing with the witness variant – V1, where no fertilising was applied, the production increases were distinctively significant, obtaining a difference of + 2,1 t/ha and respectively 2,0 t/ha. Significant increases were obtained also on the variants V2 and V5 the differences outrun the witness with 1,3 - 1,5 t/ha.

In table 3 are presented the dates concerning the production obtained at salvia – local population De Răsmiereşti (in t/ha) and relative (in %), as well as the difference of obtained production that was found when comparing with the witness variant and its significance.

Presenting graphically (fig. 3) the experimental dates obtained at salvia on observe the fact that highest productions were obtained on the variants V6 (decoct from coriander fruits–2% + sesame oil- 0,2%) and V8 (Cropmax 0,2%). Comparing with the witness variant – V1, where no fertilising was applied, the production increases were distinctively significant, obtaining a difference of + 2,7 t/ha and respectively 2,8 t/ha. Significant increases were obtained also on the variants V2, the differences outrun the witness with 1,8 t/ha.

In table 4 are presented the dates concerning the production obtained at brotherwort – local population De Dolj, (in t/ha) and relative (in %), the difference of obtained production comparing with the witness variant and its significance.

From the graphical presentation of the dates obtained at brotherwort (fig.4) we can observe the fact that the highest productions were obtained on the variants V6 (decoct from coriander fruits–2% + sesame oil- 0,2%) and V8 (Cropmax 0,2%). Comparing with the witness variant – V1, where no fertilising was applied, the production increases were distinctively significant, obtaining a difference of 2,9-3 t/ha. Significant increases were obtained also on the variants V2 and V7 the differences outrun the witness with +1,4 and 1,3 t/ha.

CONCLUSIONS

For all the studied crops, the best results were obtained on the variants in which the fertilisation was made with: - decoct from coriander fruits–2% + sesame oil (0,2%) (V6) and Cropmax (0,2%), (V8). The obtained production overcame the witness variant (untreated) with: 4,3t/ha at savory crop, 2,1 t/ha at sweet basil, 2,8 t/ha at salvia and 3t/ha brotherwort.

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Table 1

The influence of fertilisation over the obtained production at savoury - Daria

No. crt	Variant	Production		Difference comparing with witness	Signification of differences
		t/ha	%	t /ha	
1.	V1 – untreated witness	11,5	100	-	
2.	V2 – nettle macerate –2%	14,2	123,5	+ 2,7	**
3.	V3 – wood fern macerate–10%	13,7	119,1	+ 2,2	**
4.	V4 – conduras infusion–2%	13,8	120,0	+ 2,3	**
5.	V5 – macerate from tomato leaves–2%	13,9	120,9	+ 2,0	**
6.	V6 – decoct from coriander fruits–2% + sesame oil- 0,2%	15,8	137,4	+ 4,3	***
7.	V7 – comfrey macerate –5%	14,0	121,7	+ 2,5	**
8	V8 – Cropmax - 0,2%	15,8	137,4	+ 4,3	***

DL 5% = 1,75t/ha; DL 1% = 1,95 t/ha; DL 0,1%=2,7 t/ha

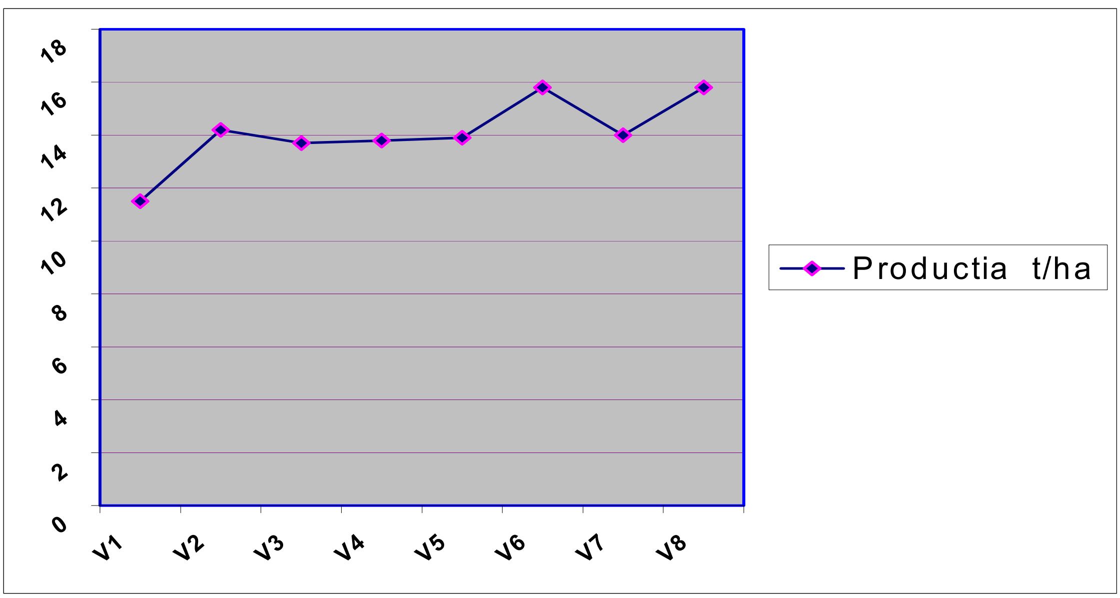
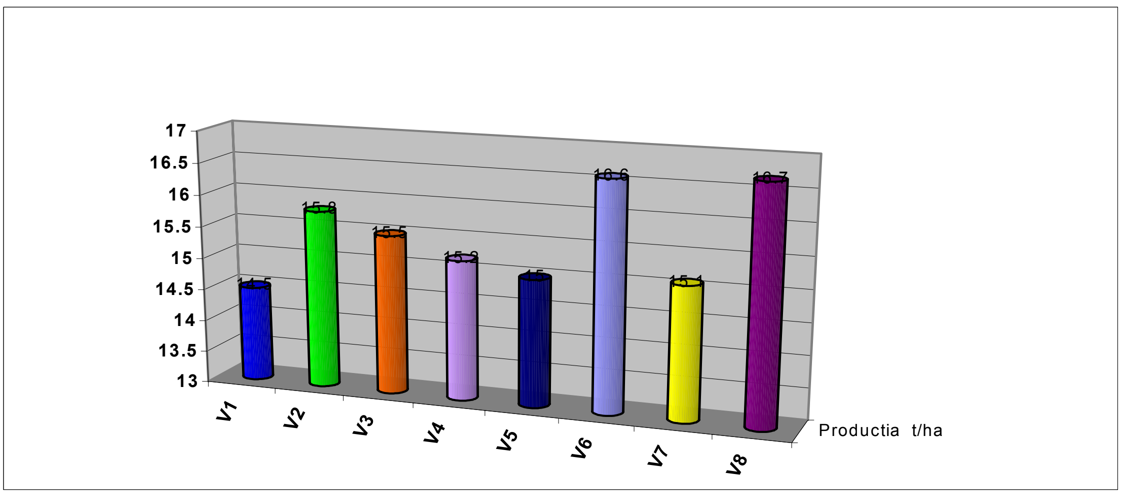


Figure 1 – Influence of fertilisation over the obtained production at savoury – Daria

Table 2

Influence of fertilisation over the obtained production at sweet basil - Vert

No. crt	Variant	Production		Difference comparing with witness	Signification of differences
		t/ha	%	t/ha	
1.	V1 – untreated witness	14,5	100	-	-
2.	V2 – nettle macerate –2%	15,8	108,9	+ 1,3	**
3.	V3 – wood fern macerate–10%	15,5	106,9	+ 1,0	*
4.	V4 – conduras infusion–2%	15,2	104,8	+0,7	
5.	V5 – macerate from tomato leaves–2%	15,0	103,4	+ 1,5	**
6.	V6 – decoct from coriander fruits–2% + sesame oil- 0,2%	16,6	114,5	+ 2,1	***
7.	V7 – comfrey macerate –5%	15,1	104,1	+0,6	
8	V8 – Cropmax - 0,2%	16,7	115,1	+ 2,0	***



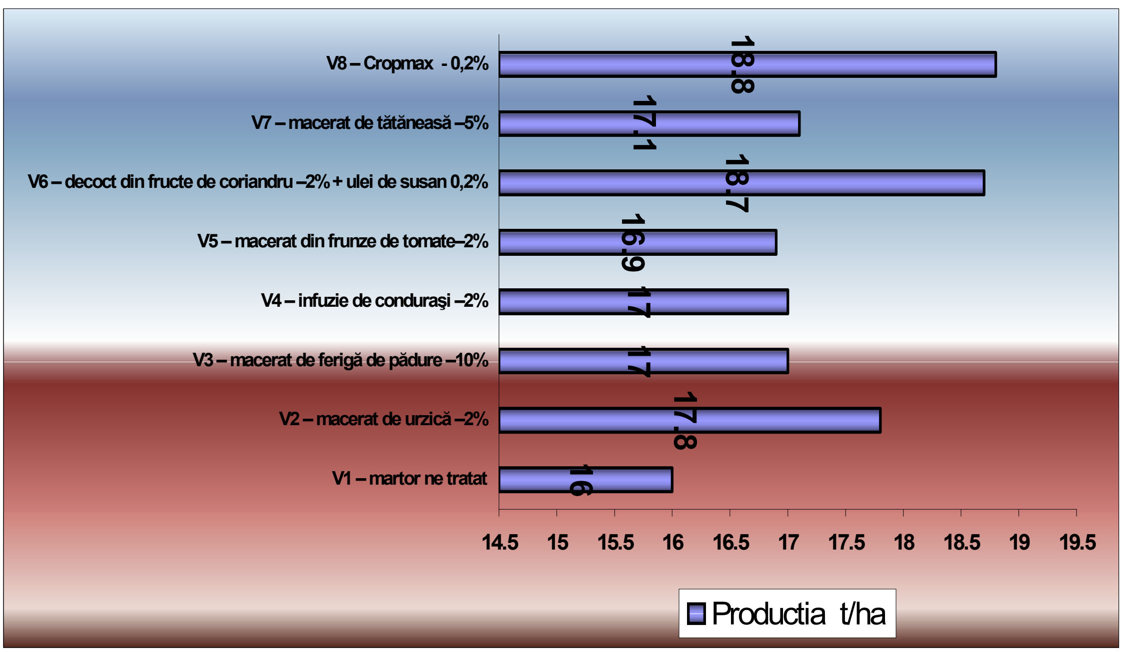
DL 5% = 0,85 t/ha; DL 1% = 1,25 t/ha; DL 0,1% = 1,8 t/ha

Figure 2 – Influence of fertilisation over the obtained production at sweet basil – Vert

Table 3

Influence of fertilisation over the obtained production at salvia - de Răsmiereşti

No. crt	Variant	Production	Difference comparing with witness t/ha	Signification of differences	
		t/ha	%		
1.	V1 – untreated witness	16,0	100	-	
2.	V2 – nettle macerate –2%	17,8	111,3	+ 1,8	**
3.	V3 – wood fern macerate–10%	17,0	106,3	+ 1,0	*
4.	V4 – conduras infusion–2%	17,0	106,3	+ 1,0	*
5.	V5 – macerate from tomato leaves–2%	16,9	105,6	+0,9	*
6.	V6 – decoct from coriander fruits–2% + sesame oil- 0,2%	18,7	116,8	+ 2,7	***
7.	V7 – comfrey macerate –5%	17,1	106,8	+ 1,1	*
8	V8 – Cropmax - 0,2%	18,8	117,5	+ 2,8	***



DL 5% = 0,75 t/ha; DL 1% = 1,35 t/ha, DL 0,1% = 1,75 t/ha

Figure 3 – Influence of fertilisation over the obtained production at salvia – de Răsmieresti

Table 4

Influence of fertilisation over the obtained production at brotherwort - de Dolj

No. crt	Variant	Production		Difference comparing with witness	Signification of differences
		t/ha	%	t/ha	
1.	V1 – untreated witness	12,5	100	-	-
2.	V2 – nettle macerate –2%	13,9	111,2	+ 1,4	**
3.	V3 – wood fern macerate–10%	13,4	107,2	+ 0,9	*
4.	V4 – conduras infusion–2%	13,5	108,0	+ 1,0	*
5.	V5 – macerate from tomato leaves–2%	13,6	108,8	+ 1,1	*
6.	V6 – decoct from coriander fruits–2% + sesame oil- 0,2%	15,4	123,2	+2,9	***
7.	V7 – comfrey macerate –5%	13,8	110,4	+1,3	**
8	V8 – Cropmax - 0,2%	15,5	124,0	+ 3,0	***

DL 5% = 0,79 t/ha
DL 1% = 1,20 t/ha
DL 0,1% = 1,85 t/ha

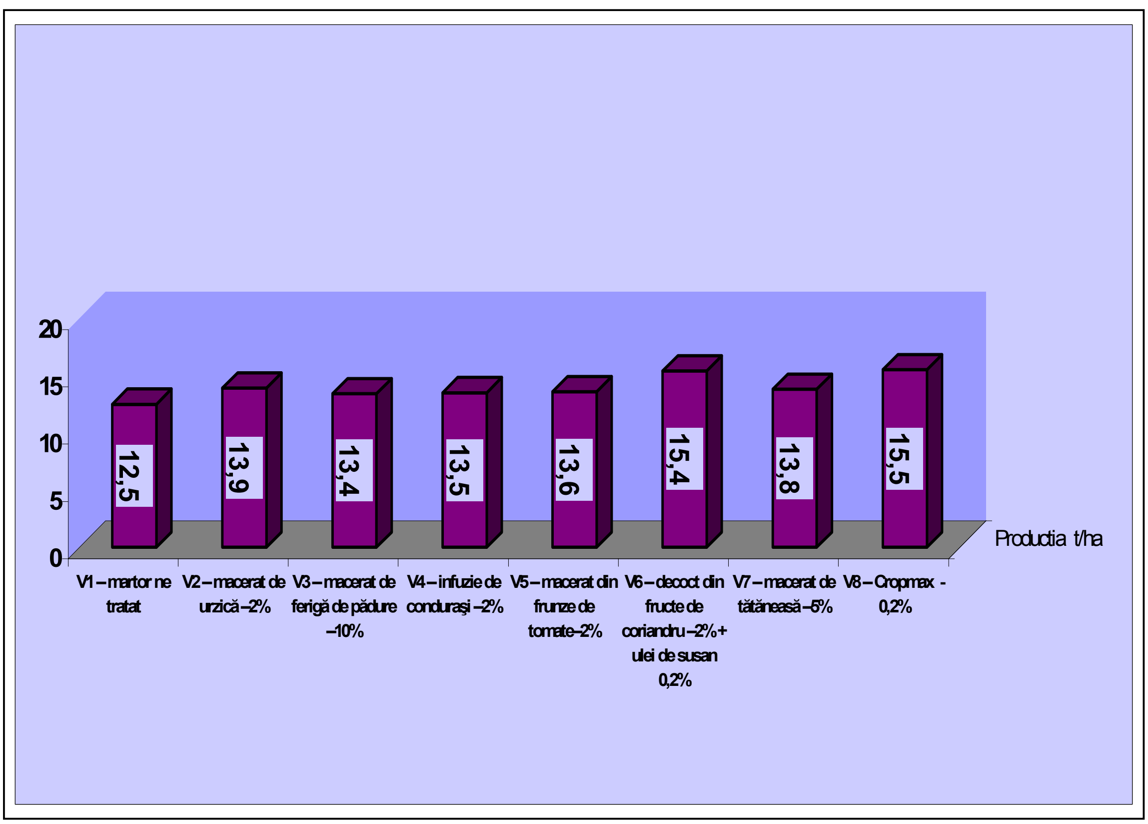


Figure 4– Influence of fertilisation over the obtained production at brotherwort –de Dolj

Lucrări ştiinţifice U.S.A.M.V.B., Seria B, Vol. XLIX, 2006

STUDIES CONCERNING THE PROGNOSIS OF WATER APPLICATION IN BACAU AREA, AT SOME AROMATIC AND SPICY SPECIES (*OCIMUM BASILICUM* L. AND *SATUREJA HORTENSIS* L.)

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Keywords: aromatic, plant, *Ocimum basilicum* L. ,*Satureja hortensis* L.

ABSTRACT

The establishment of water application moment for the spicy and aromatic species is made based on a monthly balance, in which starting from a known soil water supply, and at exits, the daily consumptions resulted from the correction of evaporation with the determined transformation coefficient. When the water supply is drawing near the minimum limit of the specie the prognosis of water application can be established.

INTRODUCTION

The main purpose of water application prognosis and warnings is the optimum satisfaction of plants requests for water, in order to obtain a maximum efficiency at plants.

Thus, the problem is studied beginning with the climacteric environment (from which the potential evaporation ETP is the fundamental parameter), involving in the correction coefficient (K_C) the plants and soil characteristics, reaching to the appreciation of maximum effective evapo-transpiration (or the maximum hydric consumption), ETM = $K_C \times$ ETP, where:

ETM – maximum evapo-transpiration;
K_C - correction coefficient;
ETP - potential evapo-transpiration.

Taking in consideration the fact that the evapo-transpiration is more complex phenomenon, due to the intervention of other factors with an important weight, appears the necessity to establish a relationship between the two categories of consumption (through evaporation and evapo-transpiration).

The minimum limit of water application to a crop is conditioned firstly by the evaporation force of the atmosphere. The establishment of the minimum limit, depending on the ETM, is responding best to the focused technical and economical exigencies.

An important condition for the establishment of the irrigation regimes is the understanding of water consumption of the irrigated plants, with direct implications in the dimensioning of irrigation systems.

The species with a high transpiration coefficient are the plants with small capacity of water utilisation. The intensity of the transpiration determines the quantity of water that the soil must assure per time unit.

During the water application, the transpiration consumption is reducing with a value equal with the water evapo-transpirations through leaves and soil surface, so the lost are low.

Depending on the phenological phases, the plants needs for water is different during the vegetation period.

MATERIALS AND METHODS

The determination of water consumption through evapo-metrical methods was made based on previous researches with minimum limit and water application norms.

The biological materials used for setting up the experience are the varieties DARIA for savory and VERT for sweet basil.

The monthly transformation coefficients were obtained through the ratio of water consumption of plants and the evaporation from the evaporimeter.

The researches were achieved during 2004-2006 years in an experimental field of water balance in soil, without internal water contribution. The field was gifted with a warning station with the following equipment: evaporimeter BAC, A class, pluvimeter, thermometer.

The factor utilised for the appreciation of the hydric consumption is the knowing of the correction coefficient (K_C) bounded with the crop and cultural techniques.

The factors that influence the plants water consumption – the evapo-transpiration (the quantity of evaporated and transpirated water per unit of cultivated surface m^3/ha/day).

RESULTS AND DISCUSSIONS

In 2004, 2005 and 2006 years were created experimental conditions that were analogue with the one from the experimental polygon with the purpose of determination of the transformation coefficients in these years too.

The leading of irrigation system was made taking in consideration the maintaining of a minimum limit of 85% from IUA, on a depth of 60 cm.

The dynamic of soil humidity was recorded through the gravimetric method, by getting soil samples, gradually on the entire vegetation period, in 20 cm layers until a 60 cm depth.

The monthly and total water consumption was established through balance methods, considering the initial reserve at planting time and the final reserve at harvest time.

The readings were made daily at the same hour at evaporimeter. In order to establish the consumed quantity of water weekly diagrams were made, recording the precipitations and evaporation, calculating the correlation coefficients per months.

The sources of covering the water consumption were: water supply from soil (without the freatic water), precipitation and irrigations. The water applications were made through perforated baluster, from basins, when the momentary provision of soil was decreased under the minimum limit of water application.

From the data presented in the table on observe the fact that the final reserve of water in the soil is almost without exceptions lower than then initial reserve (from the beginning of vegetation). So, we can conclude that the total water consumption of plants from the vegetation period does not equivalate with the precipitation sum and the irrigation norms, the difference being completed by the initial reserve.

The meteorological aspect of the year determines the fluctuations in the annual water consumption of plants that varied in the studied years between 3,4-4,7 thousand m^3/ha.

Following in dynamic the medium water consumption on observe an ascendant curve from the beginning of vegetation, curve that reach to a maximum level in June-July. After this moment an accentuate decrease of water consumption can be observed.

In what concern the evaporation at water gloss, it can be graphically represented through a similar curve, nut with higher values.

The coefficient of water capitalization had values between 135,54-169,02 m^3/t.

CONCLUSIONS

1. The research methods requires a longer period of time, so, for a better utilisation of coefficients in water application prognosis, saving the irrigation water and pumping energy, is absolutely necessary to continue the experiments in order to be able to determine a media in different climacteric conditions.
2. In the years that are regular from climacteric point of view (precipitations, temperature, atmospheric humidity), the correction coefficient values, have an increased evolution until the middle of vegetation period (unitary value) and then a decreased one (subunitary value) towards the end of vegetation period
3. The correction coefficients determined between 2004-2006 years have, in generally, subunitary values at the beginning of the vegetation period (0,90), then becoming unitary or superior in the months of maximum water consumption (0,93).
4. In the present conditions in which the water supply for irrigation becomes a problem in the establishment of costs for the obtained products, the rationalization of consumption must be a top priority.
5. The establishment of water application moment for a vegetable species in Bacau area is made based on a monthly balance, in which starting from a known soil water supply, and at exits, the daily consumptions resulted from the correction of evaporation with the determined transformation coefficient. When the water supply is drawing near the minimum limit of the specie the prognosis of water application can be established.

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Table 1

The factors that conditions the correction coefficient

Biological factors	Pedological factors	Agro technical factors
- specie; -variety; -maturation époque; - the development of rooting system; - leaves surface; - plants age.	- the soil humidity during planting time and vegetation period;	- sowing density; - type of crop (coverage degree of soil); -soil cultivation technique; - weeding;

Table 2

The factors that influence the water consumption of plants (after Grumezea, 1989)

Biological factors	Pedological factors	Agro technical factors
- solar radiation; - air humidity; - the pressure of steams in atmosphere; - precipitations; - wind; - air temperature.	- soil humidity; - texture and structure; - colour, slope, exposition; - organic substance content; - porosities; - hydro-physic feature; - fertility level.	- the developmental degree of roots; - vegetation period; - vegetation phase; - pests and pathogen agents; - temperature of leaves; - solar radiation absorption by the leaves; - the concentration of steams near by the leaves; - the age of plants; - the applied agro-technique.

Table 3

The balance of water from soil without the contribution of interior water

Crop	Year	Initial supply m^3/ha	Precipitation supply m^3/ha	Irrigation norm m^3/ha	Exits from final supply m^3/ha	The total water consumption (e+t) m^3/ha
Savory	2004	1.784,94	563,4	1.627,54	1.229,44	2.856,98
	2005	1.485,89	840,9	985,00	1.497,82	2.482,8
	2006	1.866,73	580,9	1.630,00	1.294,50	2.924,50
Sweet basil	2004	1.784,94	563,4	1.720,56	1.229,44	2.950,00
	2005	1.485,89	840,9	1.285,00	1.497,82	2.782,82
	2006	1.866,73	580,9	1.690,00	1.294,19	2.984,19

Table 4

The coefficient of monthly transformation

Crop	Year	Month	Medium water consumption $m^3/ha/day$	Evaporation $m^3/ha/day$	Coefficient of monthly transformation
	2004	May	40,33	44,80	0,90
Savory and sweet basil		June	42,70	60,80	0,70
		July	45,25	64,24	0,70
		August	49,90	47,06	1,06
	2005	May	33,07	60,80	0,91
Savory and sweet basil		June	55,32	64,24	0,83
		July	44,80	54,83	0,82
		August	64,92	59,02	1,10
	2006	May	34,20	42,22	0,81
Savory		June	34,92	30,21	1,16
Sweet basil		July	46,78	48,30	0,97
		August	26,91	30,62	0,88

Table 5.

The coefficient of water capitalization

Crop	Year	Total production t/ha	The total water consumption m^3/ha	The water capitalization coefficient m^3/t
Savory	2004	15,5	2.856,98	139,02
	2005	15,8	2.379,19	157,41
	2006	15,4	2.924,50	135,54
Sweet basil	2004	18,6	2.949,44	139,20
	2005	18,9	2.782,82	160,40
	2006	18,8	2.984,19	145,50

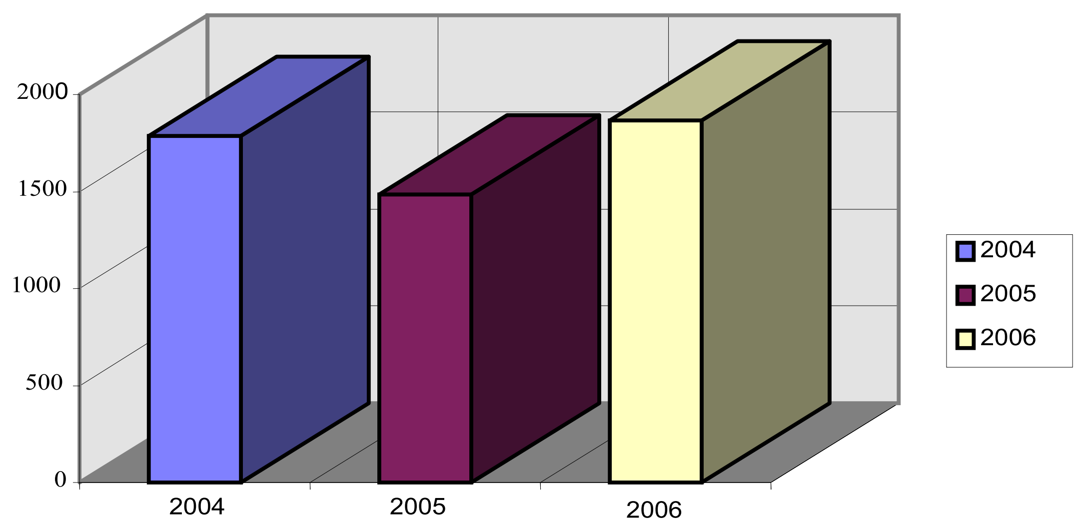

Figure 1. The initial water reserve - - m³/ha at biologic cultivation of sweet basil and savoury

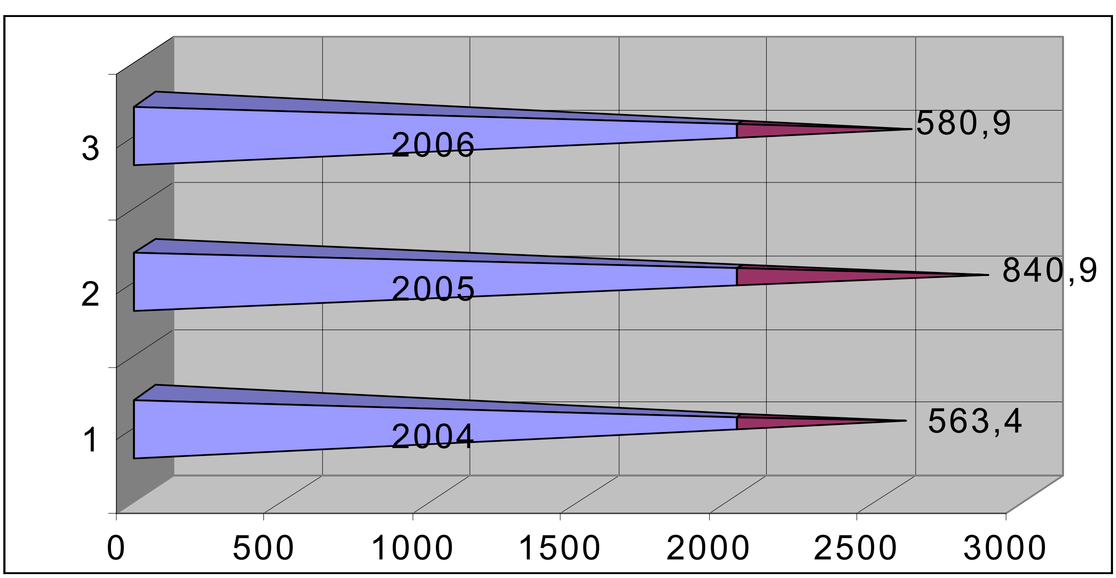

Figure 2. Entrances from precipitations (m³/ha)

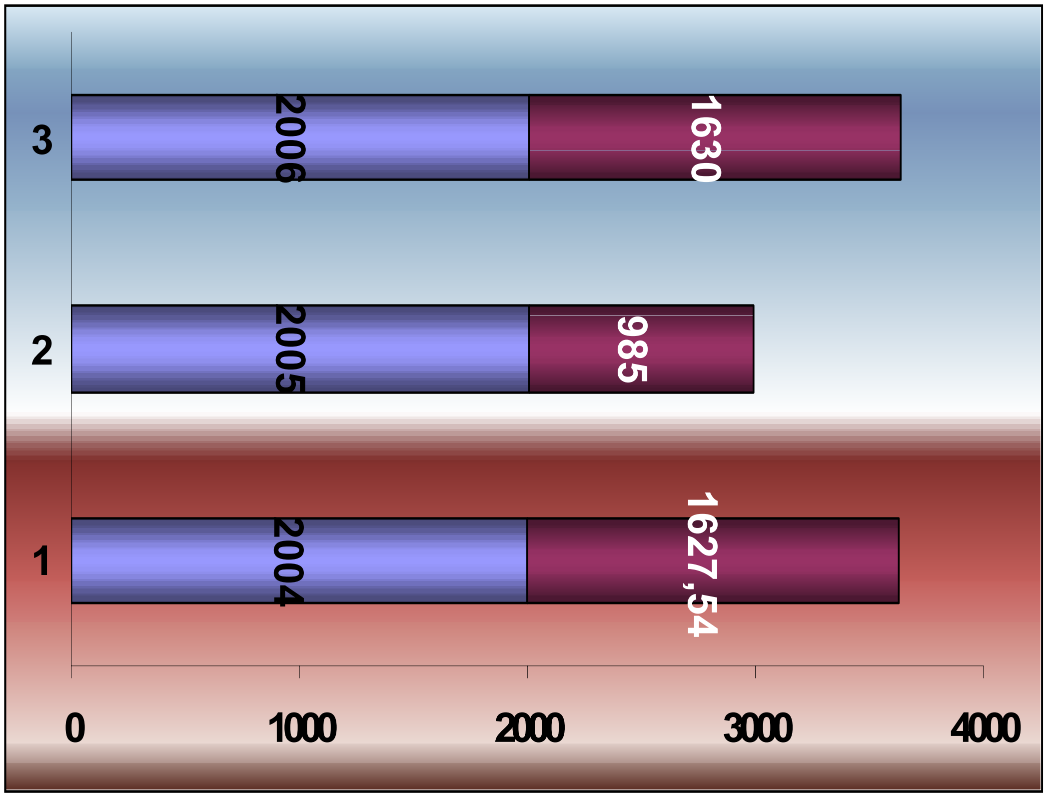

Figure 3. The irrigation norm in the biologic crop of savoury

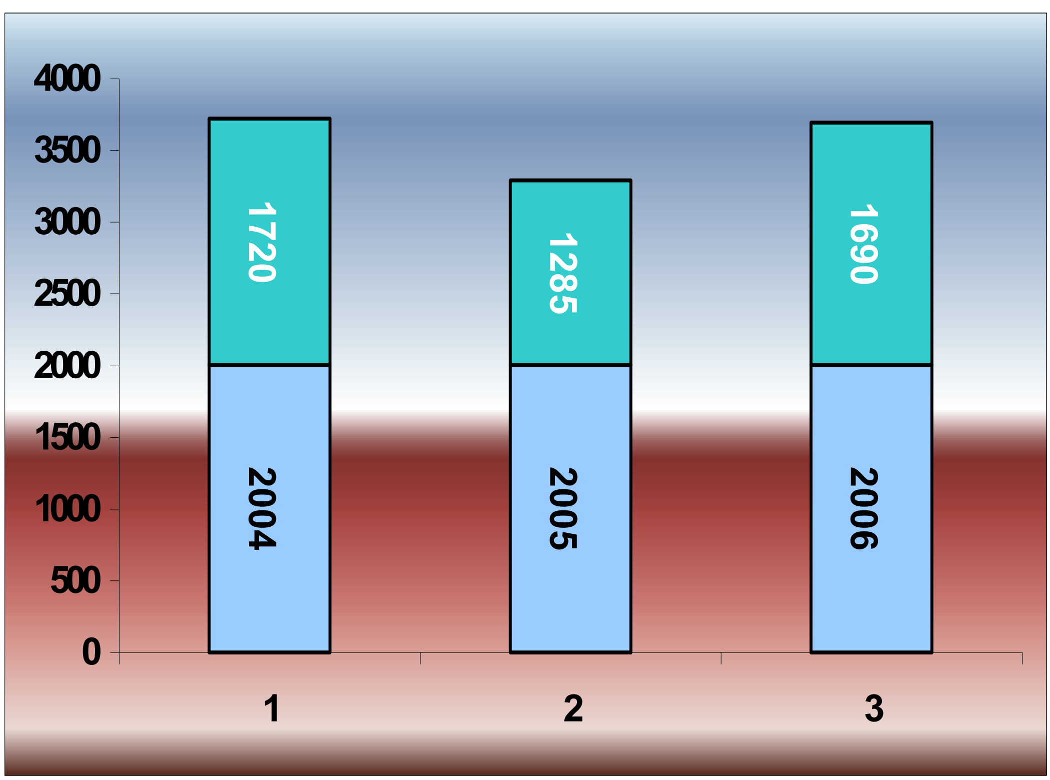

Figure 4. The irrigation norm in the biologic crop of sweet basil

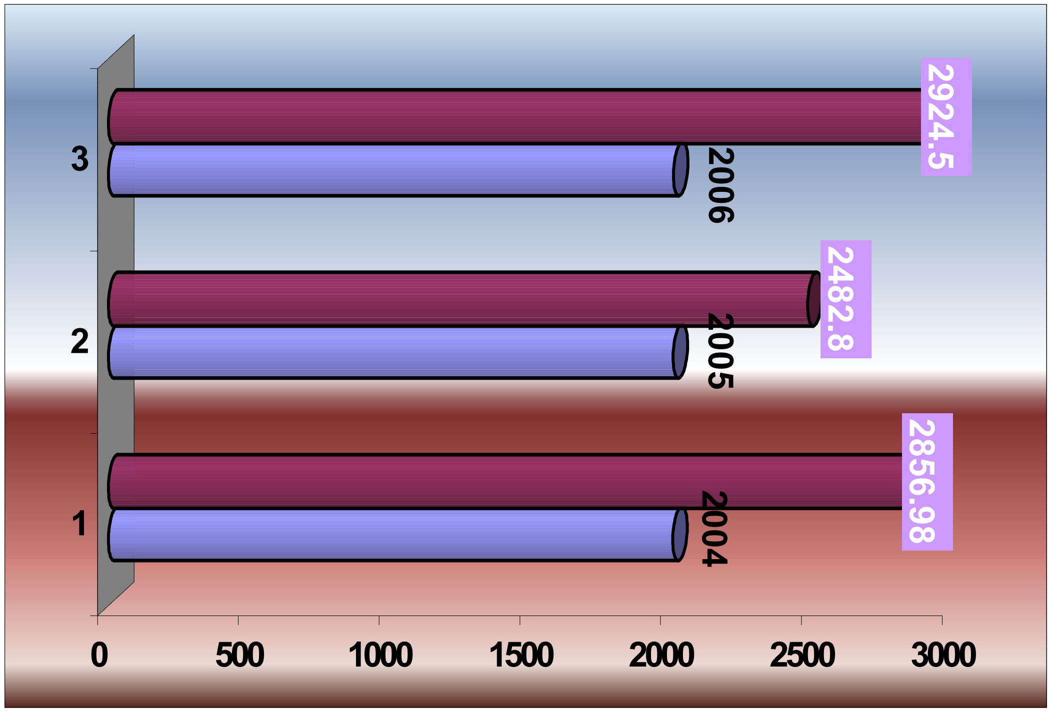

Figure 5. – The total water consumption m.c./ha in biologic crop of savoury (e + t)

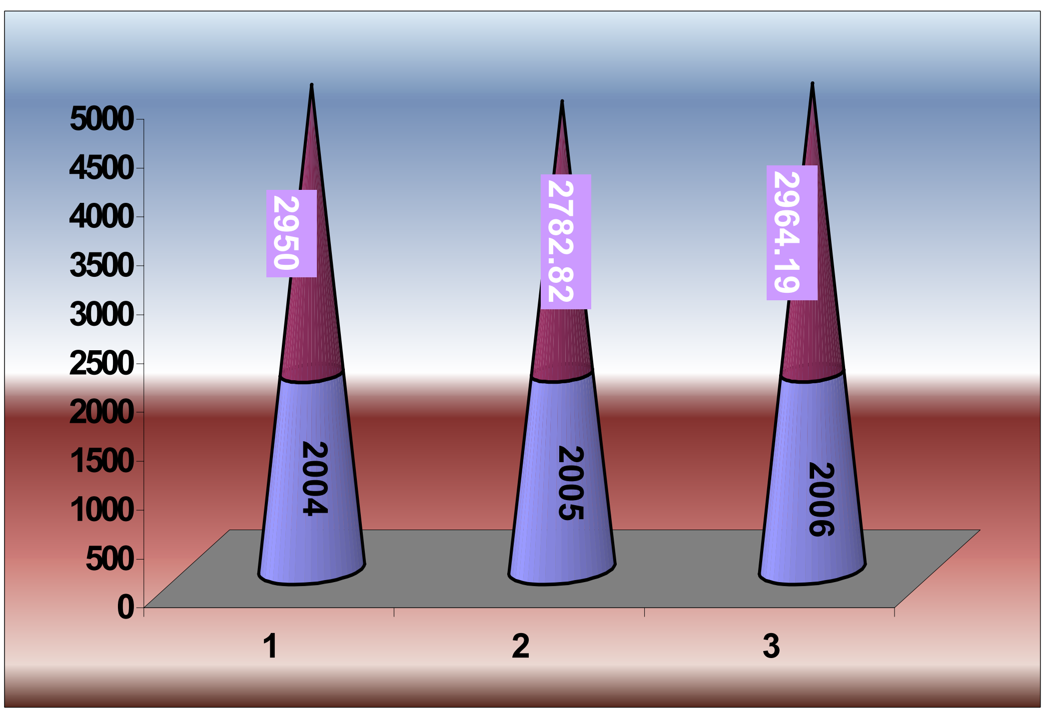

Figure 6 - The total water consumption (e + t) m.c./ha in biologic crop of sweet basil

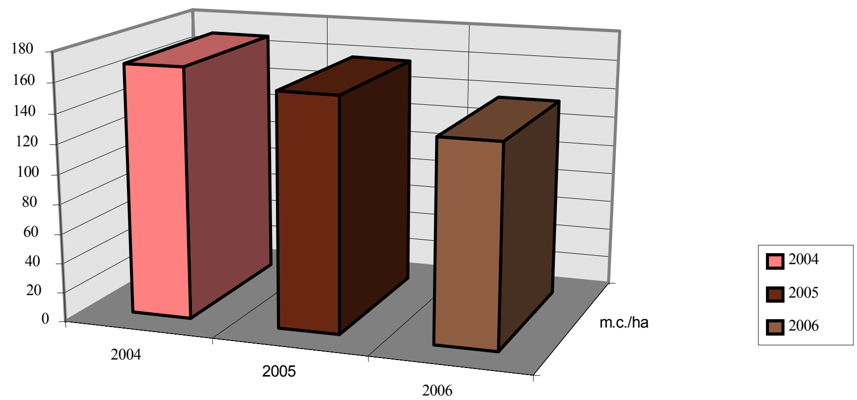

Figure 7. – The water capitalization coefficient (m.c./t) in the biologic crop of savoury and sweet basil

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STUDIES ABOUT THE INFLUENCE OF THE HYBRID AND THE DENSITY ON THE EARLY CULTIVATION OF BROCCOLI

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Keywords: *Brassica oleracea convar. botrytis var. italica* Plench, field, nutrition space, production, Chevalier, Milady, CLX3501-Ms.

ABSTRACT

Broccoli or the green cauliflower is not enough known and cultivated in Romania, but in the future it can become an important crop because of the high nutritive value and the good taste. The present paper presents the comparative study of three broccoli hybrids and the influence of four variants of density on the main biometric and production indicators in the early culture in the field. The biologic material used was represented by the following hybrids: Chevalier, Milady and Clx3501-Ms. There were used four culture densities: 70/25, 60/25, 70/35, 60/45 (the control variant).

INTRODUCTION

Broccoli is cultivated for the flower primordia (buds, before opening) and the flower pedicels which form a green head (Ciofu Ruxandra, 1996). Recent studies in medical field have shown that broccoli has in its composition substances with benefic effects for the health of the human organism, and even in the healing or slowing down the evolution of some chronic diseases, such as cancer.

In this research, the main target was to establish the best combination between hybrid and density in order to obtain a suitable and favourable economic production. Also, broccoli can represent an alternative for the completion of the range of vegetables from our country.

MATERIAL AND METHOD

The research was made at the Department of Vegetable Growing of Horticulture Faculty belonging to the University of Agronomic Sciences and Veterinary Medicine of Bucharest, in 2006.

It was organised a bifactorial experience in the subdivided lots with three repetitions: the A Factor (the hybrid), with three gradations: a1 = Chevalier F1, a2 = Milady F1, a3 = Clx3501-Ms. The B factor (the density), with four gradations: b1 = 70/25 cm, 57142 plants/ha; b2 = 60/25 cm, 66666 plants/ha; b3 = 70/35 cm, 40816 plants/ha; b4 = 60/45 cm, 37037 plants/ha (the control variant).

The culture started with the planting of the transplants. The seeding was made in boxes, and the broccoli plants rising was equal taking place in a period of ten days from seeding, because of the low temperatures. The transplants were pricked out in the phase with two leaves in plastic flower pots, with different colours in order to avoid mixing the hybrids. The temperature conditions were attentively observed, taking into account the fact that the exposure of the transplants at low temperatures on a long period of time increased the early appearance of floral stalks, while the inflorescence remains at small dimensions. The plantation of the transplants was made at 6th April 2006 (the hybrids Chevalier and Milady) and at 10th April 2006 (the hybrid Clx-3501Ms) in the field at variable distances between the rows as well as between the plants on a row. During the vegetation period, there were applied some field works which consisted of: the completion of the empty spaces, digging in order to destroy the weeds, two fertilizations made in phases with Comlex III 300 kg/ha, irrigation, treatments against the pest (Phyllotreta atra and Agriolimax agreste) with Novadim 0,15% and Optimol 15 kg/ha. The harvest was made manually by cutting the compact inflorescences, with a uniform colour, without flaws and with the floral buds completely closed at 15-20 cm from the stem. During the research period, there were made comparative observations between hybrids taking into account: the plants height, the number of leaves, the stalk diameter, the number of secondary sprouts/plant, and for the inflorescence, there were observed the weight, the diameter, number of bunches in the inflorescence and the diameter of these bunches.

RESULTS AND DISCUSSIONS

The studied hybrids had an equal rising, with a rate of 86% at the hybrid Chevalier, 88% at the hybrid Milady and 80,3% at Clx3501-Ms. Some differences can also be observed in the growing of the transplants, which before planting had a height of 14,2 cm, and 6,0 leaves in the case of Chevalier hybrid, 13,5 cm and 6,0 leaves in the case of Milady and 11,2 cm and 5,0 leaves at Clx-3501Ms. After planting in the field, some growth differences appear among the hybrids, according to the applied density. So, at a large density, there is a tendency of extending the stem and the leaves, while the stem diameter decreases, and at a small density, the stem diameter increases and the plants height is smaller. The total mean height is bigger at a density of 66666 plants/ha, respectively 59,3 cm at V2Chevalier, 52,1 cm at V6Milady and 50,6 cm at V10Clx3501-Ms, in comparison with the density of 37037 plants/ha (the control variant) where the plants reached 56,8cm at V4controlChevailer, 50,3 cm at V8controlMilady and 47,3 cm at V12controlClx-3501 Ms.

It was taken into consideration even the number of secondary sprouts from the plant, being noticed some differences which consist more of a specific feature of the hybrid than of an influence of the plants density. The bigger number of secondary sprouts can be found at the Milady hybrid. Increasing the nutrition space the weight of main inflorescences is favourably influenced, obtaining at a small density the largest inflorescences. Between the hybrids, there are meaningful differences, respectively, the largest inflorescences are characteristic for the hybrid Chevalier (621,7g), followed by Milady (472 g) and Clx-3501Ms (370,2g). The mean weight of the main inflorescences grows directly proportionally with the growth of the nutrition space, having maximum values at the control variants (37037 plants/ha), respectively 748g at V4controlChevalier, 527g at V8controlMilady, and 452 g at V12controlClx3501-Ms. As far as the main production obtained at the surface unity is concerned, it decreases with the increase of the nutrition space. At high densities (66666 plants/ha), smaller main inflorescences are obtained at all hybrids, 531g at V2 Chevalier, 397g at V6 Milady and 302g at V10Clx3501-Ms, but related with the surface unity, the production is big. At large densities of planting (66666 plants/ha), the largest productions are obtained, respectively 35,439 t/ha at V2Chevalier, 26,466 t/ha at V6Milady, and 20,133t/ha at V10Clx3501-Ms.

CONCLUSIONS

1. Broccoli is a vegetable relatively easy to cultivate, can be adapted to early cultivation in the field and can contribute at the enrichment of the range.
2. The planting density has an influence not only in the development of the plants, but also in the production obtained. The main production obtained at the surface unity decreases with the increase of the nutrition space.
3. The biggest production was obtained by the Chevalier hybrid, followed by Milady and Clx3501-Ms. The mean production obtained on a plant was of 0,667 kg at the hybrid Chevalier, 0,541 kg at Milady and 0,435 kg at Clx3501-Ms, and related at the surface unity, it was of 32,687 t/ha at Chevalier, 26,729 t/ha at Milady and 21,267 t/ha at Clx3501-Ms.

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Tables

Table 1. Experimental variants

Hybrid	Variant	Distancies (cm)	Nutrition space (cm²)	Plants/ha
Chevalier	V1	70/25	0,175	57142
	V2	60/25	0,150	66666
	V3	70/35	0,245	40816
	V4Control	60/45	0,270	37037
Milady	V5	70/25	0,175	57142
	V6	60/25	0,150	66666
	V7	70/35	0,245	40816
	V8 Control	60/45	0,270	37037
Clx-3501-Ms	V9	70/25	0,175	57142
	V10	60/25	0,150	66666
	V11	70/35	0,245	40816
	V12Control	60/45	0,270	37037

Table 2. The main phenophases at broccoli in the early cultivation

Specification		Hybrid		
		Chevalier	Milady	Clx-3501 Ms
Transplants production	Seeding (date)	3rd February	3rd February	3rd February
	Rising (date)	13rd February	13rd February	13rd February
		86%	88%	80,3%
	Pricking out	27th February	27th February	1st March
	Age of the transplant (days)	53rd	53rd	57th
	Height (cm)	14,2	13,5	11,2
	Number of leaves	6,0	6,0	5,0
Planting (date)		6th April	6th April	10th April
Harvest	Main inflorescence	15th June	11th June	19th June
	Secondary inflorescences	4rd July	3th July	6th July
The number of days from planting to harvest		71	67	71

Table 3. The influence of the density in the growing of broccoli plants

Variant	Total mean height (cm)	Total mean number of leaves	Mean diameter of the stem	Mean number of secondary sprouts/plant
V1	58,5	25,0	5,5	2,0
V2	59,3	24,6	5,0	4,5
V3	54,1	25,6	5,7	2,5
V4Control	56,8	23,9	6,0	4,3
V5	52,0	26,9	4,4	6,2
V6	52,1	27,1	4,1	4,5
V7	51,2	26,3	4,7	5,5
V8Control	50,3	26,1	5,0	4,0
V9	49,9	22,9	4,1	2,5
V10	50,6	21,8	4,0	3,5
V11	47,5	22,1	4,1	3,0
V12Control	47,3	22,6	4,2	1,2

Table 4. The statistic interpretation of the results of the production

	Variant/ (plants/ha)	The main mean production (t/ha)	The difference (t/ha) between it and the variant from the following places:			
			IV	III	II	I
	The Chevalier hybrid					
I	V1-57142	31,770	4,063***	5,138***	-3,669°°°	-
II	V2-66666	35,439	7,732***	8,807***	-	3,669***
III	V3-40816	26,632	-1,075°°°	-	-8,807°°°	-5,138°°°
IV	V4cont.37037	27,707	-	1,075***	-7,732°°°	-4,063°°°
	The Milady hybrid					
I	V5-57142	27,268	7,75***	7,391***	0,802***	-
II	V6-66666	26,466	6,948***	6,589***	-	-0,802°°°
III	V7-40816	19,877	0,359**	-	-6,589°°°	-7,391°°°
IV	V8cont.37037	19,518	-	-0,359°°	-6,948°°°	-7,75°°°
	The CLx-3501-Ms hybrid					
I	V9-57142	18,314	1,547***	1,702***	-1,819°°°	-
II	V10-66666	20,133	3,393***	3,521***	-	1,819***
III	V11-40816	16,612	-0,128	-	-3,521°°°	-1,702°°°
IV	V12cont.37037	16,740	-	0,128	-3,393°°°	-1,574°°°

DL5%= 0,226 t/ha; DL1%= 0,310 t/ha; DL0,1%= 0,423 t/ha;

Table 5. Production indicators at broccoli, early cultivation in field

Variant (plants/ha)	Mean weight of the main inflorescences (kg/plant)	Mean main production (t/ha)	Mean weight of the secondary inflorescences (kg/plant)	Mean secondary production (t/ha)	Mean total weight of the inflorescences (kg/plant)	Mean total production (t/ha)
The Chevalier hybrid						
V1- 57142	0,556	31,770	0,024	1,371	0,580	33,142
V2- 66666	0,531	35,439	0,063	4,229	0,595	39,666
V3- 40816	0,652	26,632	0,037	1,530	0,690	28,163
V4cont.- 37037	0,748	27,707	0,055	2,070	0,804	29,777
Mean	**0,621**	30,387	0,044	2,300	0,667	**32,687**
The Milady hybrid						
V5-57142	0,477	27,268	0,081	4,674	0,559	31,942
V6- 66666	0,397	26,466	0,054	3,599	0,451	30,066
V7- 40816	0,487	19,877	0,077	3,142	0,564	23,020
V8cont.-37037	0,527	19,518	0,064	2,370	0,591	21,888
Mean	**0,472**	23,282	0,069	3,447	0,541	**26,729**
The Clx-3501Ms hybrid						
V9- 57142	0,320	18,314	0,062	3,571	0,383	21,885
V10- 66666	0,302	20,133	0,070	4,666	0,372	24,799
V11- 40816	0,407	16,612	0,078	3,183	0,485	19,795
V12cont.- 37037	0,452	16,740	0,050	1,852	0,502	18,592
Mean	**0,370**	17,949	0,065	3,318	0,435	**21,267**

Table 6. The influence of the density in the content of mineral elements from the broccoli inflorescences, Milady hybrid

Var.	Mineral elements (mg/100g)											
	Ca	**Fe**	**P**	**K**	**Mg**	**Zn**	**Cu**	**Na**	**Cr**	**B**	**Sr**	**Al**
V5	65,71	0,33	197,0	255,0	32,9	0,51	0,10	5,97	0,23	0,35	0,14	0,63
V6	64,78	1,12	258,3	310,6	40,6	0,75	0,13	11,2	0,23	0,41	0,13	1,54
V7	84,12	1,25	281,2	330,3	46,3	0,96	0,12	13,7	0,24	0,58	0,13	1,42
V8con.	110,8	0,78	208,7	230,4	36,8	0,61	0,10	7,67	0,24	0,67	0,21	0,87
Mean	81,35	0,87	236,3	281,5	39,1	0,70	0,11	9,63	0,23	0,50	0,15	1,11

Table 7. The influence of the density in the content of pigments from the broccoli inflorescences, Milady hybrid

Var.	(mg/100g)					
	Chlorophill a	**Chlorophill b**	**Total Chlorophill**	**Chl.a/Chl b**	**Carotene**	**Chl/car.**
V5	41,25	31,39	72,63	1,31	19,22	3,78
V6	23,38	26,23	49,61	0,89	12,69	3,91
V7	28,98	29,80	58,78	0,97	14,39	4,08
V8con.	46,66	42,06	88,72	1,11	19,25	4,61

Table 8. The influence of the density in the process of respiration of the broccoli inflorescences, Milady hybrid

Variant	Respiration intensity, (mg CO2/kg/oră)
V5-57142 plants/ha	342,80
V6-66666 plants/ha	**467,78**
V7-40816 plants/ha	333,35
V8control-37037 plants/ha	360,83

Table 9. The content of water, total dry substance, mineral substances and dry soluble substance from the broccoli inflorescences, Milady hybrid

Variant	Water (%)	Total dry substance (%)	Mineral substances (%)	Dry soluble substance (%)
V5	86,38	13,62	1,19	5,2
V6	85,44	14,56	1,18	4,9
V7	87,18	12,82	1,10	5,8
V8con.	86,81	13,19	1,66	6,2

Figures

Figure 1. The influence of the density in the weight of the main inflorescences (kg/plant) and in the main production (kg/m²), the Chevalier hybrid

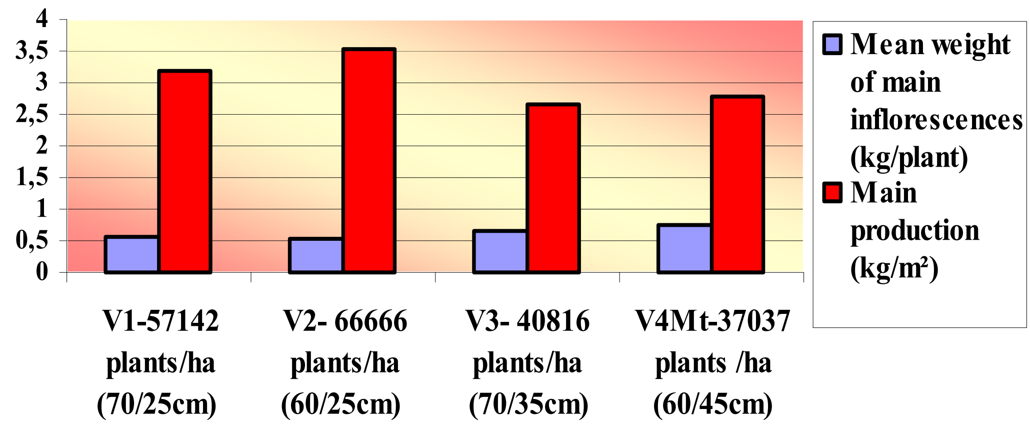

Figure 2. The influence of the density in the weight of the main inflorescences (kg/plant) and in the main production (kg/m²), the Milady hybrid

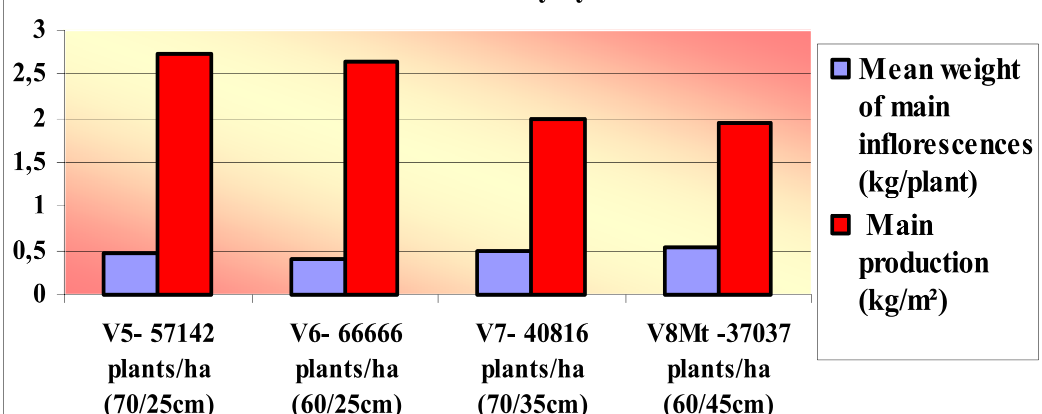

Figure 3. The influence of the density in the weight of the main inflorescences (kg/plant) and in the main production (kg/m²), the Clx-3501Ms hybrid

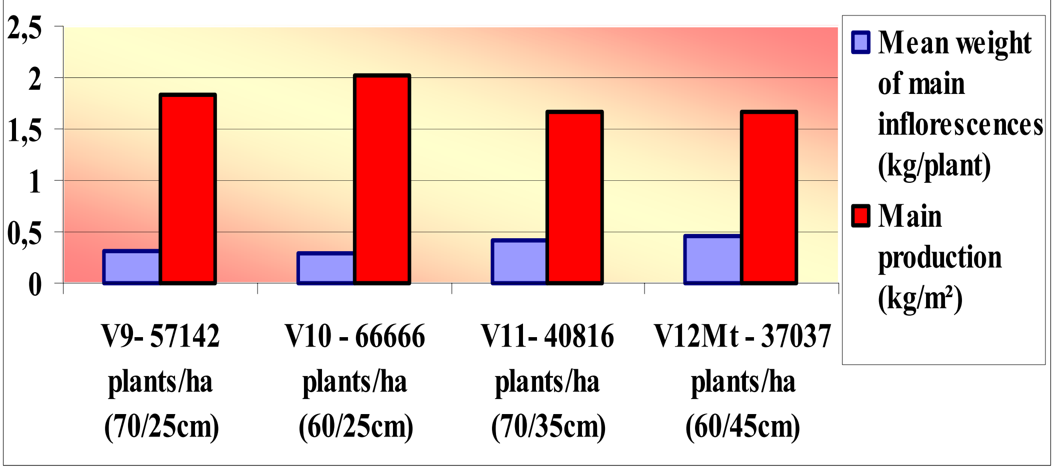

Figure 4

Figure 5

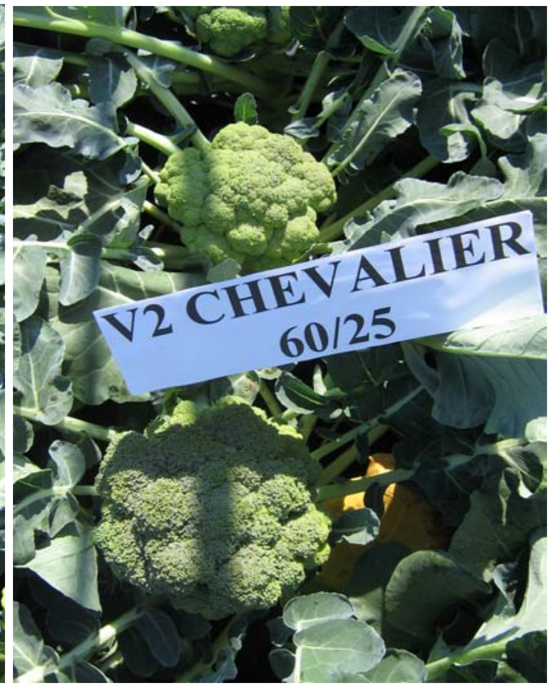

Figure 6

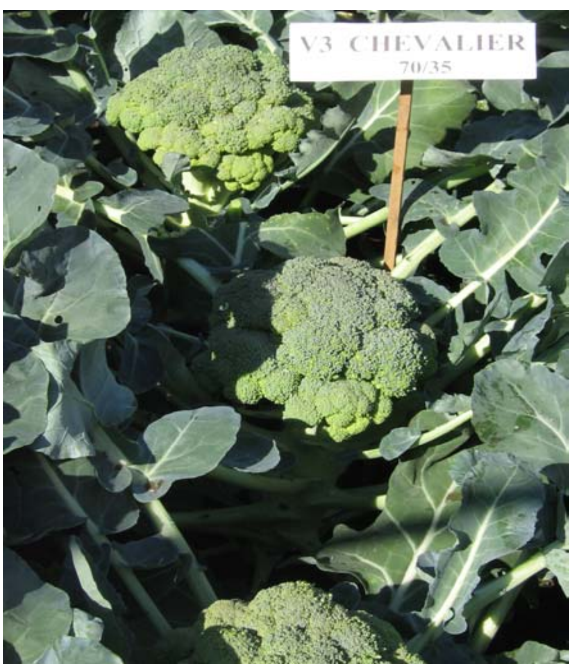

Figure 7

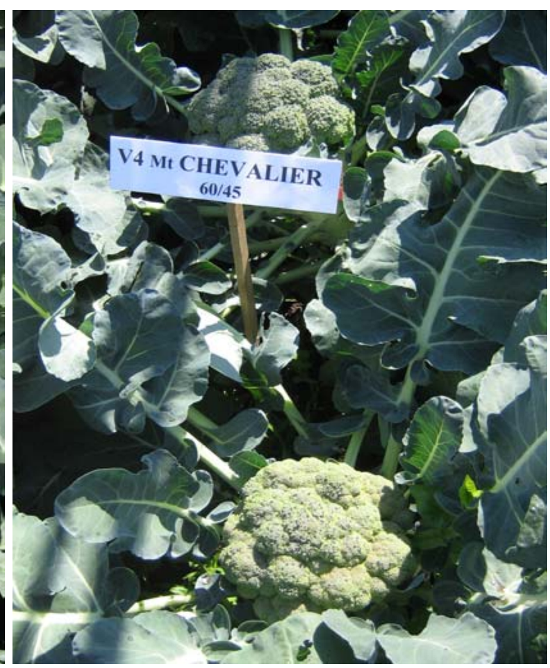

Figure 8

Figure 9

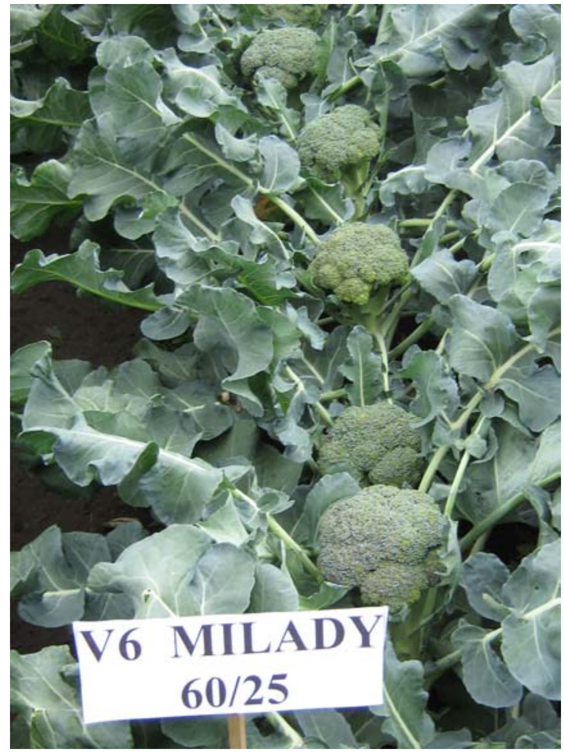

Figure 10

Figure 11

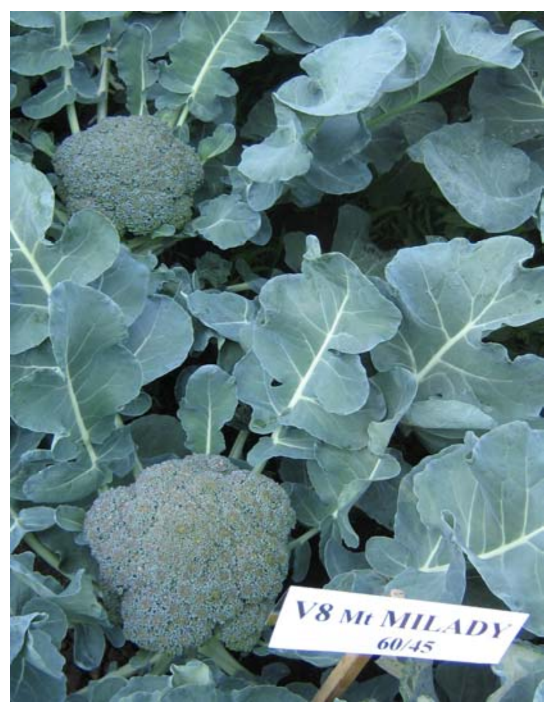

Figure 12

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RESEACHES REGARDING THE ESTABLISHMENT OF SOME CORRELATIONS BETWEEN PLANTLESTS BIOMETRIC SIZE AND PRODUCTION AT EARLY CABBAGE

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Key words: nursery transplant, substrata, biological parameters

SUMMARY

The experience has been founded to test some nutritive mixture recipes in order to produce early cabbage nurseries. The best results have been obtained on mixture of manure and perlit, in equal quantities, followed by the variant with 1/3 perlit plus 1/3 manure plus 1/3 top soil. Lower results have been obtained at variants with more perlit (2/3), because it is very poor in nutritive elements. The differences between variants have been registered at the nursery level and also at the cabbage production. The percentage of tied cabbage heads has been of 98-100% and the average weight of 0,593 kg and 0,868 kg.

The purpose of the experiment:
- To establish the best mixture recipes to produce cabbage nursery
- To use perlite in mixture with organic products in different proportions
- To eliminate the fasial fertilization of nursery by using mixture containing a high level of nutritive elements
- To obtain strong nursery able to face better the stress.

MATERIAL AND METHOD

The biological material was represented by Timpurie de Vidra, variety with a short period of vegetation aimed for early culture.
The studied variant was:
- V1 – control (2 manure+1 leaves soil+1 top soil +1/4 sand)
- V2 – ½ manure + ½ perlit
- V3 – ½ top soil + ½ perlit
- V4 – 1/3 perlit + 1/3 top soil + 1/3 manure
- V5 – 2/3 perlit + 1/3 manure
- V6 – 2/3 perlit + 1/3 top soil
- V7 – 1/3 perlit + 2/3 manure
- V8 – 1/3 perlit 2/3 top soil

The planting in the final field was made at 15-th of March, following the scheme at respectively 50/30 cm. The plant used before the culture of cabbage was bean. During the vegetative period specific works were made for the culture of cabbage culture, including fazial fertilization, once, with Complex III 100 kg/ha.

RESULTS AND DISCUSSIONS

In what regards the growth in height, at some studied variants it was of over 4,5 cm respectively at 2, 8 and 3. The weakest were 5 and 6 were the perlite was predominant poor in nutritive elements.

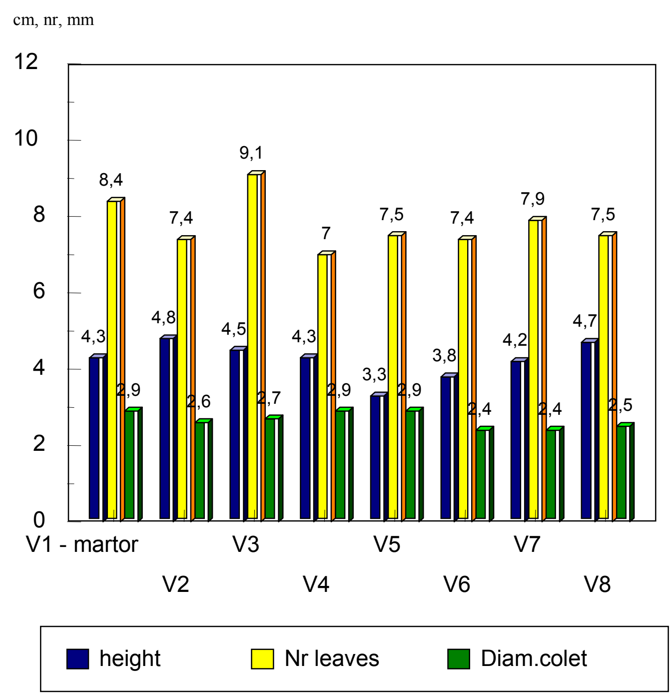


Fig. 1. Biometrical feature of cabbage nursery

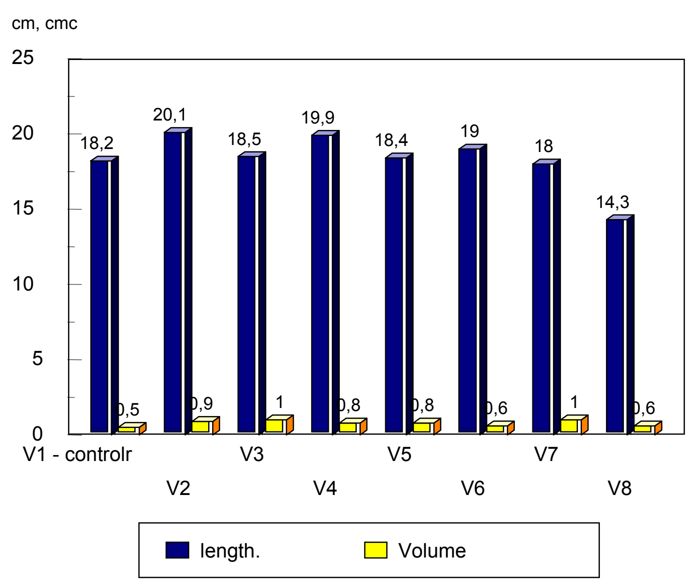


Fig. 2. The length and the volume of the roots system

In spite of all this the number of leaves was not diminished, being almost equal to the other variants. The total number of leaves was between 7 at V4 and 9,1 at V3. The strengthens of plants is appreciated by their thickness at collet which was between 2,4 mm at V6 and 2,9 mm at control, V4 and V5. The quality of a nursery is proved by the volume of the roots system. There is a position relationship between the growth of the roots and the growth of the plant. At the studied nurseries they were between 0,5 cmc at control and 1 cmc at V2 (fig. 2).

The growth of plants cam also be proved by their weight in the moment analyzed. It was observed that the stronger plants had a bigger weight, dominating the air part.

The mixture recipes did not influence the period in which the nurseries were obtained. There fore, after 53 days the nurseries from all variants fit into the field planting conditions. The heads of early cabbage had an average weight between 0,593 kg at V7 and 0.868 kg at V3 (fig 3), values established on dynamic harvesting.

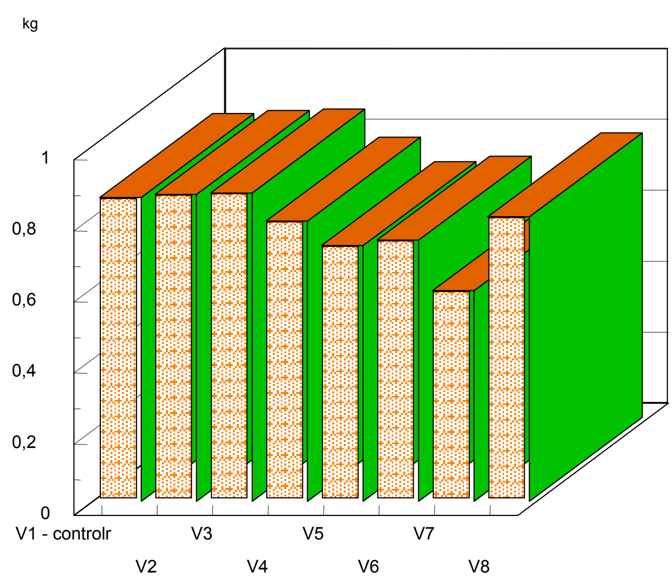
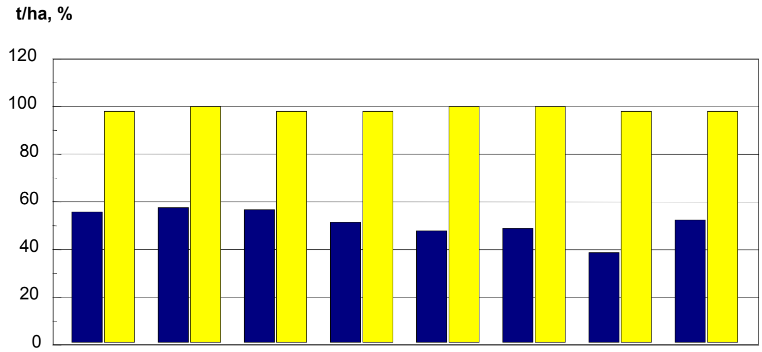


Fig. 3. The average weight of cabbage heads

The capacity of production of Timpurie de Vidra variety was influenced by the percentage of cabbage heads. The production had different values for each variant. There different are also proved by the average weight of cabbage heads.



V1 - mt	V2	V3	V4	V5	V6	V7	V8
55,8	57,6	56,7	51,5	47,9	48,9	38,7	52,3
98,0	100,0	98,0	98,0	100,0	100,0	98,0	98,0

Fig. 4. The production and the percentage of formed cabbage heads

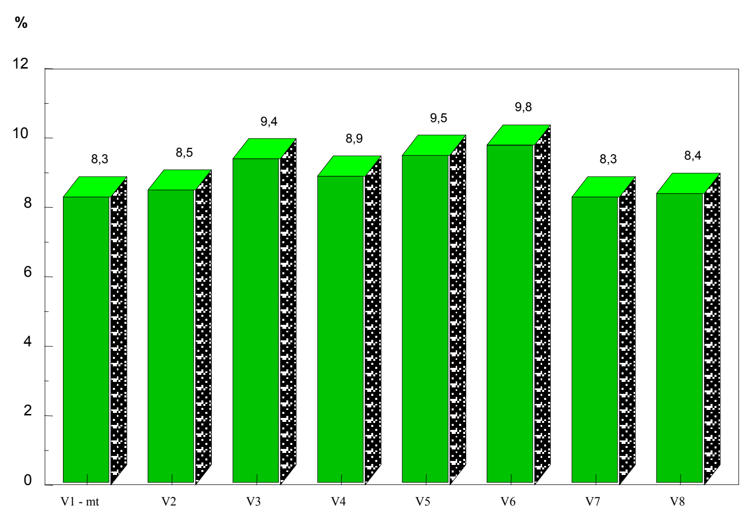


Fig. 5. The percentage of stem from cabbage head

To study a cabbage variety is necessary to consider the size and weight of stem from the head which has to be as small as possible, in order to have superior quality.

The percentage of stem varied between 8.3% at control and V7 and 9.8% at V6 (fig. 5).

To calculate the production of cabbage it is very important to establish the percentage of plants which formed saleable heads. Based on data obtained on field and on the interpretation of results, it can be proved that the forming heads percentage is high, over 98% at five variants and 100% at the others three (table 1).

Table 1

The percentage of formed heads at Timpurie de Vidra variety.

Variant	Transplants number	Harvesting heads	
		buc.	%
V1 / control	58	57	98
V2	60	60	100
V3	59	58	98
V4	59	58	98
V5	60	60	100
V6	60	60	100
V7	60	59	98
V8	59	58	98

CONCLUSIONS

Based on data and results interpretation regarding the producing of cabbage nurseries on different nutritive mixtures, the following conclusions can be stated:

1. The height of nurseries, as item which expresses their stress, was influenced by the nutritive mixture. On perlit an manure mixture were obtained on perlit 1/3 + top soil 2/3, ½ perlit + ½ top soil, 1/3 perlit + 1/3 manure + 1/3 top soil etc.
2. The average number of leaves and the collet diameter was not directly influenced by the mixture used, which concluded to small differences between variants
3. The roots system grew very well with all used mixtures. From the roots length point of view the best results were obtained at 2, 4 and 6. The roots system volume was around 1 cmc at V3, V7 and V2; the other variants registered values under 1.
4. The fresh weight of nursery at the planting moment was influenced by the nutritive mixture; this fact was proved by the rapport values between the air port and the root. Higher values were obtained at V1, V8 and V2.
5. The average weight of cabbage heads was bigger at the variants with nurseries in mixture of manure, top soil and perlit in equal proportion and control; the values varied between 855 g and 868 g. the smallest heads were obtained at the variant formed from 2/3 top soil and 1/3 perlit the values equals 593 g.
6. The biggest cabbage production was obtained at the variants which proved the biggest average weight of cabbage heads, respectively V2, V3 and control, 56.7 t/ha and 55.8 t/ha. The smallest production was obtained at V7, 38.7 t/ha.
7. The percentage of stem was under 10% at all variants
8. The forming heads percentage is very important and it influences the production. It was of 100% at V2, V5 and V6, and 98% at other.
9. The calculation of the correlation coefficient between the nursery feature and production did not show a direct dependence between these elements.

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STUDY REGARDING THE INFLUENCE OF TEMPERATURE ON SIZE AND UNIFORMITY TOMATOES FRUITS CULTIVATED IN COLD GREENHOUSE

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Keywords: tomato, uniformity, fruits

INTRODUCTION

The tomato growth in greenhouse has an important place both in the first cycle and in the second. The objective of many producers is to get good tomato crops, with uniform fruit and low expenses. Many tomato hybrids which are typical for greenhouse growth technically warmed up can also be used for the growth in unwarmed greenhouse.

Some studies realized by experts showed that not all the hybrids behaved accordingly when they had been grown in technically unwarmed greenhouse and when temperature variations had increased.

In the present study, we followed, especially the reaction of four tomato hybrids at temperature variations and their influence on the production and fruit uniformity.

MATERIAL AND METHOD

The study was realized in USAMV greenhouses-Bucharest on four tomato hybrids grown in two conditions: in warmed greenhouse (SC) and in artificial unwarmed greenhouse (SR).

The experimental variants were: $\mathbf{V_1}$ - Marissa F_1; $\mathbf{V_2}$ - Cyndel F_1; $\mathbf{V_3}$ - Fado F_1; and $\mathbf{V_4}$ - Khaterine $F_{1.}$

The growth were realized with nurseling of eighty days in warmed greenhouse on 15th of March (SC) and on 10-th of April in unwarmed greenhouse being eliminated after 120 days from the planting. The caring works for plants and soil respected the recommended technologies. Observations and establishments were realized regarding the growth and fructifications of hybrids in the two environmental conditions. From the two growth conditions minimum (8 o'clock) and maximum (14 o'clock) temperatures were registered. In order to characterize the early and total production, individual weights of harvested fruit were realized, and then were distributed on quality categories from 20 in 20 grams. The obtained dates and information were analysed statistically in order to underline the differences between variants.

RESULTS AND DISCUSSIONS

By analyzing the early production, we remarked that at all the hybrids grown in unwarmed greenhouse lower productions resulted if we compare them with the others grown in warmed greenhouse. The lowest early production was recorded at V1 both in unwarmed and warmed greenhouse, this being of 2.8 kg/m^2, that is 3.3 kg/m^2 and the highest at V3 of 5.0 kg/m^2, that is 6.2 kg/m^2. The total productions realized at studied hybrids were higher in growth conditions from technically warmed greenhouse if we want to compare them with the others from unwarmed greenhouse. They are contained between 9.060 kg/m2 (V1) and 15.424 kg/m^2 (V3), that is between 7.998 kg/m^2(V2) and 13.2 kg/m^2 (V3) - (figure1).

The Fado hybrid reacted in the most obvious way, the difference of early production between the growth from cold and warm greenhouse was of 1.187 kg/m^2, being higher with 28% if we compare it with the hybrids sum. The production from the warmed greenhouse was statistically obvious (table 1).

The productions obtained between 31 of May-31 of July also presented higher values in warmed greenhouse conditions and the differences are between 2.79 kg/m^2 at Marissa hybrid and of 5.03 kg/m^2 at Fado hybrid (table 2). Regarding the total production, the highest differences were obtained at Marissa hybrid and the lowest at Cyndel hybrid, table 3.

Regarding the uniformity of fruit grown in early production, we remarked that Melissa hybrid realized in warmed greenhouse presented a percentage of 73% of fruit with over 140 grams and in unwarmed greenhouse, the percentage was lower of 68% (fig. 2).

If we analyse the fruit uniformity of total production, we remark that at Katherine hybrid grown in unwarmed greenhouse presented the highest in uniformity of fruit if we compare it with the variant from the warmed greenhouse (fig. 2).

We appreciate that this in uniformity of fruit is due to temperature variations from day to night. In unwarmed greenhouse, in the conditions of 2004 year, between 25 of April and 31 of May, the average temperatures during the day were of 26.87 ^{o}C and in the night were of 11.8 ^{o}C, the differences being of 15.07^{o}C much higher than in warmed greenhouse, where the differences were of only 4.1^{o}C (table 4).

CONCLUSIONS

1. The total obtained productions were much higher in conditions of hybrids grown in warmed greenhouse where all environmental conditions were controlled in comparison with those obtained in unwarmed greenhouse.
2. The early productions were higher in warmed greenhouse compared with the unwarmed greenhouse.
3. Tomato fruit obtained from the hybrids grown in warmed greenhouse presented a more constant uniformity compared with those grown in unwarmed greenhouse.
4. The knowledge of hybrids behaviour and reactions at temperature variations is extremely useful for growers because tomato fruit valorifications on market must respect the standard delivery conditions.

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Table no 1

Differences between tomato early yield obtained in warm and cold greenhouse

Variants	**Early yield differences kg/m²**	**%**	**Differences of yield (31 May 31 July) kg/m²**	**%**	**Differences of total yield kg/m²**	**%**
V1 -Marissa	**0.461**	50	0.503	68	0.964	**57.76**
V2 - Cyndel	**1.074**	116	1.112	149	2.186	**130.91**
V3 - Fado	**1.187**	128	1.057	142	2.244	**134.38**
V - 4 Khaterine	**0.980**	106	0.305	41	1.285	**76.95**
Average	0.926	100	0.744	100	1.670	**100**

Table no 2

Tomato early yield obtained in warm and cold greenhouse

	UM	**Condition**	**Marissa**	**Cyndel**	**Fado**	**Khaterine**
The yield obtained (in average)	kg/m²	**SR**	2.79	3.06	5.03	3.11
		SC	3.26	4.13	6.21	4.09
Percentual diferences	%	**SR**	92.36	85	89.44	86.39
		SC	107.64	114.93	110.56	113.61
Significance	%	**SR**	N	N	O	N
		SC	N	N	*	N
			DL5% = 0.290 DL1% = 0.640 DL01% = 2.170	DL5% = 0.840 DL1% = 1.830 DL01% = 6.210	DL5% = 0.370 DL1% = 0.810 DL01% = 2.760	DL5% = 1.240 DL1% = 2.700 DL01% = 9.170

Table no 3

Tomato total yield obtained in warm and cold greenhouse

	UM	**Condition**	**Marissa**	**Cyndel**	**Fado**	**Khaterine**
Products obtain (in average)	kg/m²	**SR**	8.10	8.00	13.18	10.12
		SC	9.06	10.18	15.42	11.40
Percentual diferences	%	**SR**	94.38	87.98	92.16	94.03
		SC	105.62	112.02	107.84	105.97
Significance	%	**SR**	N	O	N	N
		SC	N	*	N	N
			DL5% = 0.870 DL1% = 1.890 DL01% = 6.430	DL5% = 0.900 DL1% = 1.950 DL01% = 6.610	DL5% = 2.150 DL1% = 4.670 DL01% = 15.830	DL5% = 2.150 DL1% = 4.670 DL01% = 15.840

Table no 4

The temperature recorded in 2004 in cold and warm greenhouse (in average)

Specifications	**The maximum temperature (°C)**	**The minimum temperature**	**Differences**
cold greenhouse 25 April -31 May	26.87 °C	11.8 °C	15.07 °C
iunie-iulie	29.8 °C	15.7 °C	14.1 °C
warm greenhouse 25 April -31 May	22.0 °C	17.9 °C	4.1 °C
1 June -1 July	29.7 °C	18.8 °C	10.9 °C

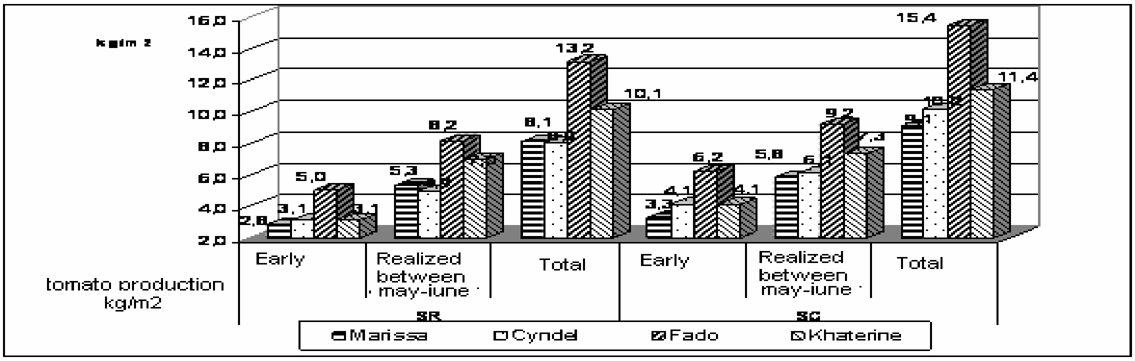
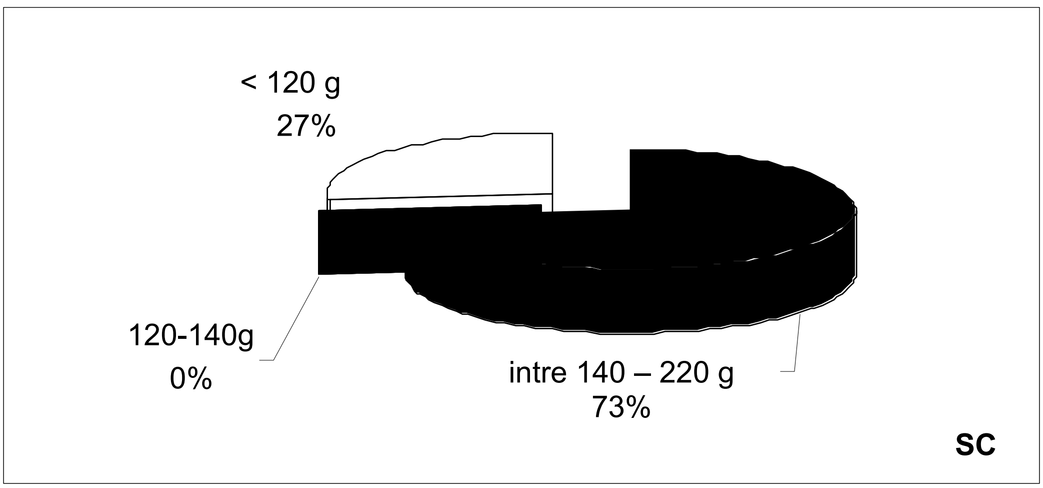


Fig. 1. The tomato yield realised in cold and warm greenhouse



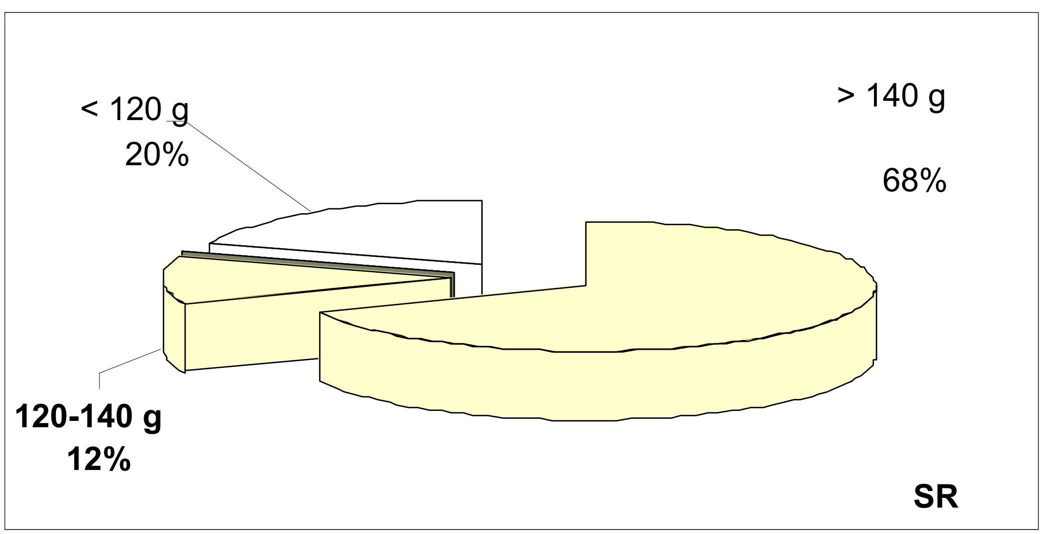


Fig. 2. Early yield of Marissa **-** Perceptual distribution on categories size fruits

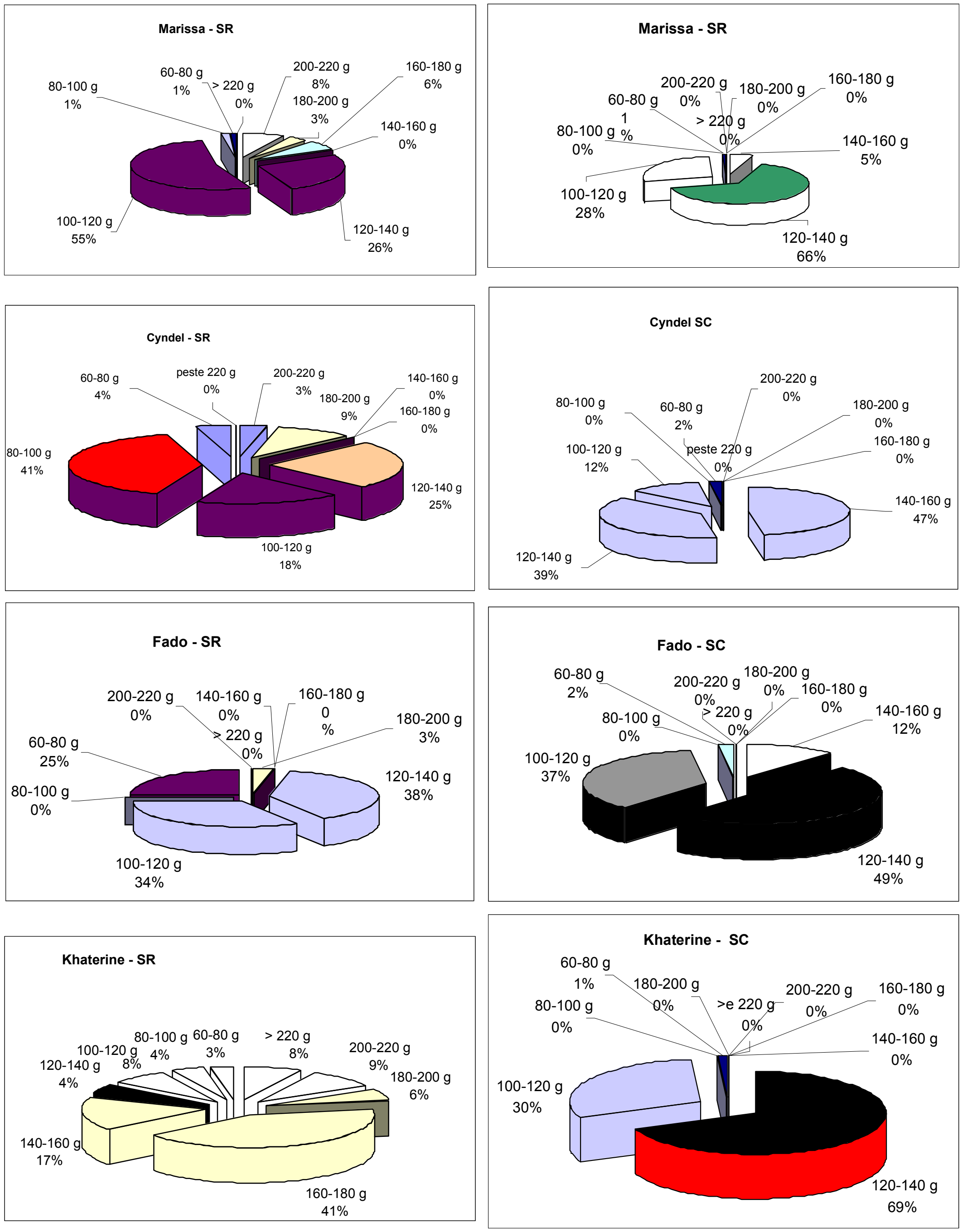


Fig. 3. The total yield variation of tomato hybrids

Lucrări ştiinţifice U.S.A.M.V.B., Seria B, Vol. XLIX, 2006

THE PRETABILITY OF A NEW ASSORTMENTS OF SUMMER-FALL TOMATOES FOR FRESH CONSUMPTION IN BUCHAREST AREA

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Keywords: summer-autumn tomatoes, tomatoes for fresh consumption

INTRODUCTION

The summer-autumn tomatoes for fresh consumption should assure the producing of very good vegetables from the commercial and quality point of view. The tomatoes fruits are obtained from the different special crops and for this there is a limited variety with undetermined grow.

This presentation represents the results obtained by utilizing of summer-autumn high crops with multi destination and for the crops in tunnels.

MATERIAL AND METHOD

The study variants:

In order to make this research project have been studied the variants presented in table 1. Practically, using a mono-factorial experiment have been studied the behaviour of a new tomatoes hybrids with undetermined grow.

The objectives of the research:

- To establish the production and quality level for tested varieties at this moment in the field;
- Elaboration of some recommendations by using of some hybrids based on the production results obtained.

The specific technology of crop applied in the experiment:

- The experimental crop was situated on a brown-red forest sole, under a tunnel uncovered, in the didactic and experimental field of the USAMVB Bucharest.
- The main fertilization have been done with a special complex fertilizer Agroblu, in a doze of 500 kg/ha, applied under the plants rows, before the establishing the crop.
- The experiment took place at 8 of March, using young plants of 46 days old, produced in special pots with a diameter of 6 cm and a capacity of 200 ml.
- The planting schema – 80 cm between the rows and 40 cm between the young plants- assured a density of 2,5 plants/square meter (2500 plants per ha).

After the establishing the crops have been done the follow works:

- To complete the wholes
- Preparing the sole by eliminating the wild plants and correcting the irrigation system
- The irrigation
- The treatments against plants diseases
- 4 fertilizations using Universal in a doze of 2 grams / plant / fertilization.

The plants have been situated in the uncovered tunnel.

The works for selection of good plants took place weekly.

OBSERVATIONS AND DETERMINATIONS

-The data of apparition and manifestation of the main phenophases
-The dynamic of vegetable growing and fructification
-The determinations regarding the production and of quality.

RESULTS AND DISCUSSIONS

Taking in consideration the description of the varieties fruits which have been used, a few determinations have been done regarding the diameter, the form indicator and average weight at two stages:

- At harvesting at 2nd of August (the fruits from the flowers 2 and 3)
- After harvesting, taking in consideration the total number of fruits and the weight of this.

From the diameter and weight fruits point of view have been promoted the varieties Caterina F1 and Lustro F1 (table 2) which corresponds to the actual requirements of the customers in Romania. The fruits of this hybrid with a diameter of 6 cm and a weight of more than 165 grams are according with the actual standards of extra quality.

From the total production point of view (table 3) have been promoted the same varieties. The production of this varieties – 7.02 kg/square meter for Caterina F1 and 6.15 kg for Lustro is higher with 2.34 kg/ha, respectively 1.47 kg/ha than the production of Saint-Pierre variety used as a sample in this experiment. During the whole harvesting period, both varieties have a high average weight of fruits (168.20 grams/fruit for Caterina F1 and 161.60 grams/fruit for Lustro F1).

As a general observation for all 7 varieties, we mentioned that the sanitary status unwell because of effects of the fungus disease, determined the ending of harvesting at the middle of September.

CONCLUSIONS AND RECOMMENDATIONS

1. Using a new variety for tomatoes summer – autumn crops in the field shows that it has been results of superior production at some hybrids of recent generation comparing to those characteristics seen at the whiteness (Saint-Pierre variety).
2. There has been clear that from the point of view of the total production Catrina F1 – 7.02 kg/mp and Lustro – 6,15 kg/mp overpass with 2,34 kg/mp, respectively 1,47 kg/mp, the witness production (Saint – Pierre – 4,68 kg/mp).
3. Quality of the 2 hybrids fruits is different; diameter and weight are superior to those produced by the other varieties included in this experiment.
4. We recommend the continuation of the experiments and the inclusion in the production of recent generation hybrids as Catrina F1 and Lustro F1.

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Table 1

The experiment variants
Summer-autumn high tomatoes – U.S.A.M.V. Bucharest 2006

No. of var.	Cultivar	Destination	
		Crop system	Consumption
1	*Saint-Pierre*	Field	Fresh
2	*Caterina F1*	Plastic tunnel, field	Fresh
3	*Abellus F1*	Plastic tunnel, field	Fresh
4	*Lustro F1*	Plastic tunnel, field	Fresh
5	*CLX 3312 F1*	Field	Fresh, processed
6	*Banier F1*	Plastic tunnel, field	Fresh
7	*Morabel F1*	Plastic tunnel, field	Fresh

Table 2

Height, diameter and medium weight of fruits
summer-autumn tomatoes – U.S.A.M.V. Bucharest – 2006

No.	Variety	Height mm	Diameter mm	I.F.	Medium weight g/fruit
1	*Saint-Pierre*	4,84	5,97	0,81	158,4
2	*Caterina F1*	7,04	6,02	1,17	172,8
3	*Abellus F1*	9,88	5,15	0,95	118,4
4	*Lustro F1*	7,48	8,20	0,91	168,3
5	*CLX 3312 F1*	6,00	1,88	3,13	81,2
6	*Banier F1*	4,90	5,03	0,98	129,2
7	*Morabel F1*	5,12	5,79	0,88	113,6

Table 3

Medium weight of the fruits and total production
summer – autumn tomatoes –U.S.A.M.V. Bucharest 2006

No.	Variety	Medium Weight g/fruit	No. of fruits on plant	Production Kg/plant	Production Kg/mp	Difference of Production Kg/mp
1	*Saint-Pierre*	94,70	19,8	1,87	4,68	-
2	*Caterina F1*	168,20	16,7	2,81	7,07	+2,34
3	*Abellus F1*	85,70	27,6	2,37	5,93	+1,25
4	*Lustro F1*	161,60	15,2	2,46	6,15	+1,47
5	*CLX 3312 F1*	60,60	25,3	1,54	3,84	-0,84
6	*Banier F1*	76,25	26,8	2,04	5,11	+0,43
7	*Morabel F1*	77,80	25,4	1,97	4,94	+0,26

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THE INFLUENCE OF THE TYPE AND THE TIME OF CROPPING AND CONSUMING UPON THE QUALITY OF SUMMER-FALL TOMATOES

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Keywords: summer-fall tomatoes, time of harvesting and consuming

INTRODUCTION

The summer type of tomatoes raised in Romania contains both traditional species and more modern ones created and commercialized by companies from Western Europe such as Holland, France and Denmark.

Because of the way in which tomatoes are organized and of their destination of being consumed fresh, farmers choose to grow species that maintain their commercial qualities and their flavour for a longer period of time. Maintaining very high quality parameters for tomatoes depends in an equal measure of their attributes and the time of harvesting and consuming.

This presentation points out the preliminary results regarding the attributes of tomatoes harvested from various sources during the season when they are ready to be consumed: the months July and August.

MATERIAL AND METHOD

Experimental values

For realizing the experimental program the following data was taken into account: Summer-fall tomatoes, U.S.A.M.V. Bucharest - 2006 (Table 1).

In order to conduct the experiment there were used three types of tomatoes with undetermined growth – R.Z. – 7490 F1 (from Holland) Tamaris F1 and Lustro F1 (from France), recommended for tied cultures in greenhouses and fields, a type with undetermined growth – Saint Pierre – recommended for tied cultures in the field and the Heinz 1370 type, with undetermined growth, that is used for untied cultures in the field.

The objectives of the research:

- Establishing the production performances for every species of tomatoes used;
- Establishing quality parameters for every type of tomatoes used;

The technology used during this survey:

- The experiment begun on the 8th of May, under the supervision of the vegetable department, using 46 days old seeding obtained in plastic flower pots (one time use glasses, with perforated bottom), trunk-shaped with an upper diameter of 6 cm and a capacity of 200 ml.
- The experiment was developed on a surface of 120 m^2 and was placed under an unheated greenhouse with a structure that was used to tie the seeding
- The distances of planting were of 80 cm between the rows and 50 cm between the plants in one row and this assured density of 2.5 plants/m^2 (2500 plants/ha).
- The plants were tied individually, with cords tied at the base of the shank on the greenhouse structural elements
- Weekly the plants were radically stripped. After 3 weeks from their plantation, the leaves from the base of the shank were removed.

- The plant health treatments against plague were conducted using fungicides containing copper which are accepted during specific technological procedures of the ecological agriculture. After the 1st of September, the plant health status begun to be negative thus limiting the production and the time of harvest.

OBSERVATIONS AND DETERMINATIONS

During this survey some observations and determinations were made regarding:
- calendaristic dates of apparition and manifestation of the main phonological phases;
- the dynamics of the growth of plants
- the dynamics of the forming and harvesting of fruits
- the main physical characteristics of the fruit that can be expressed in an quantitative way (diameter, height, weight, volume, number of loges);
- the shape index and the density of fruit;
- the main biochemical components of the harvested fruit;
- the production per plant and per unity of surface.

RESULTS AND DISCUSSIONS

After examining the observations and discussions presented before the survey reached unexpected results, from which the most important are presented in the table 2.

The data regarding the total production were obtained by summing the harvests until the middle of September, when the experimental culture was suppressed because of the bad shape of the plants' health.

The small fruits with a diameter of fewer than 35 mm weren't included in the total production index. The total production was diminished because of the relative high number of aborted flowers. But some hybrids recommended for forced and protected cultures (R.Z.-73490 F1 and Tamaris F1) had a higher percent of large fruit, formed after a normal pollination, compared to the type that was destined for field cultivation. The lack of homogeneity of the production data registered didn't allow a conclusive statistical calculus for the next year.

Experimental data regarding some morphological characteristics and physical attributes presented in the 3rd chart shows the following aspects:

The mellow tomatoes had a diameter, medium weight and volume inferior to the ones from the same seeding harvested at physiological maturity. The density of the mellow tomatoes was for the whole type of less than 1. Similar values of the mellow tomatoes had a similar ascending trend compared to the ones mentioned before. Taking into account this evolution of the dimensions of the tomatoes we can safely recommend that the fruit should be harvested only when they have reached physiological maturity.

The tomatoes from the Heinz 1370 and the Tamaris F1 were analysed in biochemistry and agrochemistry laboratories from the U.S.A.M.V Bucharest.

The transformation of the tomatoes from the phase of dough ripeness to a total one (physiological maturity) determines for both the types the rising of the content of dry substance and glucids; at the same time we can observe a slight diminishing of the acidity.

The agrochemical analysis of the unmetabolised forms of azotes, phosphorus and potassium shows that in the fruit we studied these macroelements had normal values.

CONCLUSIONS

The experimental factors – type and time of harvest – affect the production and quality of the crop.

1. Regarding the total production (10.325 kg/m²) the best type was Lustro F1 recommended by the Clause Company which created it both for field and protected cultures.
2. This remarkable production of the Lustro F1 owed its success to the high medium weight (168.30 g) of the hybrid's fruit that exceeds by far the similar production from the other types of tomatoes.
3. Also, higher production and quality indexes were obtained by harvesting the fruit at their physiological maturity in comparison to the ones harvested during the mellow stage.
4. The obtained results will be further studied by continuing this research in the years to come.

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Table 1

Summer-fall tomatoes, U.S.A.M.V. Bucharest-2006

No.	Type	Type of growth	Destined for:	
			Culture	Consumership
1	*Saint-Pierre*	undetermination	Tied in the field	Fresh
2	*RZ-73490F1*	undetermination	Tied in the greenhouse and in the field	Fresh
3	*Tamaris F1*	undetermination	Tied in the greenhouse and in the field	Fresh
4	*Lustro F1*	undetermination	Tied in the greenhouse and in the field	Fresh
5	*Heinz-1370*	determination	Untied in the field	Fresh

Table 2

Total production of summer- fall tomatoes,U.S.A.M.V. Bucharest-2006

No.	Specification	Medium number of fruit per plant	Medium weight of the fruit	Production kg/plant	Density plant/m²	Production kg/m²
1	*Saint-Pierre*	26,83	103,96	2,79	2,5	6,975
2	*R.Z.-73490 F1*	32,30	105,90	3,42	2,5	8,550
3	*Tamaris F1*	39,80	95,50	3,80	2,5	9,500
4	*Lustro F1*	24,53	168,30	4,13	2,5	10,325
5	*Heinz 1370*	15,52	123,70	1,92	2,5	4,800

Table 3

Morphological characteristics and physical attributes of the summer-fall tomatoes
U.S.A.M.V., Bucharest – 2006

No.	Type	Mellow fruits				Fruits at physiological maturity			
		diameter cm	Gram/ Fruit	Volume cm^3	No. Loges	Diam. cm	Gram/ Fruit	Volume cm^3	No. Loges
1	*Saint-Pierre*	5,67	89,21	86,00	4-5	5,80	103,96	106,20	4-5
2	*R.Z.-73490 F1*	5,84	98,52	96,80	4-5	6,01	105,89	112,50	4-5
3	*Tamaris*	5,60	84,90	83,60	4-5	5,77	95,50	91,00	4-5
4	*Lustro F1*	6,65	152,32	150,38	5-6	6,98	168,30	172,00	5-6
5	*Heinz F1*	6,10	114,45	112,50	5-6	6,34	123,70	125,00	5-6

Table 4

Biochemical and agrochemical analysis regarding tomatoes
summer-fall U.S.A.M.V. Bucharest-2006

Specification	***Heinz 1370***		***Tamaris F1***	
	Mellow	Physiological maturity	Mellow	Physiological maturity
Dry substance %	5,2	6,0	4,5	5,5
Glucids %	5,2	6,4	5,2	5,7
Vit. C ml./100g /s.p.	0,055	0,065	0,045	0,050
Acidity	0,532	0,475	0,523	0,415
N-NO3 ppm	103,2	87,5	101,5	98,7
P-PO4 ppm	69,3	76,2	69,1	74,1
K ppm	2150	2520	2235	2117

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RESEARCH AND RESULTS REGARDING SOME POSSIBILITIES OF PRODUCING VERY BIG PUMPKIN FRUITS IN ROMANIA

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Key words: pumpkin range, very big pumpkin fruits.

INTRODUCTION

The fruits obtained from the pumpkin crops from the present range are used for human consumption, fodder or for decorative purposes.

In the past years, the pumpkin range has been diversified with new crops that have higher nourishing value, remarkable decorative features or extremely big fruits. The world weight record for a giant pumpkin fruit is over 600 kg.

The giant pumpkins are being used as exhibits, which are very attractive to the public, in specialized fairs and in agricultural exhibitions.

This paper aims to present, for the first time at the national level, the results regarding the effect of some technological measures on the size of the fruits obtained from crops especially created for this purpose and the nourishing value of an edible range of pumpkins that is cultivated in Western Europe and North America.

In Romania, the range of edible pumpkins includes only some crops from the species Cucurbita maxima L and Cucurbita moschata Duch. Given these facts, the research regarding the diversification of the edible pumpkin range is highly motivated.

The present range of ornamental cucurbitaceous is diversified, including mainly ranges or species with very small fruits. Due to this fact, the general public especially appreciates the medium sized pumpkins that are used during some holidays (Halloween) but also the big sized pumpkins, which are used as exhibits at different fairs and exhibitions.

MATERIAL AND METHOD

Elaboration of technological measures contributes to obtaining very big pumpkin fruits.

Establishing the nourishing value of the fruits obtained from some edible pumpkin ranges that have not been grown before in our country.

For the purpose of carrying out this research, the variants presented in table 1 were studied.

The first two cultivars – Atlantic and Titan – are recommended for defining big fruits, while variants 3 through 7 are recommended for human consumption. Because the “Placintar” (V8) cultivar is being grown in Romania, it has been chosen as the reference crop of the experiment.

The experimental crop was grown near Slatina (Olt district), on two parcels, fertilized differently (table 2). By applying the organic and chemical fertilizers on the parcels, two fertilization levels were obtained: average and excellent.

The technology applied to variants 3 through 8 was similar to the one recommended in Romania for the edible pumpkin crops.

OBSERVATION AND DETERMINATION

To variants 1 and 2, a specific crop technology, having the following particularities was applied:

- The experimental crop was started on the 6^{th} of May, by planting 30 day old seedlings, produced in plastic pots, having the capacity of 0.5L;
- The individual holes where the seedlings were planted have been set up by deep airing with the hoe of the ploughed autumn soil;
- The planting distances – 1.4 m between the rows and between the plants within the rows have ensured a density of approximately 5000 plants/hectare. The reserved space was approximately 2 m^2 for each plant.

Systematic measures have been taken to control the weeds, repetitive watering with norms of 5 – 20 L water/patch during periods with no precipitations, systematic phytosanitary treatments and stage fertilizations.

The damaged and late fruits were removed, keeping only the well placed and vigorous fruit.

The retained fruits were put on expanded polystyrene in order to avoid direct contact with the soil.

The fruits were harvested during the second decade of October, after the foliar apparatus of the plants had been destroyed by the low temperatures of the final part of the cropping season

The first observations and determinations had as purpose establishing the physical features and the main biochemical components in the fruits. The results are presented in tables 3 and 4.

RESULT AND DISCUSSION

The weight of the fruits obtained from the Atlantic cultivars (table 3) has grown progressively during the three years of experiments, in 2006 reaching more than 70kg/fruit. At a first glance, this weight seems impressive. Until now, the specialty literature in our country does not include experimental data mentioning such big weights for edible or fodder pumpkin fruits. Compared to the world weight record, those 70,2kg/fruit represent, in fact, an encouraging start.

- The results regarding the weight of the big fruits obtained from the Titan cultivar (V2) do not recommend it as a biologic material for producing giant fruits for an exhibition.
- At the other crops, the average weights are considered to be within the normal limits for the fruits harvested at their physiological maturity.
- Regarding the nourishing value of the fruits obtained from the experiment, the fruits aimed for human consumption were emphasized by superior parameters.

Therefore, the Placintar cultivar excels through a high concentration of total carbohydrates (3,19g/100g fresh material), while Tonda Padana and Acorn do through a high concentration of dry substance.

At the fruits of Atlantic cultivar, which can be big or huge, a high concentration of gross protein can be noticed. This makes them suitable for human consumption or as succulent fodder for animals.

CONCLUSION AND RECOMMENDATIONS

On the basis of the presented results, the following preliminary conclusions can be formulated:

1. The crop that is currently grown in Romania may be diversified by introducing new species aimed for production of human consumption fruits, exhibitions and fodder;
2. The results regarding the average weight of fruits, especially at the Atlantic cultivar, emphasize the fact that the cropping technology progressively perfected has determined the increase of the parameters up to 70.2 kg/fruit. This represents the highest value recorded for this species, in the Romanian specialty literature, until now.
3. Some crops with small sized fruits but with a very good nourishing value, like Tonda Padana, Acorn and Buttercup may be recommended for completing and diversifying the current edible pumpkin crop.
4. The obtained and presented results are strong motivators for continuing the studies on this interesting research field.

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Table 1

Experimental variants - Pumpkin crop
Slatina, 2004-2006

Experimental variants	Range	Source	The destination of the fruits
1	Atlantic	McKenzie – Canada	Extremely big (huge) fruits for exhibitions; fodder.
2	Titan	Thompson&Morgan Canada	Extremely big (huge) fruits for exhibitions; fodder.
3	Jack's Lantern	Rennies Seeds - Canada	Decorative for Halloween; food consumption; fodder.
4	Kaempe	Garafarm – Ungaria	Food consumption
5	Tonda Padana	Gusto – Italia	Food consumption
6	Buttercup	McKenzie – Canada	Food consumption
7	Acorn	Victory Garden - Canada	Food consumption
8	Placintar	Romania	Food consumption

Table 2

Agrochemical features of the parcels where the experiment was located
– Pumpkin crop – Slatina – 2006

Emplacements		pH	Soluble salt - %	Concentration soluble former - ppm			
				$N – NH_4^+$	$N – NO_3^-$	$P – PO_4^{3-}$	K^+
1	Before the base fertilization	6,71	0,054	14,25	19,72	11,43	55,00
	After the base fertilization	6,64	0,050	47,50	152,86	28,57	165,00
2	Before the base fertilization	6,73	0,049	14,25	Trail	5,71	20,00
	After the base fertilization	6,69	0,040	23,75	39,45	9,50	50,00

Table 3

Biometrical determinations for the huge pumpkin fruits
Slatina-Bucuresti – 2004-2006

No.	Range	Sample	Avoirdupois (Kg)			The height of fruit (cm)	The grossness of fruit (cm)
			Altogether fruit	Pulp	Placentar tissue + seed		
1	Atlantic	1) 2005	50,00	46,850	0,725	36	6,0
		2) 2006	58,00	53,940	0,850	66	7,4
		3) 2006	70,20	56,710	1,000	90	9,6
		4) 2006	44,60	42,400	0,650	34	5,8
2	Titan	1) 2006	16,00	14,350	0,115	25	5,5

Table 4

The main biochemical components - Pumpkin crop
Slatina-Bucuresti – 2004-2006

No.	Range	Anhydrous countent (g/100gs.p.)	Nitrogen altogether (g/100gs.p.)	Crude proteines (g/100gs.p.)	Reducing carbohidrates (g/100g s.p.)	Altogether carbohidrates (g/100g s.p.)	C vitamin (g/100gs.p.)
1	Atlantic	5,84	0,44	2,75	2,43	2,93	5,28
2	Titan	14,20	0,65	4,03	1,68	6,09	11,44
3	Jack's Lantern	5,91	0,31	1,94	2,69	3,06	7,04
4	Kaempe	7,32	0,19	1,18	2,89	3,84	7,04
5	Tonda Padana	17,19	0,63	3,94	1,56	8,11	22,88
6	Buttercup	7,75	0,20	1,26	2,56	3,58	3,52
7	Acorn	11,88	0,28	1,72	1,56	7,30	3,52
8	Placintar	7,76	0,11	0,66	1,56	3,19	5,28

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THE INFLUENCE OF SOME TECHNOLOGICAL MEASURES TOWARDS THE EARLY TOMATOES PRODUCTION IN SOLARIUM

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Key words: tomatoes in solarium, assortment, irrigation through dripping

INTRODUCTION

Early tomatoes crops in solarium in the Vidra vegetable garden have been characterized in the last years by a technological delay with negative effects on production and its quality.

Because the construction of modern solariums in the area is an expensive activity, the producers' interest was focused on perfecting some technological branches such as: modernizing the assortment, using the irrigation through dripping installations for fertilization and irrigation, introducing new effective measures of ensuring the pollination.

The present paper presents the results of a research based on the introduction in the Vidra crop solariums technology of some new elements, with positive effects on the level and quality of tomatoes' production.

MATERIALS AND METHODS

The bifactorial experience was set up in a Vidra private producer's solarium, in the period 2004 – 2006. Within the framework of the experiment the variants presented in Table 1 were studied.

For achieving the experimental methods some new production implementations were used, the most important are the following:

New tomatoes hybrids – Electra F_1, Francesca F_1, Margarita F_1 and Abigail F_1, recently created by Hazera Co. from Israel, have big size fruits, with a nice commercial appearance, adequate from these points of view to the present requirements and to the Romanian consumers' sight.

Besides these ones the early hybrid Arletta F_1, of Dutch origin, was used as a test specimen cultivated for more than 10 years in Vidra vegetable gardening are with very good results. The produces irrigated through dripping were made using a Queen Gil irrigation system featuring an irrigation probe which allows the insertion of soluble fertilizers in the soaking water.

The fertilization was made by using some complex soluble fertilizers, produced by Scott's Co. The main specific elements of the crop technology applied in the experiment are the following:

The solarium used was of block type, with a surface of 1000m², with a wooden skeleton and with a rooftop height of 200, and the distance between two supports beams of 650 cm.

The seedlings were produced using classical technology, in a hotbed surface arranged in an individual solarium, with double protection and with interior space heating capabilities.

The crop was planted in semi decade 20 – 25 of March, at an average distance of 82 cm between the rows and 25 cm between each plant on the row.

The plants were removed their secondary scions at 4 inflorescences and were supplementary pollinated with the help of bumble bees from a Naturpol XS hive with a use period of 6 weeks.

OBSERVATION AND DETERMINATION

The ingathering was performed in dynamics, with the production and its quality recorded. Early and total production was statistically interpreted by using the variant analysis method.

Other observations and determinations aimed the establishment of calendar timing of the main phases and the registration of some quantitative features meant for characterizing the ingathering fruits from previous experience.

The duration of the vegetation period expressed in number of days is differs depending on the earliness of the crops and on the influence of the watering method. For the produces irrigated through dripping, the fist getting in were with 6 – 8 days earlier than the similar periods of the produces irrigated on culverts.

From the 4 new hybrids, if Abigail F1 is characterized by the earliness, similar with the control, its vegetation period being identical to the hybrid Arletta F1.

The data regarding the fruits' average weight emphasizes the fact that Electra F1, it's characterized by big fruits (183,6 – 198,4g), overtaking from this point of view the average weight of the other 4 crops. This large average weight of this hybrid's fruits produces problems in selling the production, because the great majority of the consumers prefer smaller tomato fruits. Irrigation through dripping has determined the increase in the average weight of fruits with an average of 5-7% up to the similar parameter recorder for the similar variants irrigated on the row.

Generally, early production can be appreciated as being very good in comparison with average productions obtained by other farmers in Vidra area.

Francesca F1, (5,880 kg/m^2) and Electra F1, (5,530 kg/m^2) are notable through early high production especially to the produces irrigated through dribble.

The total production presented in Table 2 can be also seen as a very good one for Vidra area. The most performing productions (V_2, V_7, V_8 si V_{10}) are outrunning 10 – 11kg/m^2. This level of production is overtaking so much the production of control Arletta F_1 as the one usually obtained for the great majority of the Vidra area producers which are cultivating solarium tomatoes in short cycle.

The data regarding total production represented in kg/m^2 and tide up on variants and repetitions were statistically interpreted using variant analysis method specific to bi factorial experiments.

From the synthesis table in which numerous multiple comparisons are made, two of them are presented in the present paper.

RESULTS AND DISCUSSIONS

Synthesis data from Table 3 scales average production of the 5 hybrids realized to the 2 variants of watering technique. In these conditions, Electra F_1, surpasses control (V1) with 2,080kg/m^2, this positive difference being very significant. The difference of + 0,840kg/m^2 between Margarita F_1 production and the control has also statistical guarantee by being significant.

The watering technique influences the level of total production. The average production of the 5 hybrids used in this experiment, overcomes for the irrigated through dripping variants, with a significant difference, the similar production realized for the similar variants irrigated on the culvert (Table 4).

Although within the framework of this paper, data related to economical efficiency are not presented, we are mentioning that the profitability of solarium tomatoes crop is insured from a level of production of over 9 kg/m^2.

CONCLUSIONS AND RECOMMENDATIONS

Based on the presented and discussed results, the following conclusions can be formulated:

1. Short cycle production performances of tomatoes crops in the Vidra vegetable garden can be improved.
2. A simple way of improving them is the introduction of new early productive hybrids in the crop, with resistance or tolerance to diseases and pests and with high quality fruits.
3. Among the hybrids used in the experiment, Electra F_1 (11,54kg/m^2) and Margarita F_1 (10,460kg/m^2) comply to these requirements which surpass the test specimen with substantial differences of 1,5 – 1,8 kg/m^2.
4. As earliness, we can distinguish Francesca F_1 (6,160kg/m^2) and Margarita F_1 (5,880kg/m^2) which surpass the test specimen (Arletta F1) with 1,45 – 1,73kg/m^2.
5. Irrigation through dripping significantly contributes to the increase in total productivity in comparison with the one of irrigation on the culvert.

Based on previous conclusions, the tomatoes hybrids production extension Electra F_1 and Margarita F_1 is recommended, for cultures in cycle are irrigated through dripping.

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Table 1

Experimental variants solarium tomatoes, short cycle Vidra 2004 – 2006

Var. no.	Watering technique (a)	Cultivars (b)	
		Name	Mading
1	culvert (a_1)	Arletta F_1 (b_1)	Royal Sluis, Olanda
2		Electra F_1 (b_2)	Hazera, Israel
3		Francesca F_1 (b_3)	Hazera, Israel
4		Margarita F_1 (b_4)	Hazera, Israel
5		Abigail F_1 (b_5)	Hazera, Israel
6	dripping (a_2)	Arletta F_1 (b_1)	Royal Sluis, Olanda
7		Electra F_1 (b_2)	Hazera, Israel
8		Francesca F_1 (b_3)	Hazera, Israel
9		Margarita F_1 (b_4)	Hazera, Israel
10		Abigail F_1 (b_5)	Hazera, Israel

Table 2

Number of fruits, average weight and production solarium Tomatoes, short cycle Vidra 2004-2006

Var. no.	Mass (g)	Production (kg/m^2)	Product yield	
			Kg/ plant	Kg/m^2
1	141,4	4,43	1,84	8,82
2	183,6	4,87	2,21	10,61
3	144,3	4,63	1,93	9,25
4	144,3	5,41	1,86	8,93
5	152,3	4,99	2,12	10,11
6	149,1	4,97	1,92	9,21
7	198,4	5,53	2,41	11,57
8	155,0	5,88	2,18	10,46
9	141,2	6,16	1,95	9,36
10	165,2	5,74	2,31	11,02

Table 3

The influence of the assortment over average production of irrigated variants on the culvert and through dripping solarium tomatoes, short cycle Vidra 2004-2006

Nr crt.	Cultivars	Production (kg/m^2)	Difference de production(kg/m^2)	Production %	Difference de production%	Signification
1	Arletta F_1	9,01	-	100,00	-	-
2	Electra F_1	11,09	2,08	123,85	+ 23,85	xxx
3	Francesca F_1	9,85	0,84	109,32	+ 9,22	x
4	Margarita F_1	9,14	0,13	101,44	+ 1,44	-
5	Abigail F_1	9,28	0,27	102,99	+ 2,99	-

Dl – 5% --------------0,29 kg/m^2
Dl – 1%-------------- 0,87kg/m^2
Dl – 0,1%------------1,37kg/m^2

Table 4

The influence of the manner of applying the watering on average production of experimental hybrids solarium tomatoes, short cycle Vidra 2004-2006

Nr crt.	Watering technique	Production (kg/m^2)	Production difference (kg/m^2)	Average production %	Production difference %	Signification
1	culvert	9,40	-	100,00	-	-
2	dripping	10,15	0,75	107,97	+ 7,97	x

Dl – 5% --------------0,29 kg/m^2
Dl – 1%-------------- 0,87kg/m^2
Dl – 0,1%------------1,37kg/m^2

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RESULTS CONCERNING INTEGRATED WEED CONTROL ON EARLY POTATO CULTURE WITHIN BUCHAREST AREA

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Keywords: early potato, weed control

INTRODUCTION

Early potato culture presents a particular importance for the boarding zone of Romanian capital, urban centre that marks out through consume of large quantities from this valuable horticol product.

One of the major technological problems for this kind of culture is weed control, the fields in southern area of Romania being strong infested with weeds.

The technological solutions concerning weed control in potato cultures intended for autumn and winter consume, established on spontaneous flora in ecological areas much different from the capital area, cannot be taken over and applied with satisfactory results in early potato cultures in southern area of our country. In view of considerations mentioned above this experiment regarding weed control in early potato culture in Bucharest area has been initiated and performed and the results are presented as follows.

MATERIAL AND METHOD

Within the experiment have been studied the variants listed in Table 1.

The experiment was located within the probing field of vegetable discipline inside of USAMV Bucharest. The 8 probing variants were installed in three repetitions, without randomisation. During the experiment was used Agatha sort (Agrico – Holland), which with a vegetation time from 76 days falls into the very early culture group. The tubers of this sort are oval, with yellow skin, excellent culinary properties, the sort belongs to use group A. Agatha sort characterizes through a very good production capacity. By testing for 3 years in Romania within ISTIS system have resulted on average 35t/ha.

The sort is recommended in Romania exclusively for early potato culture.

Although Agryl is used especially for protecting early cultures, it influences weed growth in a similar manner to clear or semiclear polyethylene film. Plastic films used for performing variants 7 and 8 are especially made as field mulching material, having a very good mechanical resistance due to UV aditivation and a very reduced weight.

Main elements of culture technology:

- planting – 5 of April, under conditions of moisture excess during springtime 2005
- scheme – 70/20 cm
- density – 71400 nests/ha

Maintenance operations applied to this culture are the usual ones for early potato culture taking into account the differences between probing variants.

Harvesting was performed on June 13, 2005

OBSERVATIONS AND DETERMINATIONS

During the experiment were performed observations and determinations regarding:

- dates of occurrence and intervals of the main stages of vegetation;
- sorting out weeds from spontaneous flora on the probing field surface;
- field determinations by means of metrical framework in order to establish weed level by registration number of plants for each weed variety on the field;
- labour determinations (weighing) in order to note weed mass drawn from probing field; for each variant - monocotiledonate, dicotiledonate sorts and total;
- harvest determination (13 of June) - nest number and following parameters:
  - tuber number
  - individual mass of each tuber
  - production (kg/plant and kg/m²)
- production data have been referred to kg/ha, arranged according to variants and repetitions and used later for variant analysis.

RESULTS AND DISCUSSIONS

Planting was put off because of unfavourable temperature evolution and heavy rainfalls during springtime 2005, with positive consequences on cutting down of irrigation number and negative consequences on the performing moment of maintenance operations.

The very good moisture conditions, grafted on an appropriate agrarian basis, determined dense vegetative mass for the most weed sorts of spontaneous flora on probing field.

Under these favourable weeding conditions were determined noticeable vegetative growths of some perennial weeds dispersed on the field – Cirsium arvense (**99,2-685,6** g/m²), Sonchus arvensis (**108,8-595**g/m²), especially for variants whose procedures provided in experimental protocol had no effect on control of weeding with sorts mentioned above (Table l-3).

With regard to the weed control the most effective results was noticed for V4 (black plastic mulch). By using this variant all weeds have been destroyed, the weed level being zero.

The effects of weed control measures on production reflected on its level (Table 4, Table 5).

From this point of view, marks out V2 (2 + billonation) – production 27.330 kg/ha, V4 (Gesagard 500 WF + billonated) – production 28.950 kg/ha and V7 (black plastic mulch) – production 19.220 kg/ha.

CONCLUSIONS AND RECOMMENDATIONS

1. Weed control by applying complex, integrated measures has a direct effect on weed level and production.
2. With regard to weeding following variants mark out - V8 (Sencor 70 WG + billonation) and V4 (black plastic mulch) – the last one determined total weed control.
3. Production level can be considered as satisfactory, especially for variants V2 – 27330 kg/ha, V4-28950 kg/ha and V8 – 19220 kg/ha.
4. White plastic mulching led to a very high weed level (832 weeds/m²) at harvesting time.
5. Some variants such as V4 will be elaborately studied in the following years in order to express scientifically proved conclusions regarding their feasibility and the practical way to be applied for obtaining a high level, qualitative and efficient production.

Table 1

Experimental variants weed control; early potatoes; Bucharest – 2005

Var. no.	Specification	Observations
1	No soil works	-
2	2 hoeing and billonated	non herbicide
3	Relay 90 EC + billonated	pré
4	Gesagard 500 FW + billonated	pré
5	Sencor 70 WG + billonated	pré
6	Agryl mulching	non chemical weeds control
7	White polyethylene mulching	UV additives non chemical weeds control
8	Black polyethylene mulching	UV additives non chemical weeds control

Table 2

Number of weeds/m^2 early potatoes, Bucharest, 13-06-2005

No.	Weeds	No soil works	2 hoeing and billonated	Mulching with			Herbicides		
				White polyethylene	Black polyethylene	Agryl	Relay 90 EC + billonated	Gesagard 500 FW + billonated	Sencor 70 WG + billonated
	Monocotiledonate								
1	Cynodon dactylon	88	48	32	-	56	8	192	48
2	Digitaria sanguinalis	48	-	320	-	-	-	-	8
3	Setaria viridis	-	-	-	-	-	-	-	-
	Total monocotiledonate (m)	136	48	352	-	56	8	192	56
	Dicotiledonate								
4	Amaranthus retroflexus	56	24	192	-	80	-	104	-
5	Capsella bursa – pastoris	-	8	-	-	-	-	-	-
6	Chenopodium album	8	8	-	-	-	24	8	-16
7	Cirsium arvense	-	128	-	-	-	16	48	16
8	Convolvulus arvensis	32	24	16	-	8	8	-	-
9	Conysa canadensis	-	-	16	-	-	-	-	-
10	Echinochloa crus galli	24	-	-	-	-	-	-	-
11	Galinsoga parviflora	-	8	-	-	-	-	16	-
12	Lamium amplexicaule	-	-	-	-	-	-	-	-
13	Polygonum aviculare	-	-	-	-	-	-	-	-
14	Portulaca oleracea	24	32	48	-	-	32	104	-
15	Solanum nigrum	-	-	-	-	-	-	-	-
16	Sonchus arvensis	56	-	-	-	-	-	-	-
17	Veronica persica	-	-	208	-	24	-	-	-
18	Xanthium italicum	-	-	-	-	-	-	-	-
	Total dicotiledonate (d)	200	232	480	-	144	80	288	22
	Total weeds	336	280	832	-	200	88	480	88

Table 3

Weight of weeds (g/m^2) early potatoes, Bucharest, 13-06-2005

No.	Weeds	No soil works	2 hoeing and billonated	Mulching with			Herbicides		
				White polyethylene	Black polyethylene	Agryl	Relay 90 EC + billonated	Gesagard 500 FW + billonated	Sencor 70 WG + billonated
Monocotiledonate									
1	Cynodon dactylon	30.4	51.2	72.0	-	12.0	65.6	54.4	76.0
2	Digitaria sanguinalis	8	-	323.2	-	-	-	-	8.0
3	Setaria viridis	-	-	-	-	-	-	-	-
	Total monocotiledonate (m)	38.4	51.2	395.2	-	12.0	65.6	54.4	84
Dicotiledonate									
4	Amaranthus retroflexus	19.2	10.4	3.2	-	30.4	-	7.2	-
5	Capsella bursa – pastoris	-	5.6	-	-	-	-	-	-
6	Chenopodium album	100.0	7.2	-	-	-	12.0	10.4	-
7	Cirsium arvense	-	685.6	-	-	-	18.4	99.2	5.6
8	Convolvulus arvensis	4.8	6.4	19.2	-	10.4	9.6	-	8.8
9	Conysa canadensis	-	-	14.4	-	-	-	-	-
10	Echinochloa crus galli	4.8	-	-	-	-	-	-	-
11	Galinsoga parviflora	-	10.4	-	-	-	-	10.4	-
12	Lamium amplexicaule	-	-	-	-	-	-	-	-
13	Polygonum aviculare	-	-	-	-	-	-	-	-
14	Portulaca oleracea	8.0	9.6	16.0	-	-	8.0	8.0	-
15	Solanum nigrum	-	-	-	-	-	-	-	-
16	Sonchus arvensis	149.6	-	595.2	-	108.8	-	-	-
17	Veronica persica	-	-	-	-	0.8	-	10.4	-
18	Xanthium italicum	-	-	-	-	-	-	-	-
	Total dicotiledonate (d)	286.2	735.2	1043.2	-	150.4	48.0	145.6	14.4
	Total weeds	324.6	786.4	1438.4	-	162.4	113.6	200.0	98.4

Table 4

Total production early potatoes, Bucharest, 2005

Var. no.	Specification	Harvest density nests/ha	Average production kg/nest	Total production kg/ha
1	No soil works	66800	0.215	14360
2	2 hoeing and billonated	64300	0.425	27330
3	Relay 90 EC + billonated	67200	0.128	8600
4	Gesagard 500 FW + billonated	67800	0.427	28950
5	Sencor 70 WG + billonated	68050	0.236	16050
6	Agryl mulching	66300	0.200	13260
7	White polyethylene mulching	69250	0.220	15235
8	Black polyethylene mulching	69400	0.277	19220

Table 5

Synthesis of experimental results early potatoes, Bucharest, 2005

Var. no.	Specification	Production kg/ha	Difference of production kg/ha	Production %	Difference of production %	Significance
1	No soil works	14360	-	100	-	-
2	2 hoeing and billonated	27330	+12970	190.3	+90.3	xxx
3	Relay 90 EC + billonated	8600	-5760	59.8	-40.2	oo
4	Gesagard 500 FW + billonated	28950	+14590	201.6	+101.6	xxx
5	Sencor 70 WG + billonated	16050	+1690	111.7	+11.7	x
6	Agryl mulching	13260	-1100	93.3	-6.7	o
7	White polyethylene mulching	15235	+870	106.1	+6.1	-
8	Black polyethylene mulching	19220	+4960	133.8	+33.8	xx

Dl – 5% =1060 kg
Dl – 1% = 2830 kg
Dl – 0,1% = 7240 kg

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THE EFFECT OF SOME NEW TYPES OF ROMANIAN PHOTOSELECTIV FOILS ON THE MICROCLIMAT IN SOLARIUM

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Keywords*: photodselective foils, Latuca sativa, Ilona, microclimate*

INTRODUCTION

In order to establish the reaction of the plastic colorants concerning the selectivity of the transparency in infrared, there have been certain researches done in Romania too by Cobâlaş (quoted by Manescu, 1977). The spectrophotocopies with transmissions between 2500 and 25000 nm show that the polyethylene colored in blue, yellow-orange and white is less transparent than the corrugated vinyl polychloride (PVC). Only the flat green colouring for a 0.15 mm polyethylene foil maintains a better transparency.

In general the allure of the curves depending on the wave length is kept regardless of the colorant.

For the various colouring thicknesses and intensities of the same material, the transparency is stronger at the lighter colourings and at the thinner foils. The most transparent colours remain the light yellow, the blue and the light green, regardless of the wavelength. The least transparent colour is the yellow-orange one.

Among the climatic conditions, besides the relative humidity and soil humidity, another determining factor within the growing and the fructifications processes, is temperature (Melton and Dufault, 1991; McMichael and Burke, 1998).

MATERIAL AND METHOD

The foils studied are prototype photoselective polymeric foils designed, made and tested in our country by SC Incerplast SA, SC Prointermed S.R.L Pitesti and USAMV Bucharest, within the Relasin research programme.

The photoselective foils were made through the processing of low pressure polyethylene, in their polymeric matrix being introduced certain special chemicals additives, such as pigments, UV stabilizers, UV protectors. These were added to the additived white foil (Table no 1).

The experiment was organised in the experimental field of the Vegetables growing department in USAMV Bucharest in 2006. The photoselective foils, as well as the normal control foil to which they were compared, were used to cover the high tunnel type solarium, in which there have been effectuated associated cultures of tomatoes and lettuce.

The treatments were:

V1 control – PE film transparent
V2 – light yellow foil
V3 – dark yellow foil
V4- light green foil
V5 – dark green foil
V6 – light pink foil
V7 – dark pink foil
V8 – transparent foil additivated

OBSERVATIONS AND DETERMINATIONS

The purpose of the present research was to notice the modifications of the microclimate created under the photoselective foils – the establishing of the modification of the microclimate under the photoselective foils.

The research registered the following results: the evolution in the dynamics of the temperatures, of the light intensity, of the atmospheric intensity and that of soil, determinations being effectuated once at every five days, on the outside in the solarium and in the soil, with the help of certain specific devices electronic (thermohigrometers, luxmeter, combitester). At each variant (type of foil), the registering were done in the points established as following: outside the solarium 25 cm above the ground, on the two sides of the tunnel; inside, at the plants level, on each row of the culture: in the soil, 10 cm deep, on each row of plants.

For the quantification of the microclimate parameters certain synthetically indicators:

Were calculated:

Σ_1 – the amount of the temperature degrees outside the solarium;
Σ_2 –the amount of the temperature degrees inside the solarium;
Σ_3 – the amount of the temperature degrees in the soil;
D- $\Sigma 2$- $\Sigma 1$ (the difference)
M1 – the mean of the illuminating in the solarium at plants level;
U – the mean of the relative humidity in the solarium.

THE RESULTS OBTAINED

The analysis of the data concerning the mean climatic factors demonstrated the specific influence of the photoselective foils which was the object of the research. There can notice differenced between both the normal polyethylene foil and the other additived foils, as well as within these, between the various variants of colors experimented.

The results concerning the variation of the luminous intensity (Diagram no1)

The modifications of the illumination at the plants level could be noticed especially in the foggy days, the foils exerting a significant influence on both illuminations determined at the plants level as well as on the different of illumination between the photoselective foils and the control foil.

By comparison with the normal polyethylene foil used as a control one can notice that the majority of the photoselective foils determined the growth of the illumination level in the solarium (diagram no 1). The greatest quantity of light was registered under the light pink foils (970 lx) and dark pink ones (911 lx), while the dark yellow and the light yellow foils posed the control foil only with 323-353 lx.

Results concerning the modification of the thermic regime (conditions)

The global accumulations of heat in the protection period, expressed through the mount of the temperature degrees, are showing in diagram no 2. As a result of the optic characteristics specific to the types of foils used, right in the outside layer of air from the surroundings of the solarium there were noticed certain differences between the values of the global temperatures.

Inside the solarium superior to the control (437 ºC) with 14.7 ºC was only the light pink variant (451.7 ºC, all the other photoselective foils experimented leading to the lowering of the amount of the temperature degrees with 4.7 (V7)to 26.5 ºC (V5) (Diagram no 2). All the types of foils determined the lowering of the temperature accumulations in the soil toward the control (391 ºC) the least difference being registered at the additive white foil (2 ºC), while at the light yellow foil the amount of the temperature in the soil was 21 ºC under the control, the type of foil used to cover the solarium exerting a significant influence an the heat accumulation in the soil (R^2= 0.5027).

Diagram no 2 The influence of the different types of photoselective foils on the heat accumulations.

Σ_1 the amount of the temperature degrees for the outside (ºC) ; Σ_2 the amount of the temperature degrees in the solarium (ºC); Σ_3 the amount of the temperature degrees in the soil (ºC).

Results concerning the influence of the photoselective foils on the humidity of the air (diagram 3). The relative humidity of the air lowered for most of the photoselective foils (59.23-68.88%).

Toward the control protected with normal polyethylene (64.35%) with one exception at the variant covered with treated white foil, where a 2.829 growth of the relative humidity was registered.

CONCLUSIONS

By comparison with the normal polyethylene foil used as control one can notice that the majority of the photoselective foils determined the growth of the illumination level in the solarium.

All the foil types determined the lowering of the temperature accumulation in the soil toward the control (391 ºC), the smallest difference being registered at the additivated white foil (2 ºC), while at the light yellow foil the amount of the temperature in the soil was 21 ºC below the control.

The pink photoselective foil was the only one that favoured the thermic condition (regime), determine superior accumulation of temperature in the solarium with 6.8 ºC by comparison with the control.

The use of the photoselctive foils lead to a lowering of the relative humidity for most of the variants, except for the variant covered with treated white foil, where it was registered a 2.82% growth at the relative humidity.

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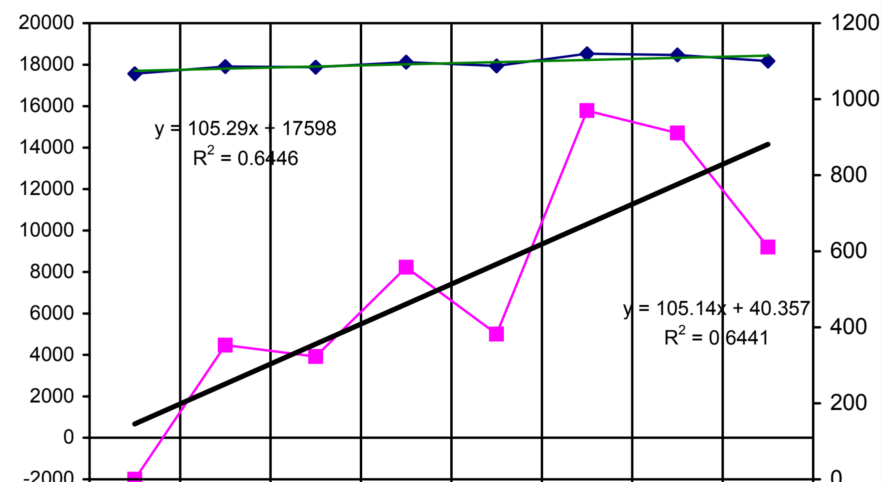
Table 1 The experimental receiving and the optical properties of the photoselective foils

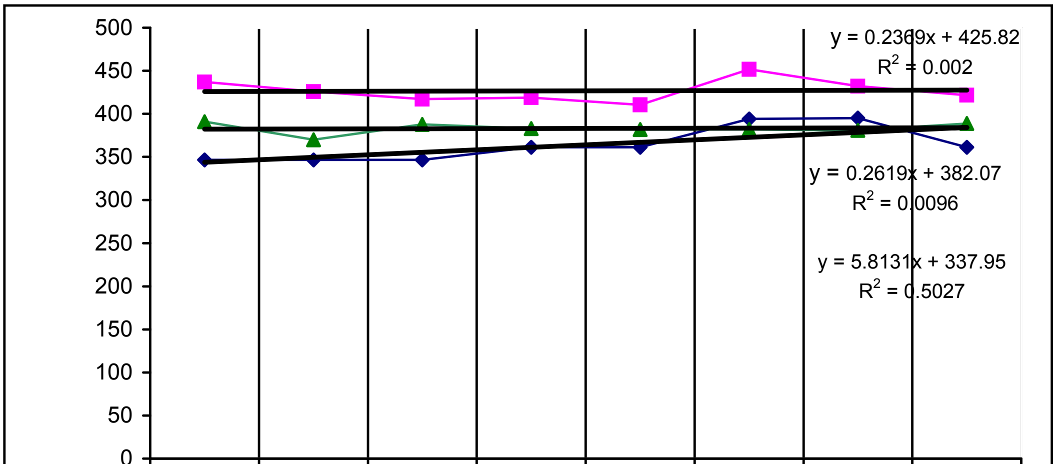
Treatments	Control – PE foil transparent	Light yellow foil	Dark Yellow foil	Light green foil	Dark green foil	Light pink foil	Dark Pink foil	Transparent additivated foil
PEJD 150	100	X	X	X	X	X	X	X
UV stabilizer	-	X	X	X	X	X	X	X
UV barrier	-	-	-	-	-	-	-	X
Light transmittance UV-VIS %	80	73	68	76	65	70	62	82
Opacity %	29,30	34,23	48,84	37,12	47,14	39,72	49,97	23,46

Diagram 1. The variation of the luminous intensity depending on the type of foil used



	V1 alb martor	V2 galben deschis	V3 galben închis	V4 verde deschis	V5 verde închis	V6 rosu deschis	V7 rosu închis	V8 alb tratat UV
Luminous intensity (lx)	17558	17911	17882	18117	17941	18529	18470	18170
diferent V1	0	353	323	558	382	970	911	611

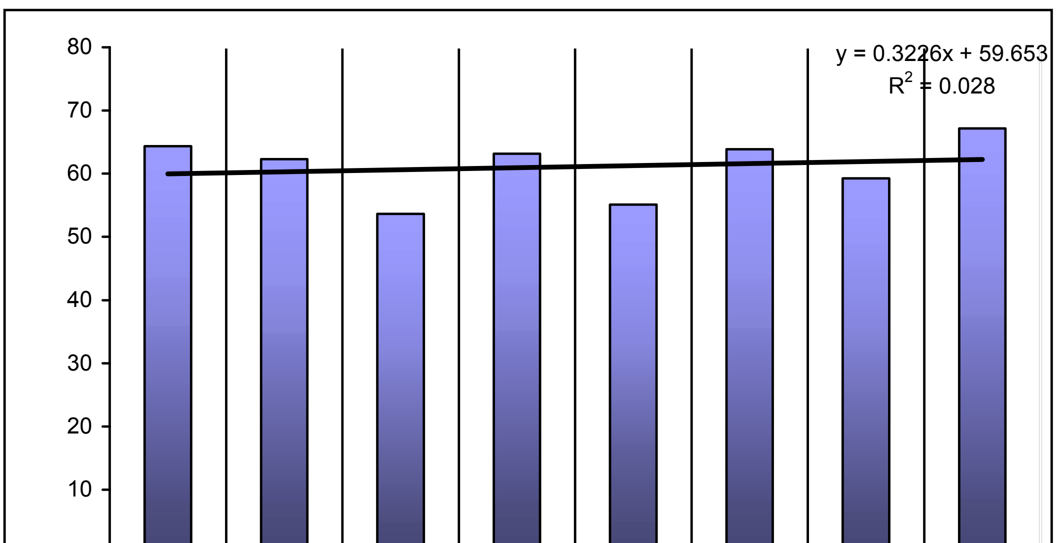
Diagram 2 The influence of the different types of photoselective foils on the heat accumulations



	V1 alb martor	V2 galben deschis	V3 galben inchis	V4 verde deschis	V5 verde inchis	V6 roz deschis	V7 roz inchis	V8 alb tratat
?1 (oC)	346.6	346.6	346.6	361.2	361.2	394.3	395.2	361.2
?2 (oC)	437	426	417.1	418.8	410.5	451.7	432.3	421.7
?3 (oC)	391	370	388	383	382	382	381	389

Σ_1 the amount of the temperature degrees for the outside (ºC);
Σ_2 the amount of the temperature degrees in the solarium (ºC);
Σ_3 the amount of the temperature degrees in the soil (ºC).

Diagram 3. The variation of the humidity in the air U (%) in the solarium covered with photoselective foils



	V1 alb martor	V2 galben deschis	V3 galben inchis	V4 verde deschis	V5 verde inchis	V6 roz deschis	V7 roz inchis	V8 alb tratat
U (%)	64.35	62.29	53.64	63.17	55.11	63.88	59.23	67.17

Image 1. The protection of the lettuce plant with photoselective foils

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THE EFFECT OF THE IRRIGATION WITH THE SALINE WATER ON THE DEVELOPMENT AND THE QUALITY OF TOMATO FRUIT

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Keyword: *lycopersicum esculentum*, development, saline water, quality

ABSTRACT

This study aims at investigating the effect of the saline water on the development and the quality of one variety of tomato *lycopersicum esculentum* Cidel F_1. This variety was planted in vases of vegetation and was irrigated with waters of different quality, corresponding to V_1 0.317 ms/cm, V_2 1.5 ms/cm, V_3 2.5 ms/cm, V_4 4ms/cm.
Some phenotypic observation (plant height, number of internod, height of the internod) and quality regarding the fruit (acidity, sugar content, Nitrogen content, Phosphor content Potassium content).
We observed that the tomato plants resisted to a concentration of 1.5 ds/m but in the case of higher concentration the plants were affected.
The inflorescence was affected because in the case of V_3 and V_4 the flowers were aborted
In the case of the treatment irrigate with saline water we have an increasing of the acidity and decreasing of the sugar content
The acidity and the sugar content have an inverse proportional variation meaning that in the control we have low acidity and a higher sugar content and vis-versa in the case of V_4
The treatment irrigated with saline water had an content of nitrogen phosphor and potassium much higher than the control

INTRODUCTION

The total quantity of water on the globe represent 1.4 milliard of km^3 which the majority (97.5%) of this amount is salin water. Other 1.73% is blocked as glacial in the north and the south poles. And good quality water represents 0.3%.

The use of the saline water in agriculture for irrigation become indispensable in all the arid and semi-arid zones (Hamdy A.,1998), 357.5 millions in Autralia, 319.3 millions in Asia, 146.9 millions in America, 80.5 millions in Africa, 50.8 millions in Europe.

In the Mediterranean area, nearly 200000 ha are under off-season protected cultivation. The tomato is a major protected crop (Hamdy and Lacirignola. 1993).

Under protected agriculture, the risk of soil salinization is relatively high as salt can accumulate at a higher rate in short period, than under outdoor conditions.

Salinity is the major reason for low yield and the quality deficiency of tomatoes. (Mizrahi etal., 1988; Sonneveld and Welles, 1988; Mitchell et al., 1991; Mougou et al. 1993).

The use of bad quality water, saline water, require to: make a tolerant variety for salinity, amelioration of the water management, adoption of advanced irrigation technologies and maintenance of the chemical and physical properties of the soil.

MATERIALS AND METHODS

The experiment has been carried out in 2006, in the glass house of the department of Horticulture in the University of Agronomical Science and veterinary medicine Bucharest, and has the following objectives:

Study of the behaviour of the tomato crop (*Lycopersicum esculentum*) irrigated with saline water, and the effect on the quality of the fruit.

Study concerning the behaviour of the tomato crop (*Lycopersicum esculentum*), irrigated with saline water, and it effect on the development and growth.

The variety of the seedling of tomato used in this study is *Cindel F1*, and had been cultivated in vases of 35 litters in volume with a diameter of 40 cm and 25 cm depth, with the density of one plant in vase.

In this experiment we used 4 variants:

- V_1- Control irrigated with fresh water 0.37 ms/cm (Control)
- V_2- Plant irrigated with saline water 1.5 ms/cm
- V_3- Plant irrigated with saline water 2.5 ms/cm
- V_4- Plant irrigated with saline water 4 ms/cm

Each variant had four repetitions

The pH and the total salt content in the soil extract has been determined

Some plant measurement has been determined: plant height (cm), number of inter-nod, length of inter-nod.

For the tomato fruit some test were applied (sugar content, acidity and N, P, K)

RESULTS AND DISCUSSIONS

3.1 Effect of the salinity on the development of the crop

The figure 1 showed the height of the tomato crop. The four variant of treatments showed a difference in height.

After the 60^{th} day after plantation the plants irrigated with fresh water had a height of plant height decrease in the four treatments. After the 60^{th} day the crops irrigated with fresh water reach a height of 95.8 cm and in the same time the others irrigated with saline water at the concentration of 4 ms/cm reach the height of 62.4 cm with a decrease of 34.86%.

In the case of the treatments irrigated with saline water which have respectively 1.5 and 2.5 ms/cm, the difference of the height of the plant reaches 20.9% with the control.

In the figure 2 are presented the number of inter-nod formed in vegetative cycle for the tomato crop for the 4 variants.

We observe a decreasing of the number of inter-nod (24.2%) in comparison between the control and the one irrigated with the water which a concentration of 4 ms/cm.

All the value in the treatments irrigated with saline water is less than those found the control.

We observe that the difference is 13.11% between the 2 treatments irrigated respectively with 1.5 ds/cm and 2.5 ds/cm.

The inter-nod length is revealed in the figure 3. The last measurement showed that the inter-nod length decrease 17.28% in comparison with the control. In the flowering stage the effect of the salinity begin to show. The highest difference excites with the control and V_4 and reached after 45 days 20.69%.

3.2 Effect of the salinity on the fruit quality of the fruit

We will present in following results the effect of the salinity on the fruit quality. For this reason some tests has been made (sugar content, acidity, and agrochemical determination (N,P,K- soluble forms).

The results obtained are presented in the table1 and figures 4,5,6,7.

In the two dates of analyses we observe:

- No difference regarding the sugar content in the fruit in 20.07.2006. the sugar content in the control sowed the higher sugar content.

- The acidity increase with the increasing of the concentration of the salt in the irrigation water.
- Potassium was absorbed in the treatments with saline water much better than in the case of the control
- The absorption of the Phosphor in the fruit was much higher in 20/07/06, as a result of the formation of the soluble forms than in 27/07/06 when it was lower
- In the case of the nitrogen at the first date of the fruit analysis (20.07.06) we observe much higher values in the saline treatment with comparison with the control, after which on the second date (27/07.06) the nitrogen content increase with the increasing of the salinity, the nitrogen values in V2 and V3 was lower than the control.

CONCLUSIONS

After the results mentioned we can take the following conclusions:

1. The salinity affects the growing of tomatoes plants. The plant in this study resisted to a concentration of 1.5 ds/m but in the case of higher concentration the plants were affected.
2. The inter-nod length was affected during the inflorescence, but in the beginning of the vegetation there were no differences
3. The inflorescence was affected because in the case of V_3 and V_4 the flowers were aborted
4. In the case of the treatment irrigate with saline water we have an increasing of the acidity and decreasing of the sugar content
5. The acidity and the sugar content have an inverse proportional variation meaning that in the control we have low acidity and a higher sugar content and vice versa in the case of V_4
6. The treatment irrigated with saline water had a content of nitrogen phosphor and potassium much higher than the control.

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Table 1 The fruit quality criteria

Treatments	Date	Acidity	Sugar content	K (ppm)	P (ppm)	N (ppm)
ED	20/07/2006	6.4	3.5	3620	44.2	17.1
ED	27/07/2006	6.6	5.5	2400	30.8	38.0
E1.5	20/07/2006	8.3	3.5	5240	82.2	39.9
E1.5	27/07/2006	9.6	5.2	5480	35.6	22.8
E2.5	20/07/2006	8.5	3.5	3480	66.4	32.3
E2.5	27/07/2006	11.4	5.2	6680	39.5	36.1
E4	20/07/2006	7.7	3.5	4000	75.8	26.6
E4	27/07/2006	10.7	5.3	6280	45.0	45.6

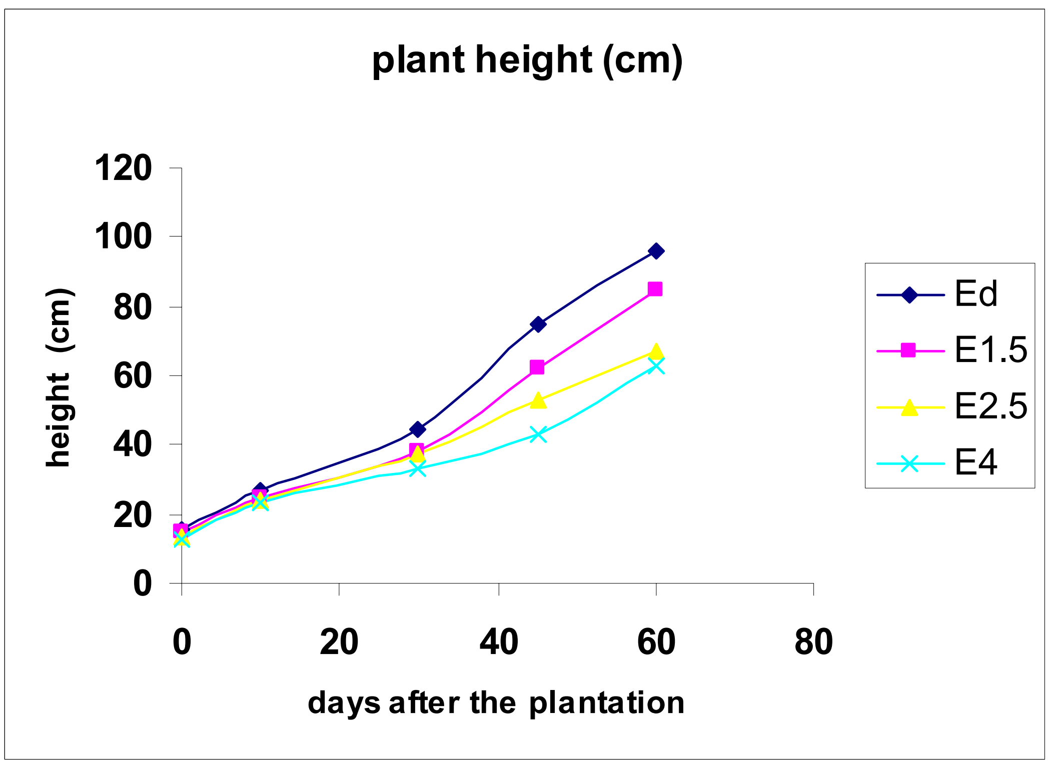

Fig. 1. Plant height in (cm) of the *Lycopersicum esculentum* obtained in the study

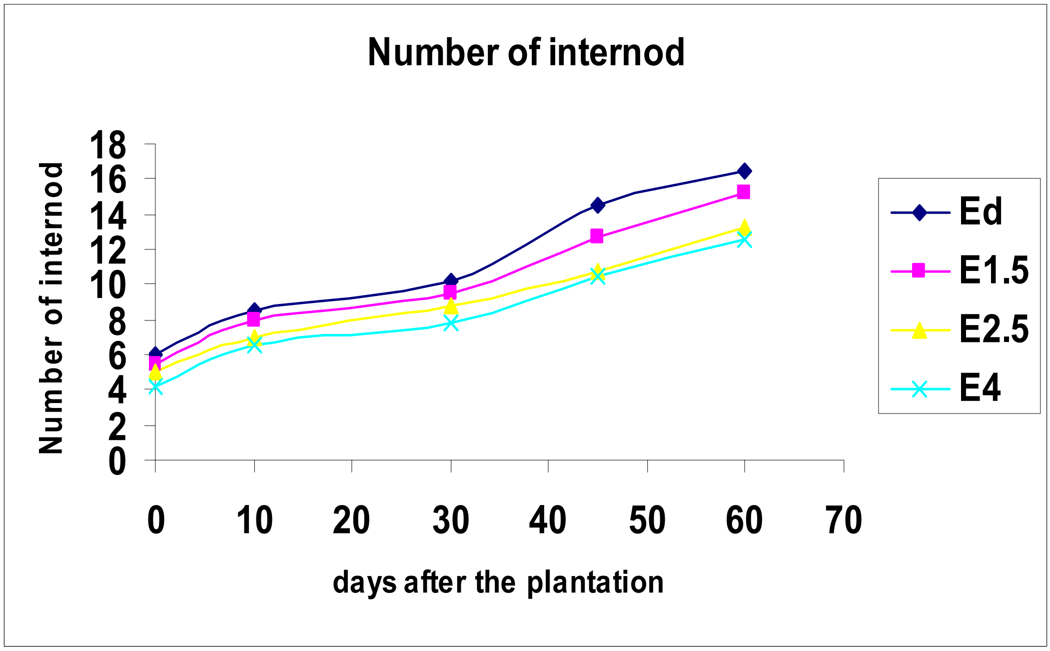

Fig. 2. Number of internods of the *Lycopersicum esculentum* obtained in the study

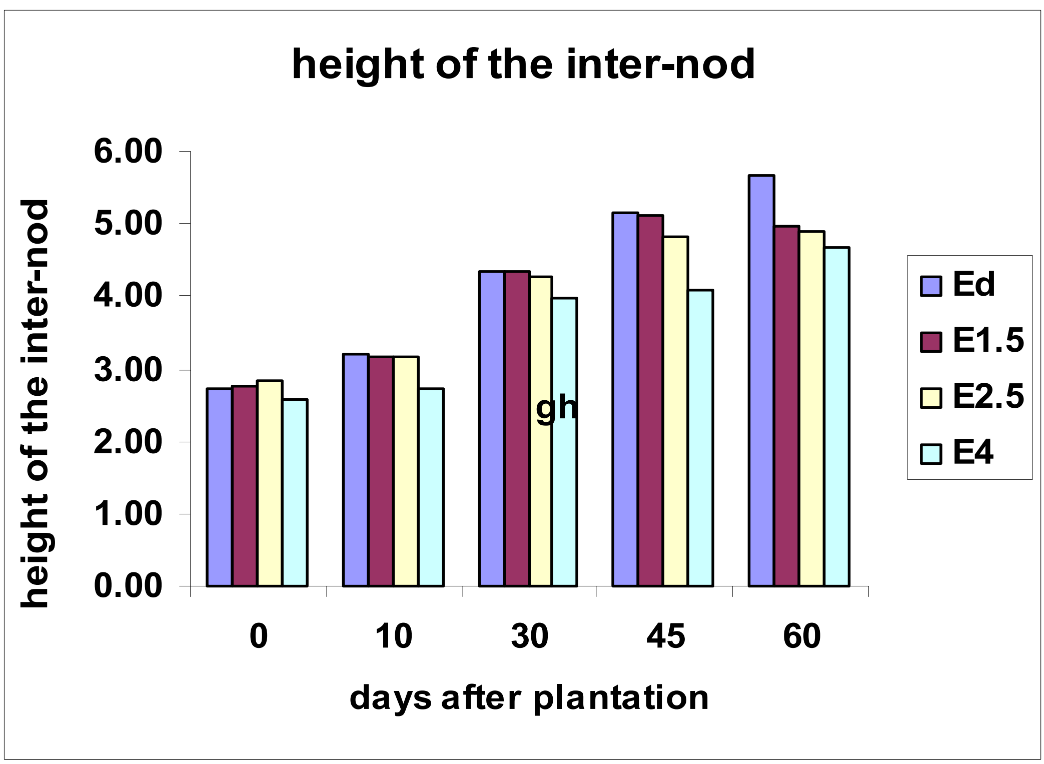

Fig. 3. Lenght of the internode in (cm) of the *Lycopersicum esculentum* obtained in the study

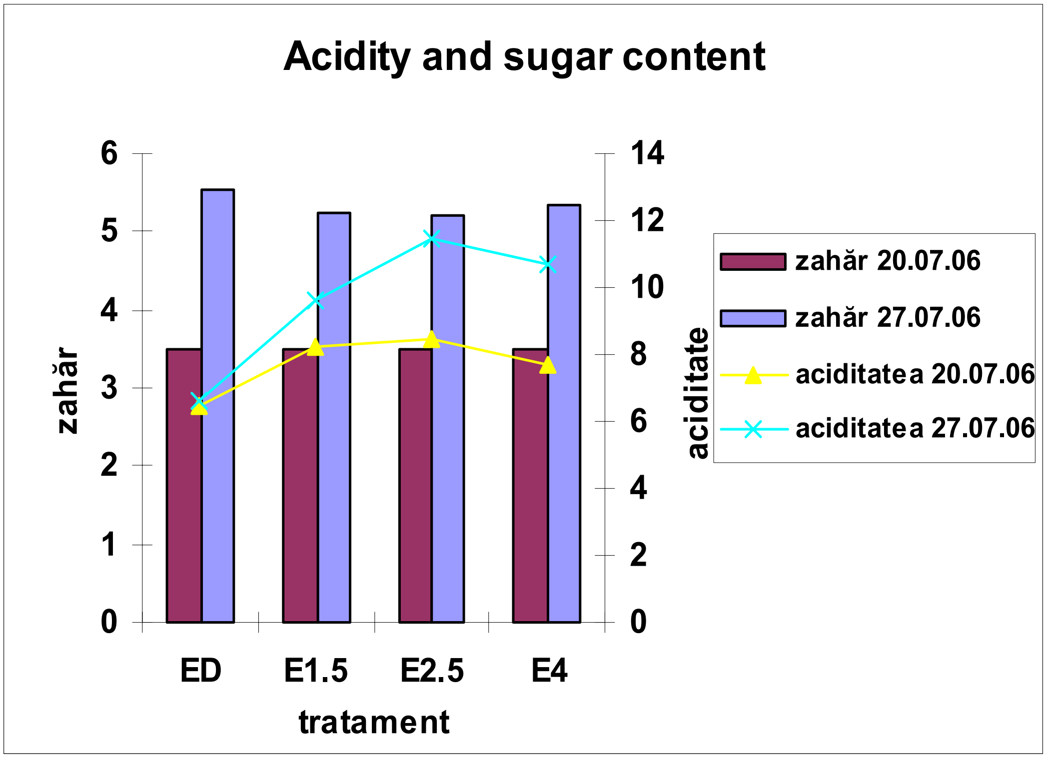

Fig. 4. Acidity and sugar content of the *Lycopersicum esculentum* obtain in the study

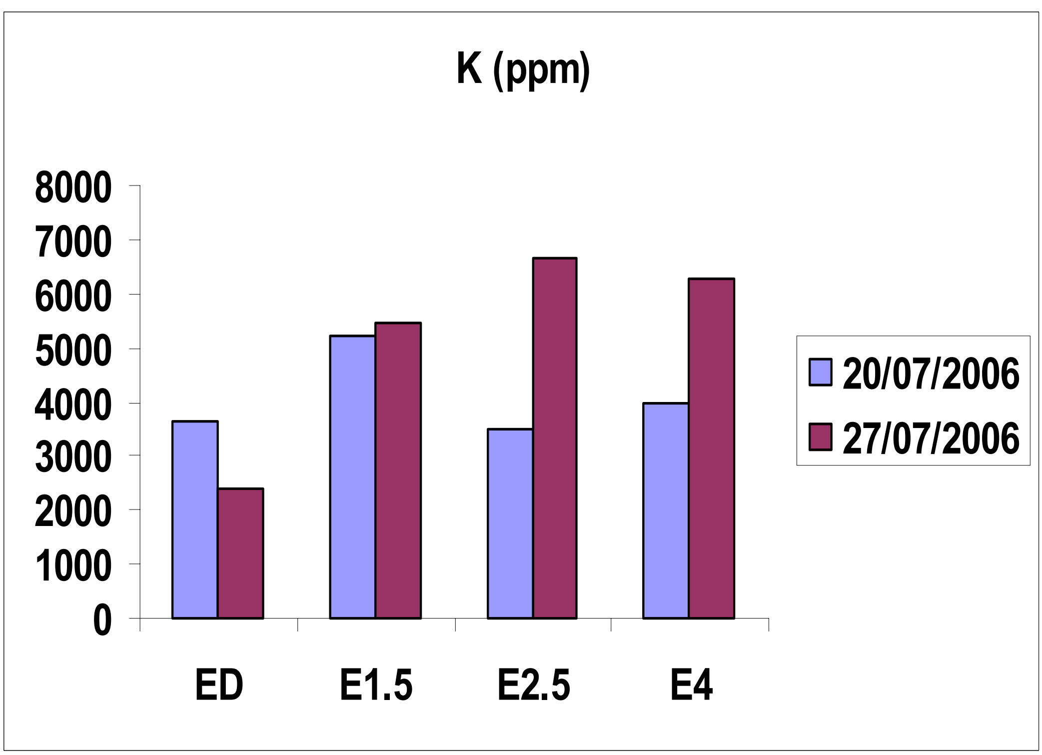

Fig. 5. Potassium content in the fruit of the *Lycopersicum esculentum* obtain in the study

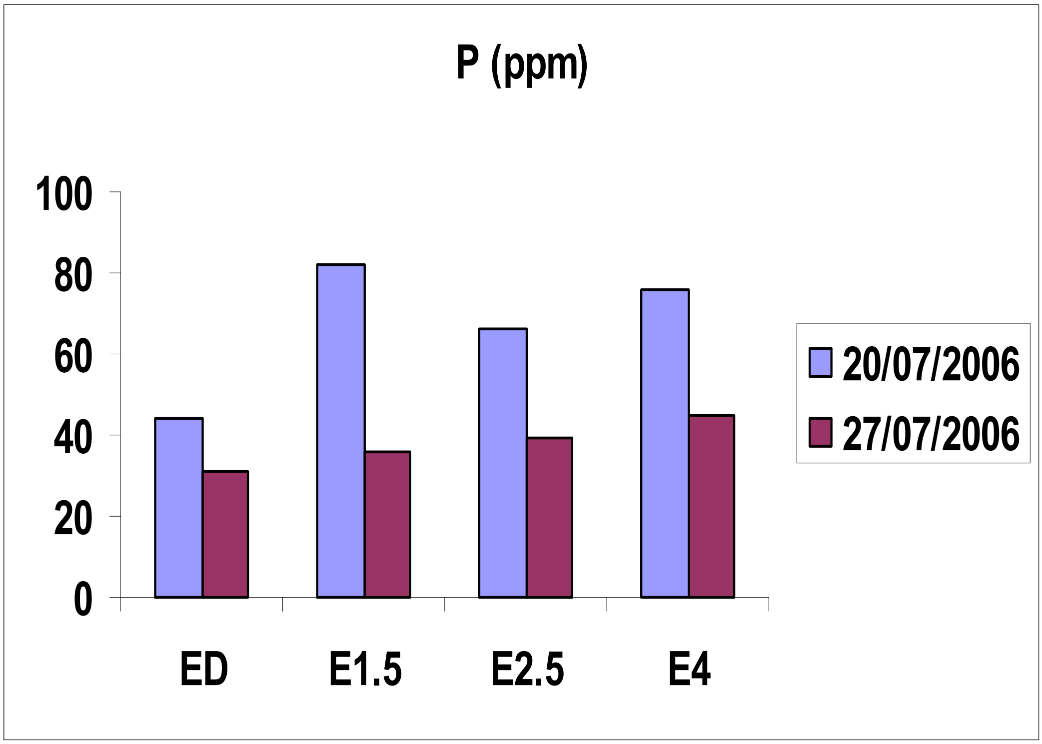

Fig. 6. Phosphorus content in the fruit of the *Lycopersicum esculentum* obtain in the study

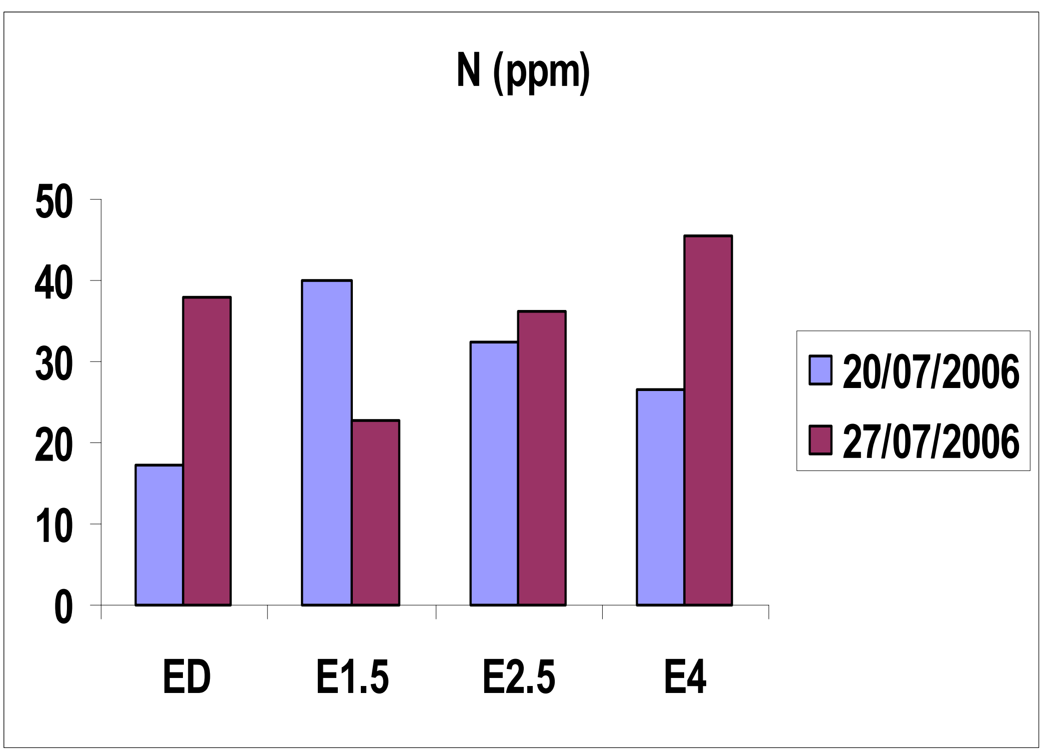

Fig. 7. Phosphorus content in the fruit of the *Lycopersicum esculentum* obtain in the study

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THE INFLUENCE OF IRRIGATION WATER ON CABBAGE IN EARLY AND AUTUMN CULTURE

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Key words: culture systems, nitrates content, accumulation, metabolisation

SUMMARY

This paper presents the results of the research about the synchronization of nitrates content of surface waters used for culture irrigation in the arranged space within The Buzau Research-Development Base for Vegetable Growing and of the level and quality of the white cabbage in early and autumn culture.
There is an important synchronization between the nitrates content of irrigation water and that of cabbage plants, in various growing phases. In cabbage heads the NO_3 concentration was 3.8 -5.3 times smaller for the early culture and 6.3 times smaller for autumn culture compared to young plants. Reversed linear correlations between the productions level and the nitrates content of the cabbage heads ($r^2 = 0.621$) were determined. For the autumn culture the accumulation rate of nitrates is smaller, and their metabolisation capacity is 1, 6 times higher compared to early culture, and there is a reaction specific to different types of cultivars

INTRODUCTORY NOTE

The quality of irrigation water should be considered an extremely important factor for the modification of the soil properties, the process of plant growing, as well as the level and quality of the acquired production in its interaction soil-water-plant (2, 3, 4). Beside the physical properties (temperature, aeration degree, suspension content), for the evaluation of quality of the irrigation water, other indicators mentioned by the present in force standards regarding the chemical composition, the pollution and toxicity level, etc (5,6,7). Among these indicators, the content of nitrates of the irrigation water is of utmost importance as there is a major risk because of the possibility of transmitting these substances to plants, respectively to vegetables, with dangerous effects on the consumers' health (1).

ORGANIZING THE EXPERIENCES, MATERIALS AND METHOD

The experiences took place in 2001, at SCDP Buzau, for 2 cabbage cultures (early and autumn cabbage) and had the following objectives:

- to study the nitrates accumulation in the cabbage plants depending on the type of the culture (early or autumn), on the grown variety or hybrid, on some elements of the irrigation conditions, on the nitrates content of the irrigation water;
- to show the way of distribution of the nitrates in different parts of the plant;
- to establish some correlations between the nitrates content of the irrigation water as a quality parameter of the irrigation water and the achieved cabbage production.

The experimental conditions were: alluvial mollic soil, the sum of the temperature grades during the vegetation period was 3507^{O}C, and total rainfall during the vegetation period 457 mm.

The experiments had a linear blocks design with 4 repetitions. For each culture, the surface of the repetition plot was of 45 m^2 and that of the variant plot of 180 m^2; the total surface for the experiment was of 720 m^2 (540 m^2 for the early culture and 180 m^2 for the autumn culture).

The experimental variants corresponded to the studied cultivars, i.e.:

- for the early culture – TUCANA F1; FLAVIUS F1; ALTESS F1 early hybrids
- for the autumn culture – BUZAU late variety

Applied Agrothechnique followed the directives in the specialised technologies regarding the white cabbage growing in the field. 1-3 days before planting, the field was sprinkled with Stomp weed killer (5 litres/ha), in the vegetation period were applied 2 fertilisations with nitrogen from nitrate ammonium in quantity of 150 kg./ha, etc, and phytosanitary treatments with specific substances were applied. In Table 1 you may find the differences regarding the two culture systems

For each culture system, observations and determinations in dynamics were made using specific investigation methods regarding:

- the nitrates content in the irrigation water was spectrophotometric analysed in the laboratory of CN Romanian Waters S.A., Ialomita – Buzau Water Department
- the nitrates in the soil – analysed with a ion selective electrode
- the nitrates in the plants – photocolorimetric analysed in water extract and dosing with fenoldisulfonic acid
- the production was registered by weighing the repetitions and the variants;
- for the mathematical processing of the results the variation analyse method was used (Dunnet, Student, ANOVA tests) and was calculated the correlations between the nitrates content of the irrigation water, soil, plants and the level of the obtained production

THE ACHIEVED RESULTS

The determinations performed in the dynamics for the two culture systems showed the effect of the quality of the irrigation water regarding the nitrates content of the water on the cabbage plants in different vegetations phases.

The obtained results in the early culture are shown in Table 2 and Figure 1.

The values the represent the average of the analysed hybrids show a reversed relation between the nitrates content in the watering water, soil and plants. A month after planting (April 21st) although the NO_3^- concentration of the water was 0, 5 mg/l, in young cabbage plants there were the highest values. As the plants grew (May 14th) the nitrates content of the leaves decreased, and at the harvesting point of the cabbage heads (with a 9,6 times increase of the NO_3^- concentration in the water), in the plants the content was at the lowest point, thus showing their capacity of metabolising the nitrates from the irrigation water and from the soil.

The information in Table 2 underlines the different behaviour from this point of view of the studied hybrids. Compared to the NO_3^- diminution in the young plants, there was a 3.8 times diminution of the concentration in the cabbage heads for the Altess F1 hybrid, 4 times for Tucana F1 and 5.3 times for Flavius F1, proving this hybrid's highest capacity of metabolising the nitrates.

Taking into consideration the obtained values as an average of the cultivated hybrids, we can reach the conclusion that there is a 4, 3 times diminution of the nitrates content for the young plants of early cabbage, once the heads harvest maturity was reached.

The mathematical analyse proves a revered linear correlation between the nitrates content of the irrigation water and that in the early cabbage plants at different vegetation phases. The determination coefficient (r^2 = 0.9942) has a high value proving there is a tight correlation between the two indicator of quality (Figure 1)

The analyses of the autumn cabbage show differences determined by the two culture systems and by the growing field (Table 3). Compared to early cabbage, the values of the nitrates quantity in the heads were lower (387.20 ppm compared to 502.42 ppm) and the quantity of nitrates was 6.3 times reduced compared to the young plant phase.

For this case also it is noticed a strong reversed correlation between the nitrates content in the irrigation water and in the plants at different vegetation phases, where the value of the determination coefficient is $r^2 = 0.9849$ (Figure 2).

After a comparative analyse of the information gathered from the experience, we can say that for the autumn culture, during the vegetation period, the nitrates metabolisation is higher compared to that in the early culture, the final product being less harmful (Figure 3).

From the comparative analyse shown in Table 4 you can notice that at harvesting point, in the early cabbage the nitrates quantity in the plants is higher. The same trend of differences is kept between the two culture and cultivars regarding the distribution of nitrates in the edible parts. Thus compared to the total determined quantity in the early culture, the heads contain 47.4 % from the nitrates (502 ppm), whereas in the autumn culture you can notice the diminution of the weight of the nitrates to 42.4% (387 ppm).

The studied cultivars had a specific capacity of accumulation and metabolisation of the nitrates from the water and from the soil, on the first places being the Buzau autumn cabbage variety and the Flavius F1 early hybrid, in which the nitrates quantity within the heads represented only 42.4%, respectively 46.4 % from the total per plant.

Along the whole vegetation period, between the nitrates content in the cabbage plant and that in the irrigation water there is a significant correlation that proves in the relation water – soil – plant water quality directly influences the storage of nitrates in the plants (Fig. 4).

The results about the obtained production show important differences between the studied cultivars and the two culture systems (Table 5). If the early hybrids produced an average crop of 38.14 t/ha (0.657 kg/plant), in the autumn culture, for the Buzau variety there was a harvest of 61.52 t/ha (1.723 kg/plant).

From the data shown in the table from above and in Figure 5, you can notice that between the production level and the nitrates content of the cabbage heads is a rather tight ($r^2 = 0.621$) reversed linear correlation. For the autumn culture where the production was almost double compared to the early culture, the nitrates content decreased.

In order to explain the influence of the irrigation water on the nitrates content of the cabbage plants in the two culture systems, the total contribution of nitrates in the irrigation water was calculated, taking into consideration the period of evolution of the vegetation cycle, the number of the plants per hectares, specific elements of the irrigation conditions and the nitrate content of the water that is used for watering. Based ob the production results and on those about the nitrates content in the cabbage heads was calculated the storage/accumulation report and the nitrates metabolisation report along the vegetation period, showing the differences between the two culture systems and the specific reaction of different studied cultivars (Table 6).

You can notice that for each NO_3 mg brought to the plant from the irrigation water by means of the soil, in the cabbage heads the nitrates accumulation is 2.80 mg for the early cultures compared to only 1.71 mg for the autumn culture. The Buzau variety has a higher capacity of metabolisation the nitrates accumulated during a longer vegetation period, compared to early hybrids. Thus, for 1 NO_3 mg $^-$ determined in the heads at the harvest moment in the autumn culture, this variety transformed a quantity of nitrates 1.6 times (0,58 mg) higher than the hybrids in the early cabbage (0.36 mg).

These results allow us to underline the conclusion that even if the nitrates contribution brought by the irrigation water to the surface unit and on the plant is much higher at the cabbage autumn cultures compared to the early ones, due to the longer vegetation time, to bigger production and to enlarged capacity of metabolisation of the late varieties, in the autumn cultures are obtained cabbage heads of a higher quality in terms of nitrates content.

CONCLUSIONS

1. The quality of the irrigation water influences the cabbage cultures by the water – soil – plant relation. Along the entire vegetation period there are very important correlations (r^2 = 0.397243) between the nitrates content in the cabbage plants and the nitrates content in the irrigation water.
2. The highest nitrates concentrations were found in the young plants (2160- 2427 ppm) and the lowest in the heads (387-502 ppm), showing the plants' capacity to metabolise the nitrates from the irrigation water and from the soil.
3. The diminution of the NO_3^- concentration in the heads compared to that in young plants was 3.8 times for the Altess F_1 hybrid, 4 times for the Tucana F_1, 5.3 times for Flavius F_1 and 6.3 times for Buzău variety, proving the different behaviour of the observed plants.
4. Reversed linear correlations were determined between the nitrates content of the irrigation water and the cabbage plants in different vegetation phases (r^2 = 0.9942 for the early culture; r^2 = 0.9849 for the autumn culture) on one hand, and between the production level and the nitrates content of the cabbage heads (r^2 = 0.621).
5. Although the contribution of the nitrates from the irrigation water to the surface unit and on the plant is much higher for the autumn cabbage cultures compared to the early cultures, because of the longer vegetation period, of the bigger production and of the higher capacity of metabolisation of the late varieties, as for the nitrates content in the autumn cultures there are heads of a higher quality.
6. For the cabbage culture, the quality of the heads regarding the nitrates content is influenced by the culture system and by the quality of the irrigation water. In order to reduce the risk of pollution with nitrates, it is recommended the severe control of the nitrates content in the water and according to each culture type it is recommended the choice of the most appropriate cultivars in terms of their metabolisation capacity.

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Table 1. Applied agrotechnique

Specification	Early Culture	Autumn Culture
The transplant growing	In the multiplicative greenhouse; sowing on the January 24th, planting out on March 3rd, in nourishing	Rarely sown on June 9th in beds in the field, not planted out
Planting	March 25th with a density of 58.000 plants for ha.	June the 17th, with the density of 35.700 plants per ha.
Irrigation	Number of watering = 7 Interval = 10 – 12 days Watering norm = 300 – 500 mc/ha Irrigation norm = 2850 mc/ha	Number of watering = 13 interval = 8 – 10 days Watering norm = 400 – 500 mc/ha Irrigation norm = 4850 mc/ha

Table 2. The nitrates content - early cabbage

Date	Hybrid	Nitrates content		
		water (mg/l)	soil (ppm)	plant (ppm)
21.04	V_1Tucana F_1	0.5	444.15	2231.16
	V_2 Altess F_1		825.40	2058.25
	V_3 Flavius F_1		786.18	2190.73
	Media		685.24	2160.05
14.05	V_1Tucana F_1	1.8	305.82	1390.35
	V_2 Altess F_1		581.15	1208.44
	V_3 Flavius F_1		422.60	1075.50
	Media		436.52	1224.76
27.06	V_1Tucana F_1	4.8	60.75	554.64
	V_2 Altess F_1		62.12	541.61
	V_3 Flavius F_1		46.17	411.01
	Media		56.35	502.42

Table 3. The nitrates content - autumn cabbage, Buzau variety

Date	Nitrates content		
	water (mg/l)	soil (ppm)	plant (ppm)
17.08	3.0	468.16	2427.52
23.09	3.1	291.32	1780.58
20.10	4.2	116.85	845.37
20.11	2.8	43.05	387.20

Table 4. The nitrates distribution in different parts of the cabbage heads at the harvesting moment

Hybrid/Variety	Total ppm	Out of which:			
		exterior leaves		heads	
		ppm	%	ppm	%
Early cabbage					
V_1Tucana F_1	1178,12	623,48	52,9	554,64	47,1
V_2 Altess F_1	1109,16	567,55	51,2	541,61	48,8
V_3 Flavius F_1	884,95	473,94	53,6	411,01	46,4
Average	1057,41	554,99	52,6	502,42	47,4
Autumn cabbage					
Buzău	913,26	526,06	57,6	387,20	42,4

Table 5. The influence of the cultivars on the production and on the nitrates content of the cabbage

Cultivars	Production		Nitrates content - heads
	t / ha	**kg / plant**	**ppm**
Tucana F1	34.15	0.589	554.64
Altess F1	42.34	0.730	541.61
Flavius F1	37.93	0.654	411.01
Average for the early culture	38.14	0.657	502.42
Buzău	61.52	1.723	387.20

Table 6. The contribution of the nitrates and the metabolisation report in cabbage in different culture systems

Specification	UM	Early Culture	Autumn Culture
Culture period/ number of days	date (no of days)	25.03 – 27.06 (93)	15. 07 – 20.11 (125)
Density	No. Of plants/ha	57.000	35.700
Irrigation norm	mc / ha	2.850	4.850
Total nitrates contribution in the irrigation water			
- per hectare	kg /ha	6,825	16,360
- per plant	mg / plant	117.67	389.52
Production	t/ha kg /plant	38.14 0.657	61.52 1.723
The heads content of nitrates when harvesting	ppm mg*	502.42 330	387.20 667
Accumulation rate	$mgNO_3$/plant : $mgNO_3$/ head	1 : 2. 80	1 : 1. 71
Metabolisation rate	$mgNO_3$/ head : $mgNO_3$/ plant	1 : 0.36	1 : 0.58

- the conversion from ppm to mg took into consideration the average mass/weight of the heads

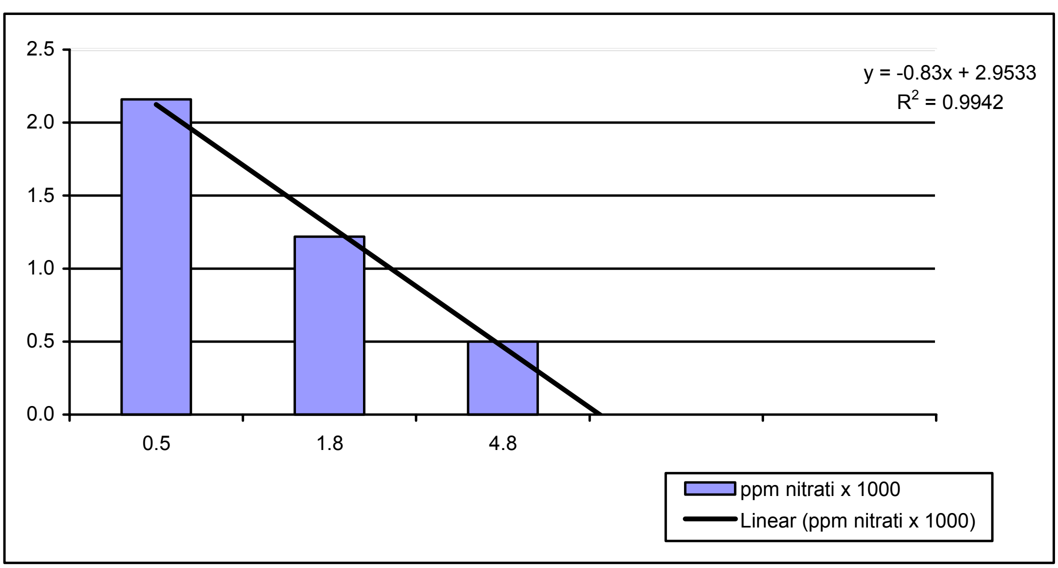


Fig. 1. The relation between the nitrates content in the irrigation water and in the early cabbage heads.

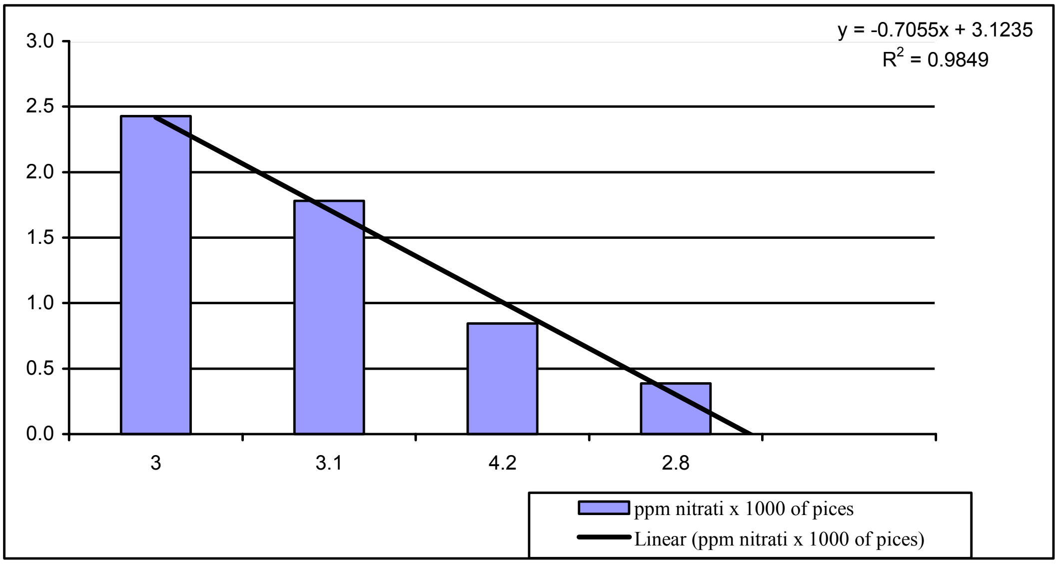
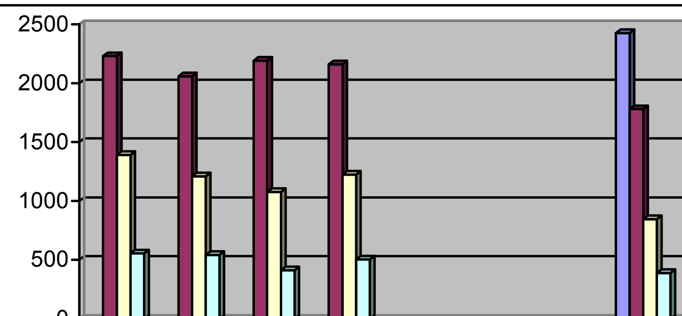
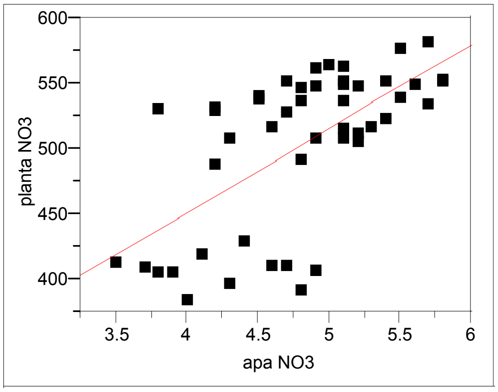


Fig. 2 The relation between the nitrates content in the irrigation water and in the autumn cabbage heads



	Tucan a	Altess	Flavius	Media			date	De Buzau
3-D Column 1							17_Aug	2427.5
21-Apr	2231.2	2058.3	2190.7	2160.1			23_Sep	1780.6
14-May	1390.4	1208.4	1075.5	1224.8			20_Oc	845.37
27-Jun	554.64	541.61	411.01	502.42			20_Nov	387.2

Fig. 3. The nitrates content in cabbage plants in early and autumn culture



NO3 Concentration in cabbage plants = 193.38633 + 64.382015 NO3 concentration in water

r^2	0.397243
r^2Adj	0.384139
The average of the answer	502.42
Number of observations	48

Term	Estimate	Er. Std	t Ratio	Prob>|t|
Intercept	193.38633	56.53588	3.42	0.0013
NO3 water	64.382015	11.69308	5.51	p<.0001

The estimation of the parameters

Fig. 4. Correlation between NO3 (ppm) inplant and NO3 (mg/l) in watering water –early cabbage

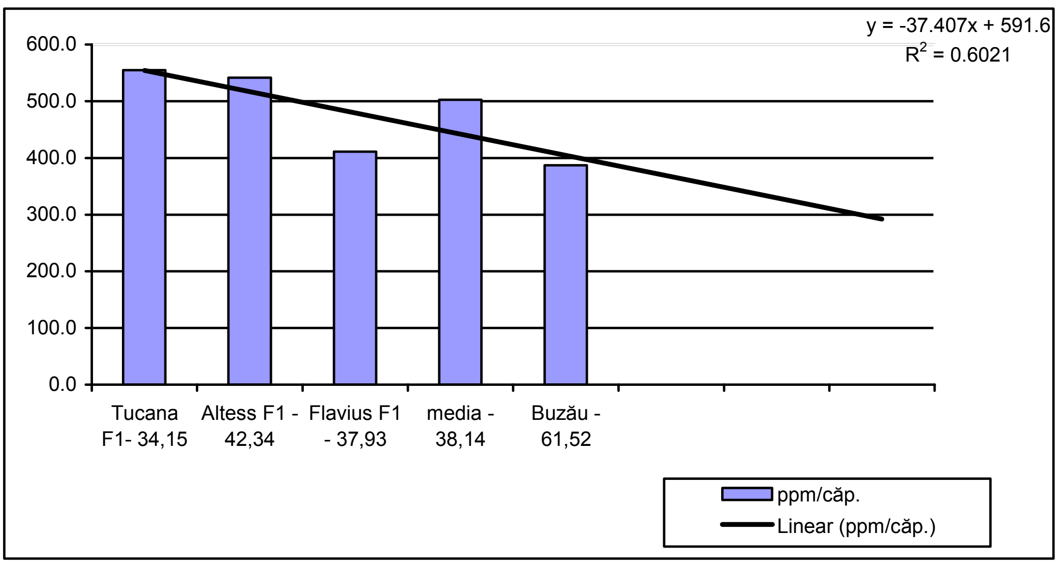


Fig. 5. The relation between the production level in different cabbage cultivar and the NO_3 content in the heads

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THE EFFECT OF THE NITRATES IN IRRIGATION WATER ON THE YIELD AND QUALITY OF TOMATO FRUITS

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Keywords: land utilization systems, nitrates concentration, accumulation, metabolisation

ABSTRACT

The paper presents the results of a research conducted at SCDL Buzau, regarding tomato cultures grown in the field, in solariums covered with polyethylene and greenhouses, irrigated with water from the Buzau River.

INTRODUCTORY NOTE

The nitrates found in the irrigation water affect the quality of certain legumes, through the relation water-soil-plant (1;3), and represent a real danger of pollution. The laws in force regulate the maximum admissible limits for the nitrates concentration in waters used for irrigation of both cultures and certain leguminous plants (4, 5, and 6). For tomatoes, these limits are established at: 150 ppm for field cultures and 200-300 ppm for plants grown in greenhouses and solariums.

Given the fact that the metabolisation of the nitrates in fruits in different depending on the environmental conditions that influence all the metabolic processes occurring in plants (2), the determination of the influence of nitrates concentration in the irrigation water, of the land utilization system and the cultivars on the yields obtained and the nitrates concentration in fruits is very important for the orientation of tomato growers.

ORGANIZATION OF EXPERIMENTS, MATERIALS, AND METHOD

The experiments were conducted in the field, in solariums and in greenhouses, using a linear block design with four repetitions. Data regarding the studied variants and the carrying out of the researches are presented in Table 1.

During the vegetation period, according to the tomato cultivation technology, the following maintenance works were performed: manual weeding, fertilisation – 3 times, with Complex III in doses of 300 kg/ha, fitosanitary treatments with specific fungicides and insecticides (Rubigan 0.03%, Previcur 0.2%, Bayleton 0.05%, Fastac 0.03%), tying in, pulling out the shoots and dead branches cutting off at 4, 6 and 10 inflorescences.

The irrigation type was different for each cultivation system; the irrigation applied was an open irrigation between plant beds, maintaining the humidity at a minimum level of 70 – 75% in the active humidity interval. During the vegetation period, watering was applied when for the depth of the active layer the momentary provision of water in the soil approached the minimum level (23.2% in the field, 22.60% in the solarium, 22% in the greenhouse). The number of watering was: 7 in the field, 11 in the solarium and 14 in the greenhouse, with average watering quotas of 500, 370 and 450 cubic meters /ha, respectively, and the irrigation quotas were of 3500, 4050 and 6300 cubic meters/ha.

OBSERVATIONS AND DETERMINATIONS, INVESTIGATION METHODS

For the three cultivation systems, observations and determinations specific to the observed parameters were made, namely:

- determination of the nitrates concentration in plants, was performed at the beginning of the harvesting for each cultivation system, based on mean fruit samples, harvested by repetitions and variants. The concentration was measured calorimetrically in water extract using phenoldisulphonic acid.
- yields obtained from different cultivation systems were recorded by weighting the repetitions, the results representing the average values for each variant per hectare.
- in order to process the results mathematically, the existing correlations were determined (using the EXCEL software from Microsoft®), namely the correlations between: the yield level and the nitrates concentration in fruits; the total quantity of nitrates accumulated by a plant (ppm) from the irrigation water, and the NO_3^- concentration in fruits.
- determination for each cultivation system of the nitrates quantities accumulated per cultivated hectare, plant and fruit from the irrigation water was made taking into consideration: the elements specific to the irrigation system (number of watering, watering and irrigation quotas characteristic for cultivation in the field, in solariums, and in greenhouses), the nitrates concentration in the watering water upon application, the number of plants per hectare, the yields obtained for each plant).
- the ratios of nitrates accumulation in fruits and of their metabolisation, specific for each hybrid and cultivation system, were calculated by reporting the nitrates quantities found in plants to those found in fruits.

RESULTS

From the analysis of the results obtained for the 5 studied tomato hybrids, it results that there are material differences between the three cultivation systems, both regarding the obtained yields and the quality of the fruits as far as their nitrates concentration in concerned (table 2).

In different systems, using the same hybrids, the following average yields were obtained: 39.74 t/ha in the field, 64.19 t/ha in solariums and 78.22 t/ha in greenhouses.

We must notice the specific reaction of the studied hybrids to the cultivation system. In field cultivation, the most productive hybrid was Cindel (48.26 t/ha), which exceeded the average of the experiment by 8.59 t/ha, followed by H_2 – Buzau (47.34 t/ha). In solariums and greenhouses, the largest yields were obtained for the hybrid H_2 – Buzau (73.05 t/ha and 93.61 t/ha, respectively, 8.84 – 15.39 t/ha over the average of the studied hybrids).

Results regarding the nitrates concentration in fruits at consumption maturity show material differences both between the cultivation systems and the studied hybrids. Compared to the average nitrates concentration found during the experiment in tomato fruits, that is 120 ppm NO_3^- for plants grown the field, 140 ppm NO_3^- for those grown in solariums, and 320 ppm NO_3^- for those grown in greenhouses, the highest values were registered for H_1 – Buzau, followed by H_3 – Buzau, and the lowest for H_2 – Buzau.

It can be noticed that in the same cultivation conditions H_2 – Buzau, which registered yields over the average compared to the other hybrids, accumulated in fruits the smallest quantities of nitrates (87 ppm in field cultivation, 105 ppm in solariums and 235 ppm in greenhouses). This hybrid is characterized by a high nitrates metabolisation capacity, even when cultivated in greenhouses, the NO_3^- concentration in fruits being at the upper admitted limit. By comparison, the other hybrids registered higher values, inversely proportional to the yields obtained. The largest accumulations of nitrates were found in the fruits of the hybrid H_1

– Buzau (169 ppm in the field, 190 ppm in solariums, and 430 ppm in greenhouses, where the level is two times higher than the MAL of 200 ppm).

These results prove the importance of choosing the cultivar that is the most adequate for certain environmental conditions and a cultivation system.

Between the level of yields obtained in different cultivation systems and the NO_3^- concentration in fruits, there is a direct linear correlation, whose coefficient of determination (r^2 = 0.8242) shows the effect of the cultivation conditions, and implicitly of the gain of nitrates from the water brought due to the large irrigation quotas on the increase of the quantity of nitrates in the fruits coming from greenhouses as compared to that specific to field cultivations. (Figure 2).

From the analysis of the correlation between the yield obtained with the hybrids studied within each cultivating system and the content in nitrates of the fruits (fig. 3 -5), it results that the value of the coefficient of determination is very low (r^2 = 0.0783 in the field; r^2 = 0.0716 in solarium; r^2 = 0,0710 in the greenhouse). This proves that within the same land utilization system there is a weak relation between the two parameters and in particular, it underlines the very specific reaction of the different cultivars to the metabolisation of the nitrates in water and soil,

For the three culture systems, differences were identified both with regard to the total gain of nitrates due to irrigation water, and the specific capacity of cultivars to metabolise during the vegetation a part of nitrates coming from the water and soil (table 2).

Due to the periods of development of the cultivation cycles specific to each system, to the elements specific to the irrigation type (different no. of watering, watering and irrigation quotas specific to the field, solarium, greenhouse cultivation, etc.) as well as to the concentration of nitrates determined in the irrigation water at the moment when it is used, the total gain of nitrates per cultivated hectare, per entire cycle of vegetation is different. Thus, the calculations revealed a gain of 16.285 kg NO_3^- in field, as compared to 15.615 kg NO_3^- in solarium and 19.395 kg NO_3^- in greenhouse.

Considering the different number of plants cultivated per unit of surface, the quantity of nitrates brought by the irrigation water for a plant was calculated. It was found that its values are comparable for the filed (339 mg/plant) and solarium (390 mg/plant) cultivations, but are higher for the greenhouses (539 mg/plant), where, due to a longer period of vegetation, a larger number of watering were applied (14 as compared to 7 in the field, and 11 in the solarium) and larger irrigation quotas.

Between the gain of nitrates from the irrigation water for a cultivated hectare in different systems and the quantity per plant, there is a very close correlation with the value of the coefficient of determination r^2 = 0.9259 (fig. 6)

In order to evaluate the effect of the nitrates concentration on that from the tomato fruits in different cultivation systems, the accumulation ratio was calculated (expressed as the quantity of NO_3^- accumulated in the fruits of a plant, based on the density per hectare, corresponding to an unity of NO_3^- per plant from the irrigation water during the period of cultivation. The table 3 shows that this ratio is 1:0.29 in field, 1:0.58 in solarium, increasing to 1:1.29 in greenhouses (2 times larger than in solarium and 4 times larger than in field).

Due to the different cultivation conditions and to the biological characteristics of the studied hybrids, the metabolisation ratio of the nitrates from water and soil during the period of vegetation up to the harvest maturity was different. In the field conditions, the cultivated hybrids had an larger average capacity of metabolisation (1:3.42) as compared to the solarium (1:1.73) and greenhouse (1:0.77) conditions, proving the superior quality of fruits coming from the field, as well as the increase of the risk of pollution with nitrates of the greenhouse fruits.

The increase by 2.3-2.7 of the nitrates concentration in tomato fruits coming from the greenhouse as compared to the solarium and field is also due to the reduced intensity of light in the greenhouse conditions, which is mentioned in the reference literature as on of the factors favoring the accumulation of NO_3^- in plants.

A direct correlation has been found between the quantity of nitrates per plant from the irrigation water administered during the period of vegetation of various cultures and the quantity contained in the at harvest maturity. The value of the coefficient of determination is $r^2 = 0.8242$ (fig. 7) proving a larger effect of the quality of irrigation water on the nitrates concentration in the tomato fruits.

The results resulted from these experiments prove that the cultivation of tomatoes, the quality of fruits with regard to the concentration of nitrates is dependant on the cultivation system and the quality of the irrigation water. In order to reduce the risk of pollution with nitrates, especially for the protected cultures from greenhouses and solaria, it is recommended to strictly control of the concentration of nitrates in the irrigation water and to choose the cultivar that is the most adequate as regards the capacity of metabolisation.

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Table 1. Data regarding the experiments

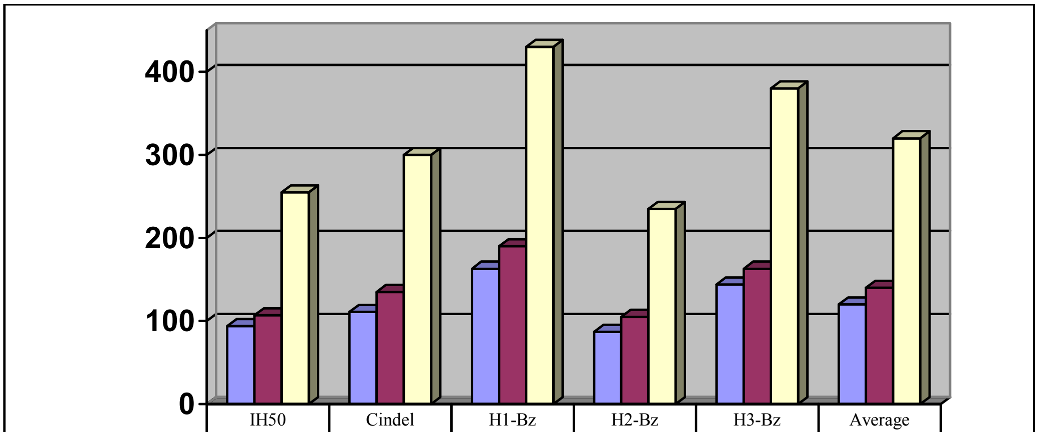
Variants	Total surface in sq m			Cultivation period/no. of plants per ha.		
	greenhouse	**solarium**	**field**	**greenhouse**	**solarium**	**field**
V1 (Mt)- IH-50	120	120	1000	15.02- 25.06 / 36.000	12.04–10.07 / 40.000	5.05- 8.08 / 48.000
V2 - Cindel						
V3 - H_1-Bz.						
V4 - H_2-Bz.						
V5 - H_3-Bz.						

Table 2. The influence of the cultivation system on the tomato yield and the nitrates concentration (ppm) in fruits – 2002

Variant	field		solarium		greenhouse	
	Yield t/ha	**Nitrates concentration ppm**	**Yield t/ha**	**Nitrates concentration ppm**	**Yield t/ha**	**Nitrates concentration ppm**
V1 – IH-50	30,20	94	59,40	107	63,22	255
V2 –Cindel	48.26	111	66.12	135	87.74	300
V3 - H_1- Buzău	45.08	163	69.62	190	84.20	430
V4 - H_2- Buzău	47.34	87	73.05	105	93.61	235
V5 - H_3- Buzău	27.82	144	52.78	163	62.35	380
Average	39.74	120	64.19	140	78.22	320

Table 3. The gain of nitrates from the irrigation water for tomato cultivation in different systems

Specification	M.U.	Field	Solarium	Greenhouse
Period of cultivation / no. of days	date (no. of days)	5.05- 8.08 (95)	12.04–10.07 (89)	15.02- 25.06 (131)
Density	no.of plants /ha	48.000	40.000	36.000
Irrigation quotas	mc / ha	3.500	4.050	6.300
The total gain of nitrates from the irrigation water: - per hectare	kg /ha	16.285	15.615	19.395
- per plant	mg / plant	339	390	539
Yield	t/ha kg /plant	39.74 0.828	64.19 1.605	78.22 2.173
The nitrates concentration in the fruits at harvest	ppm mg/fruit	120 99	140 225	320 695
Accumulation ratio	$mgNO_3$/plant: $mgNO_3$/ fruits	1 : 0.29	1 : 0.58	1 : 1.29
Metabolisation ratio	$mgNO_3$/fruits $mgNO_3$/ plant	1 : 3.42	1 : 1.73	1 : 0.77



	IH50	Cindel	H1-Bz	H2-Bz	H3-Bz	Average
Field	94	111	163	87	144	120
Solarium	107	135	190	105	163	140
Greenhouse	255	300	430	235	380	320

Fig. 1. The nitrates concentration in the tomato fruits in different cultivation systems

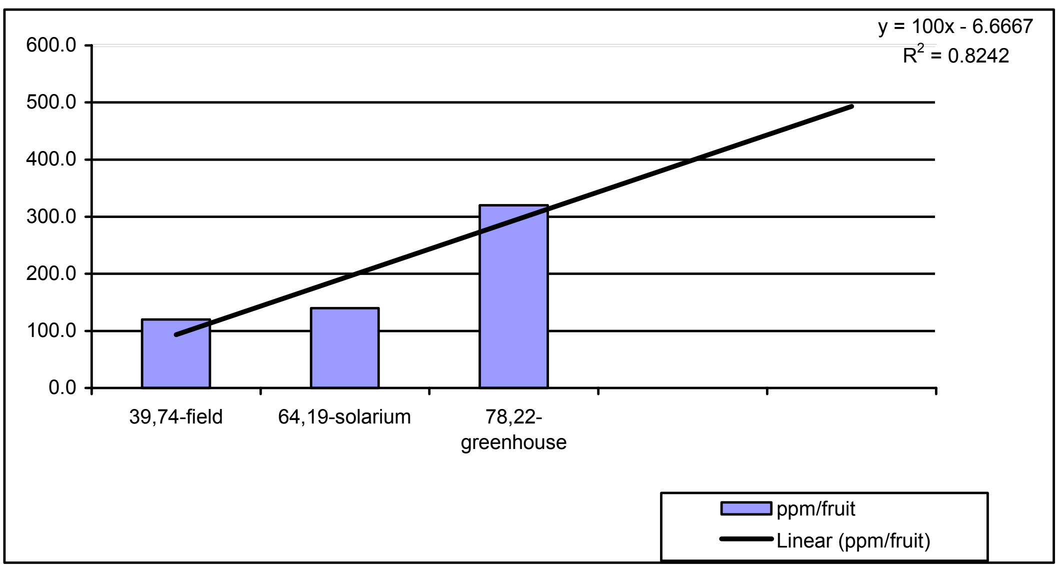


Fig. 2. The relation between the level of yields and the NO_3^- concentration in tomato fruits

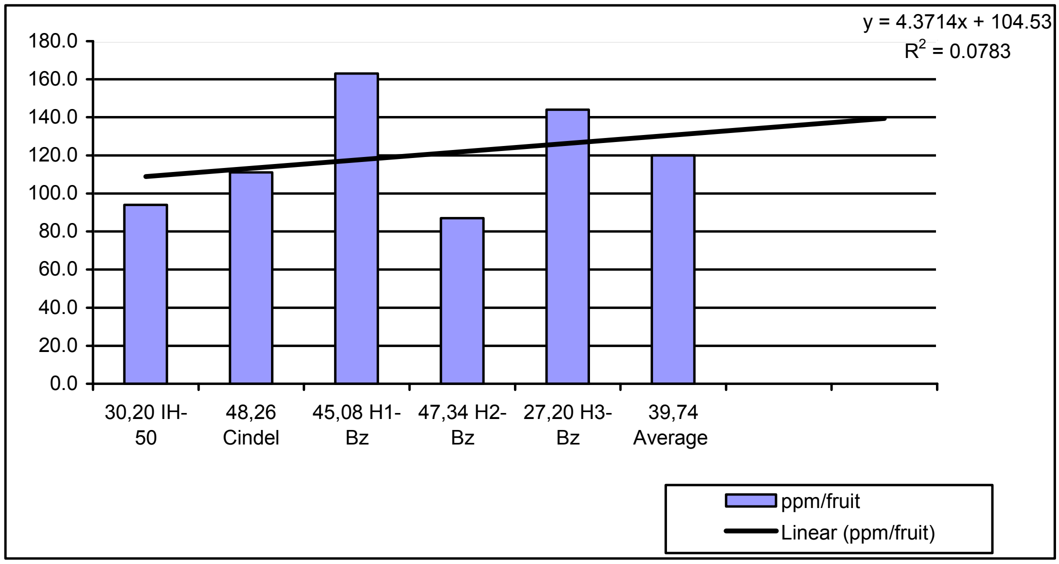


Fig. 3 The relation between the level of yield at different tomato hybrids and the NO_3^- - concentration in fruits - field cultivation

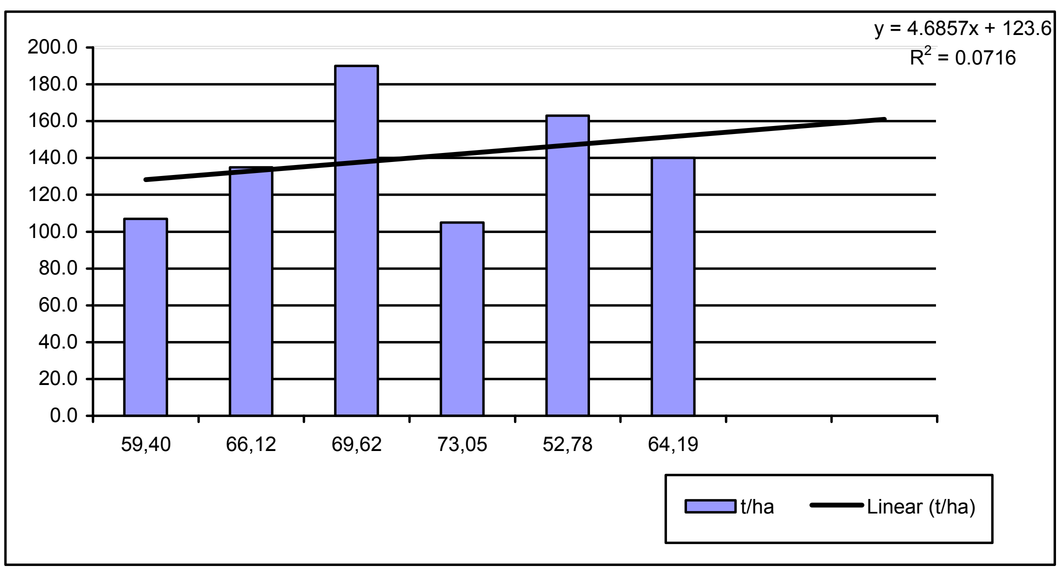


Fig. 4 The relation between the level of yield at different tomato hybrids and the NO_3^- - concentration in fruits - solarium cultivation

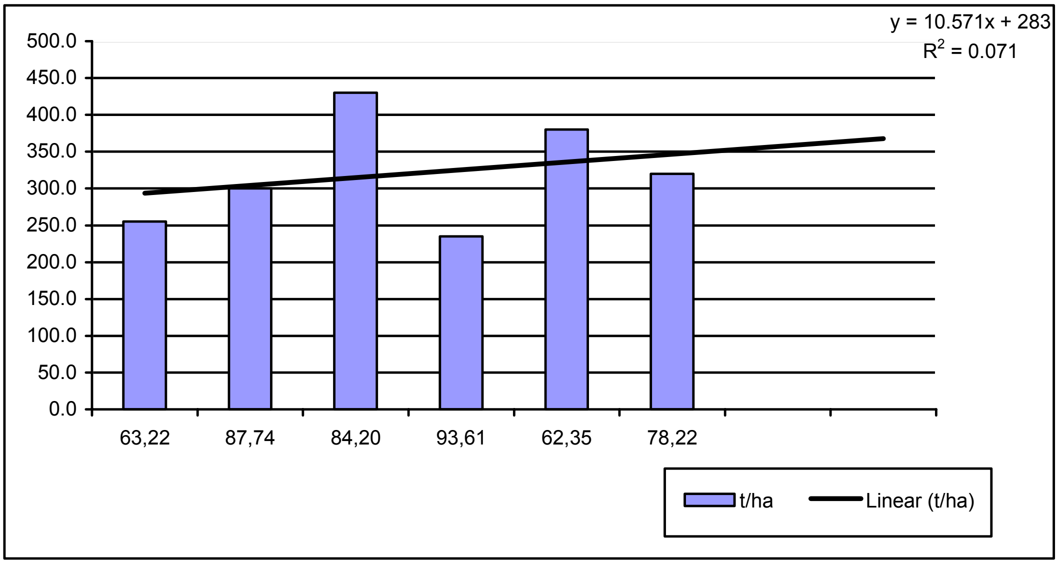


Fig. 5 The relation between the level of yield at different tomato hybrids and the NO_3^- - concentration in fruits - greenhouse cultivation

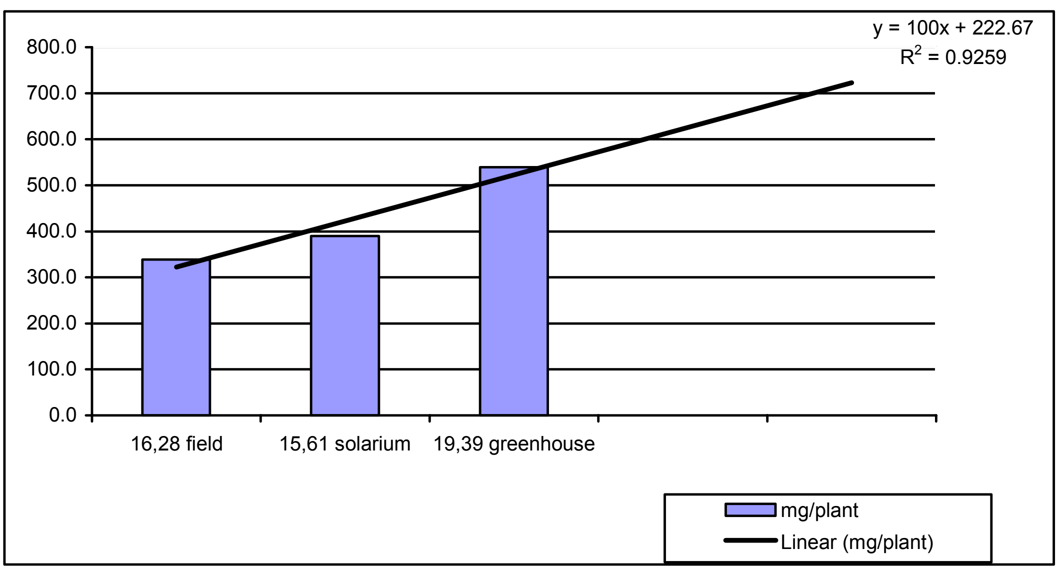


Fig. 6 The relation between the total gain of nitrates in the irrigation water ((kg/ha) and the quantity per plant (mg)

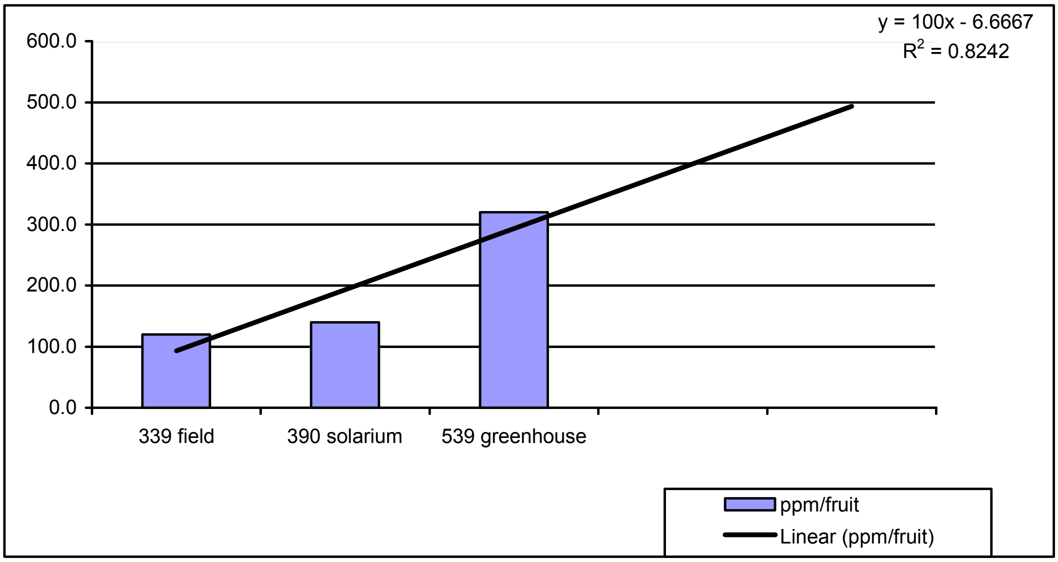


Fig. 7. The relation between the total gain of nitrates from the irrigation water per plant (ppm) and the NO_3^- concentration in fruits

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THE ADAPTABILITY OF SOME CATEGORIES OF TOMATOES FOR ECOLOGICAL CULTURES

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Keywords: ecology, type, hybrid, port, quality

ABSTRACT

The study has as main subject ascertaining the most adequate tomato breeds and hybrids adaptable at the ecological culture in exact conditions of climate and soil of particular areas from Romania (jud. Telorman)

INTRODUCTION

In specialized literature there are some opinions according to which the success of the production of a culture is in most part determined by the applied technology, and the influence of the breed is less. In great part this kind of remark is just, but the reality shows that the evolution of the breed both in quantity and quality depends on a numerous factors, so that this sort of affirmations cannot be extremely categorical. Many of these factors are already known quite well, but many of them are not noticed not even by the growers or the research workers, especially if we take into consideration the factors that influence the quality of the vegetable products. This certainly is true for the tomato culture-one of the most cultivated and appreciated species of the vegetables.

The demand of the consumers for the tomatoes is explained by the fact that the fruit of this breed, after approximately 200 years of cultivation in Europe in alimentation purposes is so diverse. We mention here that every type of the use and of preparation, demands certain characteristics that the fruit of the tomatoes must have. The realization of the wanted parameters, -those that must respect the fruit- with a certain destination or type of use, depends both on the characteristics of the chosen breed for its cultivation in this purpose and on the technological series applied, and more exactly on the way the applied technology manages to create the growing and the maturing conditions of the plant and of the formation of the fruit in the given pedoclimate conditions. And for this, vast theoretical and practical knowledge is needed, which allow the selection of the best solutions for each real situation.

Those modest investigations made during the already presented ideas in this essay, represents the contribution of the authors in making complete the data base regarding the process of knowing some breeds of the Lycopersicum species, cultivated by respecting the strict principles of ecological technologies.

MATERIALS AND METHODS

The experimental lot with those five breeds was placed in a private vegetable garden from Draganesti Vlasca, jud.Teleorman.

The tested breeds were:

- Dubok
- Pink De-Barao (fig.1)
- Black De-Barao (fig.2)
- Yellow De-Barao (fig.3)
- Gavrish (F1) (fig.4)

The seedling was produced according to the instructions of classical technologies, but without using chemical transfer substances, usually used for the process of fertility. The field plantation was made on the 5th of May, when the seedling had the age of 55 days. The seedling in plantation was not too vigorous, as the low temperatures from this period, together with an acute cloudiness did not allow proper growing and maturing conditions in the areas where they were produced.

The soil of the experimental perimeter was characteristic for the area – leached black earth. Before plantation the soil was fertilized with semi decomposed manure – 2 kg at a square meter. During the vegetation period no other fertilization process or any treatment against affections or pest were made.

The observations made during vegetation period were especially referring to biometrical measurements to plans and fruit, the organoleptic conclusions of the fruit, the capacity of conservation of the fruit, which is usually directly correlated to the idea of their transportation. The information we got after the observations were compared with those from the description of the breeds presented in specialized literature.

RESULTS AND DISCUSSIONS

In order to simplify the obtained results, we will present the comparative description of the tested breeds in the case of our experiment.

The Dubok breed

The plants have a specific (determined) growing, with the height of around 50-65 cm, and the bush has 5-6 branches. In the description of the breed, we are mentioned the endurance of the soil to the rottenness of the fruit, which we seen in our test, but we also observed a serious sensibility of the plants to fuzariosis: most of the leaves became sear before the maturing of the first fruit.

The inflorescence is simple with 4-7 fruit.

The first fruit mature after approximately 120 days. The specialized literature presents this breed as an early one, and the maturation begins after 95-105 days. The difference in maturation in the case of our experiment owes to the meteorological conditions, which were not in favour for a proper maturation in optimum conditions, which the plants of this breed need. The fruit are medium as size of 70-100g, have a spherical shape – easily flattened, with an almost smooth skin with the colour of cardinal red. The taste quality is good. The capacity of conservation in room temperature was seen as low-medium, of 5-7 days. Specialized literature recommends it both for fresh consume and industrialization.

De-Barao breed

The plants do not have a specific (determined) growing, in our experiment, with 2 stems and had a height of over 170 cm. But literature indicates a height of 2.5-2.7m, a reason for which we recommend it to be cultivated (in gardens around the house), along wire fence, in order to form a bower, taken into consideration that this type of breeds have a clear resistance at shade. The first mature fruit were cut after 130 days, which is more than the dates mentioned in literature.

The inflorescence is simple, with 4-5 fruit in a bunch.

The fruit have a weigh of 60-80g, oval shape and smooth skin, and the colour, just as the name says – is a flesh red with pink influence. The taste quality is good, but in our experimental culture many fruit did not have in pericarp, at 2-3 mm under the epidermis a thin layer of fibrous texture, which seen in section (in division) are easily seen as different because of the yellowish colour, not like the pulp. The taste quality of these fruit did not change much, but this characteristic is a minus in appreciation the quality.

The capacity of conservation of the fruit is good. (7-9 days)

Specialized literature recommends this breed first of all for conservation (as a whole fruit).

Black De-Barao breed

The plants do not have a specific growing, with parameters of height and rhythm of growing similar with the anterior breed.

The first mature fruit were cut after 117 days, which situate the breed in the category of semi early type.

The plants have the same type of inflorescence, but have many fruit in bunch, between 5 and 7. The fruit are small, with a weight of 50-65g, long-oval shape, smooth skin, cardinal red with dark red in some places around the bell, and firm pulp.

In the description of the breed, the specialized literature emphasizes both the endurance during transport and the capacity of conservation of the fruit. We also observed this last characteristic point: fruit in room temperature could be conserved during 20 days without any change in aspect or taste in proportion of 81%.

The breed can be recommended for conservation (whole fruit), but less for daily consume, as its taste qualities are appreciated as medium –good.

Yellow De-Barao breed

The growing of the plants and the type of the inflorescence are like the other breeds from the Barao group, above described.

The maturing of the fruit was registered at 127 days after the spring of the plants.

Among the characteristics of this breed’s fruit we can notice the reduced or medium weight of the fruit (70-85g), the spherical-long shape, the smooth skin, the yellow and sometimes with orange influence colour.

In every De-Barao breeds the fruit have two seminal cells.

In room temperature the fruit can be conserved around 12 days with a deteriorated fruit percentage of 25%. As opposed to the other breeds from this group, the cut fruit were 14% damaged (chapped), which influenced negatively their capacity of conservation.

The taste quality of the breed is good. The breed can be used both for conservation and for daily consume.

H F1 Gavish

The plants of this hybrid do not have a specific growing. In the description of the hybrid the height of the mentioned plants in literature is over 3m.

The inflorescence is simple (not with branches), with 7-9 fruit.

The fruit are medium-big, with the weight of a fruit of around 90-120g. The shape of the fruit is almost perfectly symmetrical, smooth skin; the colour in the moment of the cut is yellow-orange with parts of the fruit (usually not large) green.

In describing the hybrid the capacity of the fruit for conservation is clear. In our experiments the fruit could be conserved after the cut for 31 days (the series of the fruit is still under our observation) in room temperature in proportion of over 85%, and the damaged fruit percentage was bigger. Literature mentions that the period of conservation can be around 6 months.

CONCLUSIONS

1. The tested breeds in our experiments, in terms of applying the ecological technology, presents interest especially for being cultivated in family gardens.
2. A higher sensitivity to Fuzarium was seen in yellow De Barao breeds and especially in Duboc, so that during the specialized culture of these breeds, actions regarding the cultural hygiene must be taken.
3. All the breeds in De-Barao group, having a no determined growth can be used for cultivation along wire fences or on bowers.
4. The size, shape, taste, the conservation capacity of the fruit from this group, which result in the ecological culture, can be recommended for the use of conservation.
5. The black De-Barao breed, especially the Gavish hybrid is adapted for of long time conservation, of over 30 days.


Fig. 1. Pink De-Barao


Fig. 2. Black De-Barao

Fig. 3. Yellow De-Barao

Fig. 4. Gavrish (F1)

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RESEARCH AS REGARD AS THE BIOLOGY, TECHNOLOGY AND ORNAMENTALY ASPECT OF CHERRY TOMATO

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Keywords: biology, cherry, tomato

INTRODUCTION

The Solanaceae family includes many representatives in the tropical area, also in temperate regions, over 75 genus and 2000 species, including ornamentally, alimentary and therapeutically fruits.

Tomatoes with cherry type fruits from *Lycopersicon esculentum* specie belong to the followings botanical varieties:

a) Var. Cerasiforme, Alef (L. cerasiforme Duval)

Thin leaves and usually smaller and less acuminated.

Flowers grouped in different inflorescences dimensions. Globularly or elongated fruits (Plum tomatoes), with plane surface, 2 cm diameter, red or yellow.

b) Var. Pyriforme, Alef (L. cerasiforme Duval) = Pear tomatoes

Fruit form is like a pear, with a length of 3,5- 4 cm.

MATERIAL AND METHOD

Direct sowing in the field when the soil temperature was 10-12^{0}C, with an increase tendency has carried out the experiment.

Before sowing, seeds have been imbibed during 5 days at 18-20^{0}C.

After seedling rising, the culture has been thinned when plants have had formed 3-4 true leaves.

The obtained seedlings have been planted in the field.

Thereafter a part of these seedlings have been planted in large pots, with a capacity of 20 L. As a substratum, it was used a cernosiom type soil originated from the area were the experiment culture had been sown.

In the field culture, there were performed the following technology: hoe, irrigation, and palisade. There were not applied phytosanitary treatments.

The observed cultivars phytosanitary states become inadequate in the first half of September (low temperature and frequently rains).

Work Material (fig. No 1-5)

To realize this experiment the following cultivars have been used:

A. PEAR GOLD CHERRY – Originated from Central and South America, very sweet fruits, high content in ascorbic acid, proteins, carbohydrate, fibres, long storage period at the room temperature (7-10 days), plant with a smaller high (1 m), indeterminate growing. This cultivar was described for the first time in 1805 by Persoon. The vegetation period is 75 days.
B. RED CHERRY – This cultivar was mentioned since 1880, it has a vigorously growth, indeterminate, sweet fruits, very resistant to diseases especially to *Fusarium* and tobacco virus, 60-65 days from sowing date to fructification.

C. GOLD CHERRY – Growth is indeterminate, sweet fruits, a diameter of about 2 cm, vigorously plant, resistant to diseases *Fusarium* and tobacco virus, 62 days from sowing date to fructification.
D. FI SANTA – Indeterminate growth, variety from Italy. Fleshy fruits, oval-elongated, branched inflorescences, with 12-20 fruits.
E. GRAN RACOLO - Indeterminate growth, spherical fruits, vigorously plant, large inflorescences with 15-25 fruits.

OBSERVATIONS AND DETERMINATIONS

In this experiment there were carried out observation and determination regarding:

- date of the main phenophases
- plants growth dynamics
- numbers of fruits in a inflorescence and the inflorescences numbers on a plant
- fruits form, dimension, colour, mass, volume
- entire plant mass, volume and height
- plants leaf area
- yield on a plant
- fruits chemical composition (ascorbic acid, carbohydrates, acidity, soluble solids and total dry matter, mineral substances)
- tomatoes fruits fresh period at the room temperature and in the fridge
- appreciation of the ornamental function for tomatoes plants and their fruits

RESULTS AND DISCUSSIONS

Following this experiment there were obtained interesting and useful results, between them there will be presented the most important ones:

The analyzed cherry tomato cultivars have 2-3,5 cm diameter, mass range between 4,8- 16, 4 g and volume varied between 5 and 17 ml. Different form (spherical, plum form or pear form), as well as red and yellow colour give an ornamental aspect to these tomato. The most interesting are PEAR GOLD CHERRY and GOLD CHERRY.

The experiment demonstrated that cherry tomatoes present highest concentration for all the studied parameters (ascorbic acid, sugars, total acidity, soluble solids content, total dry matter, mineral substances (ashes), as against the ordinary tomato (control). So, the highest ascorbic acid content has been noticed for Gold Cherry cv. As regard as soluble solids content, the best results have been registered for Red Cherry cv, and the highest dry matter emphasized Pear Gold Cherry, the cultivar that presents higher values for mineral substances too. Acidity and sugars values represent fruits quality indicators, especially as concerning fruit taste. Also, fruits mineral content influence tomato fruits quality. Ascorbic acid, sugars and titratable acidity level decrease as fruit ripening and during post maturation, as a consequence of the breakdown or oxidation processes. As results, the level of these components being high at the beginning storage period, the cherry tomatoes will have a longer fresh state period. Also, a higher dry matter content means reduced water content. As water losing as percent for the dry matter, wizened, faded it will be produced and in the case of the cherry tomato these phenomena are slowly as compared with the big tomato, with higher water content.

Ornamentally and utilitarian aspect of cherry tomato

The true cherry tomato ornamentally aspect refers firstly to entire plant aspect, cultivated both in soil or in pots, as well as to the floral arrangements from which takes part tomato too, giving an originally and novelty mark.

An important role has the aspect of tomatoes with small dimensions, with varied colours and different forms: spherical, ovoid, pear form.

The utilitarian aspect refers to their fresh or conserved consume. As fresh fruits they are consumed a simple salads or assorted with other legumes. The fresh fruits have a pleasure taste due to the balance between its organic substances (sugars, organic acids) and mineral substances too. As conserved, fruits are consumed as pickles, but also as jam.

CONCLUSION AND RECOMMENDATIONS

1. Cherry tomato, less known in our country appears as a novelty and as a consequence at a very high price. They should become in Romania a legume as any other because there are no problems in the production process, their technology being as for others tomato cultures. In fact, the world tendency is to extent the culture surface area with this tomato type, thus in the followings 10 years this will be doubled, being at least 10% from the total surface area occupied by tomato.
2. Taking into account the cherry tomato special aspect, ornamentally by their clusters fruits, different as form and colour, with a high ornamental potential remarked both in pots or in open areas it is recommended using them as ornamentally plants in garden, balcony and even in apartments.
3. The high ascorbic acid, acids, soluble solids content, total dry matter as compared with the control and in sugars, confers to cherry tomato fruits a good storage resistance, next to the high alimentary value. The best comportment was registered for cvs. Gold Cherry and Pear Gold Cherry, followed by Red Cherry. Due to the chemical composition, these tomato have not only a higher ornamentally potential, but they have a very pleasure taste and they are freshly for a longer time.

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Table 1

Cherry tomatoes morphological characters

Ind.	Cultivar	Fruit dimensions (cm)			Mean mass (g)	Mean volume (ml)	Form	Colour
		Height	Diameter	If				
A	*Pear gold cherry*	3,2	2	1,6	6,7	8,3	Pear form	yellow
B	*Red cherry*	2,4	2,4	1,0	5,9	7,5	Spherical	red
C	*Gold cherry*	2	2	1,0	4,8	5	Spherical	yellow
D	*F1 Santa*	3,5	3	1,2	14,6	5	Elongated	red
E	*Gran racolo*	3,5	3,5	1,0	16,4	17	Spherical	red

Table 2

The chemical composition of the cherry tomato fruits

Ind.	Cultivar	Ascorbic acid mg/100g pp°	Sugars (%)	Total acidity (%)	Soluble solids content (%)	Total dry matter (%)	Mineral substances (ashes) (%)
A	*Pear gold cherry*	0,37	2,7	0,57	4,9	10,60	4,54
B	*Red cherry*	0,50	3,98	0,72	6,1	8,95	2,98
C	*Gold cherry*	0,69	2,8	0,49	4,5	8,42	2,1
D	*F1 Santa*	0,58	1,43	0,29	3,7	8,64	2,47
E	*Gran racolo*	0,39	2,81	0,54	5,0	9,28	2,06
F	*Martor**	0,24	2,9-3,88	0,32-0,50	4,8-6	5,57-7,42	1,75-1,87

*= cultivars with fruits having more than 50 g

°= fresh product

Fig. 1. *Red cherry*

Fig. 2. *Gran racolo*

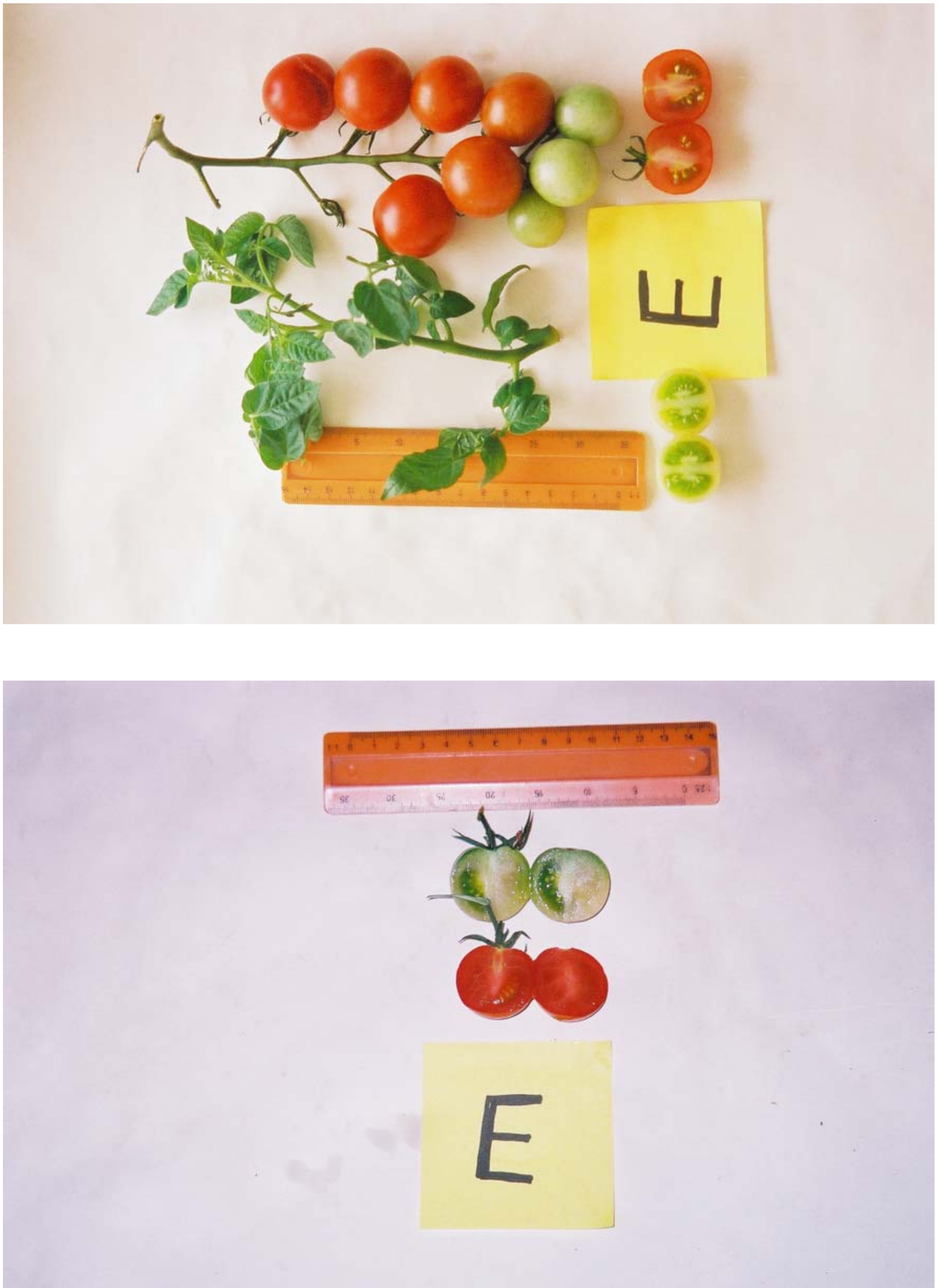

Fig. 3. *San marzano*

Fig. 4. *Gold cherry*

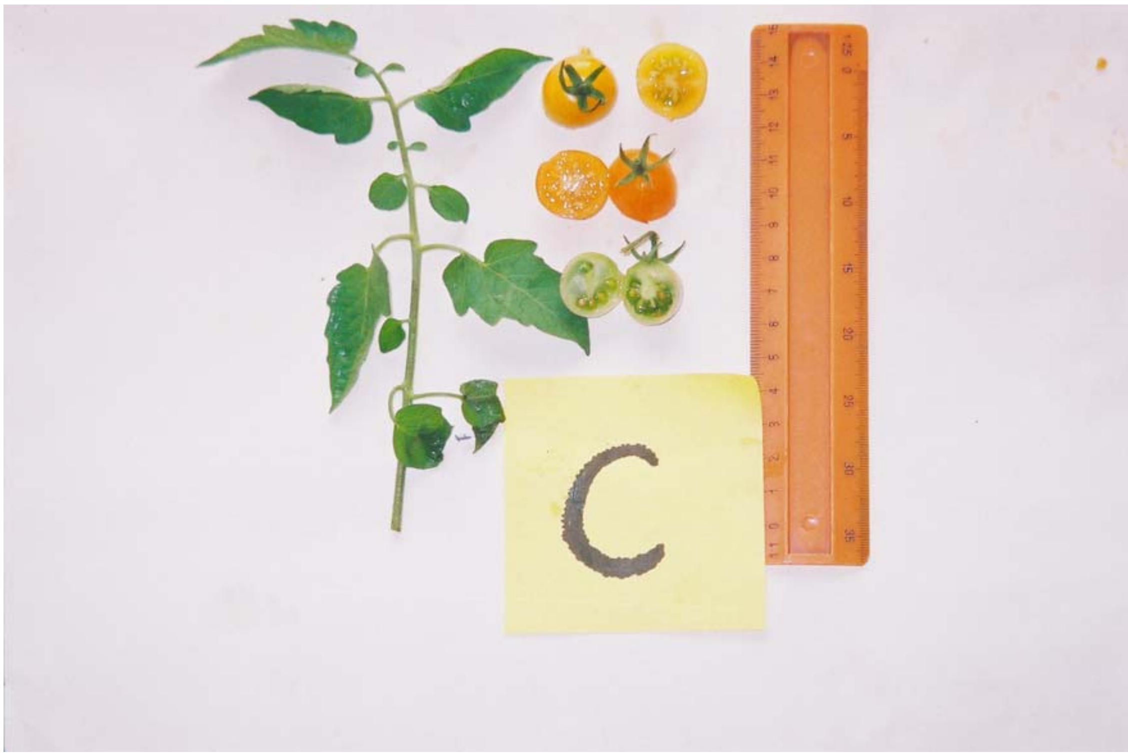

Fig. 5. *Pear gold cherry*

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THE INFLUENCE OF DIFFERENT TYPES OF COMPOSTS TO THE BELL PEPPER FRUIT QUALITY

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Keywords: bell pepper, fruit, greenhouse, compost

ABSTRACT

The research was made in an unheated greenhouse of Vegetable Department of Horticulture Faculty of University of Agricultural Sciences and Veterinary Medicine, in 2005.
The influence of compost types and organic mixtures to the bell pepper fruit quality was investigated. Bianca and Nikita cultivars were used under the following variants: V_0control – hybrid Bianca, non-fertilized, V_2 - hybrid Bianca, fertilized with leaves compost, V_3 - hybrid Bianca, fertilized with chopped branch wine compost, V_4 - hybrid Bianca, fertilized with mushrooms compost, V_5 - hybrid Bianca, fertilized with vegetable waste compost, V_6 - hybrid Nikita, fertilized with vegetable waste compost, V_7 - hybrid Nikita, fertilized with mushrooms compost, V_8 - hybrid Nikita, fertilized with chopped branch wine compost, V_9 - hybrid Nikita, fertilized with leaves compost, V_1control – hybrid Nikita, non-fertilized. The experimental design was organized in ten subdivided plots with three repetitions. Variants fertilized with mushroom compost and leaves compost outstand by quantity (58.6 and 56.6t/ha) and by quality (81% first quality). V4 fertilized with mushroom compost has the lowest level of water, having in the same time the highest percent in dry matter(6,74%).

INTRODUCTION

The present paper wants to demonstrate how many types of composts may influence the quantity and the quality of harvesting. The quality of fruits depend very much the nutritive elements and the organic matter content in composts. Also, the compost quantity applied is very important for obtaining high and qualitative production.

MATERIALS AND METHODS

The research was made in an unheated greenhouse of Vegetable Department of Horticulture Faculty of University of Agricultural Sciences and Veterinary Medicine.

There were used four types of composts: leaves compost (leaves, barks, and grass clippings), chopped branch wine compost, mushrooms compost and vegetable waste compost. The amount of compost utilized was the same for all variants (excerpt variants control), 30 tons/hectare.

The culture was started on 15 April 2005. The biological material was represented by two cultivars of pepper, Nikita and Bianca with blocky yellow fruits. Density, for both hybrids was 37000 plants/hectare (distances between rows being 60 cm and between plants 45 cm).

The experiment included ten variants with three repetitions for each variant with the following experimental variants:

V_0control – hybrid Bianca, non-fertilized
V_2 - hybrid Bianca, fertilized with leaves compost
V_3 - hybrid Bianca, fertilized with chopped branch wine compost
V_4 - hybrid Bianca, fertilized with mushrooms compost
V_5 - hybrid Bianca, fertilized with 50% vegetable waste compost +50% manure
V_6 - hybrid Nikita, fertilized with 50% vegetable waste compost +50% manure
V_7 - hybrid Nikita, fertilized with mushrooms compost

V_8 - hybrid Nikita, fertilized with chopped branch wine compost
V_9 - hybrid Nikita, fertilized with leaves compost
V_1control – hybrid Nikita, non-fertilized

Before starting culture, were lifted probes for agrochemical analyses, from greenhouse soil and from studied composts and were determined the Ph soil value, the level of soluble salts, the level of nutritive elements- N- NH^+_4, N- NO^-_3, P_2O_5, K^+ (soluble forms) in water extract (1:5).

Determination of soluble dry matter was made by refractmetric way, determination of ascorbic acid by iodometric method, determination of titrable acidity by titration method, determination of water and dry matter by drying to 105^0C.

RESULTS AND DISCUSSIONS

Soil reaction (ph analyzed in water suspension 1:5) recommended for growing pepper in greenhouse is between 6.3 and 7.5 (from very low acid to low basic). Leaves compost and chopped branch wine compost have a low acid ph, mushrooms compost is neutral, only vegetable waste compost is very acid. Control variant, chopped branch wine compost and vegetable waste compost have optimal content of nitrogen, mushrooms compost and leaves compost have a high level of NH^+_4+ NO^-_3. Mushrooms compost and leaves compost have an optimal level of P_2O_5, chopped branch wine compost and vegetable waste compost are middle content of phosphorus (Table1).

Hybrid Bianca V2, fertilized with leaves compost has 14.6 fruits /plant, average weight of fruits is 108.6 g, the length of fruits is 9.3 cm and the yield is 1.58 kg fruits/plant. The best production is obtained to V7 fertilized with mushroom compost, 1.13 kg fruits/plant (Table 2).

Variants fertilized with mushroom compost and leaves compost outstand by quantity (58.6 and 56.6t/ha) and by quality (81% first quality) (Table 3).

The content of water in fruits varies between 93.26 and 95.32%. V4 fertilized with mushroom compost has the lowest level of water, having in the same time the highest percent in dry matter (6.74%) **(**Table 4).

V4, fertilized with mushrooms compost and V8, fertilized with chopped branch wine compost have the highest content in ash. V2 fertilized with leaves compost has only 0.40%. The percent of soluble dry matter is highest to the fruits from plant fertilized with leaves compost (V2).

The bell pepper fruit has the content in ascorbic acid is very high. Very good content in ascorbic acid has the fruits from variant fertilized with vegetable waste compost (V6) **(**Table 4).

CONCLUSIONS

V2 fertilized with leaves compost had 14.6 fruits/plant, the average weight of fruits is greater than other variants, with 5.86 kg/m^2 yield surpass de control variant.

To Nikita, mushrooms compost realizes a great number of fruits/plant, 14 big fruits with 9.74 cm length. Also, very good results were obtained to V5 and V9 with 3.74 and 3.94 kg/m2 production.

To Bianca, variants fertilized with leaves compost and mushrooms compost realize not only high yielding (58.6 and 56.9 t/ha) but and commercial quality of production (81% quality I).

V7 Nikita, fertilized with mushrooms compost has a very high production 41.9 t/ha, with 80% quality I from total yield, followed by V9 with 32.3 t/ha, but better percent with good quality fruits.

V4 fertilized with mushroom compost has the lowest level of water, having in the same time the highest percent in dry matter (6.74%).

Table 1. Analyses of ph and nutritive elements in organic substrates and greenhouse soil

Variants	PH	Salts %	N- NH^+_4 ppm	N- NO^-_3 ppm	P_2O_5 ppm	K^+ ppm
Greenhouse soil	7,25	0,099	21,1	40,5	45	41
leaves compost	6,5	0,012	25	65,3	45,2	105,3
chopped branch wine compost	6,5	0,0102	17,5	60,5	25,7	57,6
mushrooms compost	7	0,015	20	98,8	50,5	115,3
vegetable waste compost	5,5	0,0145	15,3	45,5	32,5	68,5

Table 2. Production indicators to bell pepper organic fertilized

Hybrids	Variants	Average number of fruit/plant	Average weight/fruit (g/piece)	Average length of fruits(cm)	Average yield (kg/plant)	Average yield (Kg/m^2)
Bianca	V0mt	12.6	104.1	9.7	1.31	4.85
	V2	14.6	108.6	9.6	1.58	5.86
	V3	13.8	105.3	9.4	1.45	5.37
	V4	14.5	106.2	9.6	1.53	5.69
	V5	12.0	99.2	9.4	1.19	4.40
Nikita	V6	11.2	75.2	8.8	0.82	3.12
	V7	14.0	80.9	9.4	1.13	4.19
	V8	12.8	79.0	9.3	1.01	3.74
	V9	13.2	80.2	9.3	1.06	3.91
	V1mt	11.0	77.0	8.7	0.85	3.14

Table 3. Pepper fruit quality

	Variants	Production Quality I		Production Quality II		Production
		t/ha	%	t/ha	%	t/ha
Bianca	V0mt	36,8	76	11,7	24	48,5
	V2	47,5	81	11,0	19	58,6
	V3	42,4	79	11,3	21	53,7
	V4	46,0	81	10,9	19	56,9
	V5	32,9	75	11,0	25	44,0
Nikita	V6	24,1	76	7,6	24	31,2
	V7	33,5	80	8,4	20	41,9
	V8	29,2	78	8,1	22	37,4
	V9	32,5	83	6,6	17	39,1
	V1mt	24,2	77	7,2	13	31,4

Table 4 Chemical composition of bell pepper fruits

Variants	Water (%)	Dry matter (%)	Ash (%)	Soluble dry matter (%)	Ascorbic acid (%)
V_{0mt}	94,17	5,83	0,48	4,00	67,9
V_2	95,19	4,81	0,40	4,50	76,9
V_3	94,28	5,72	0,50	3,50	76,6
V_4	93,26	6,74	0,52	4,00	78,0
V_5	94,05	5,95	0,49	3,80	74,7
V_6	94,17	5,83	0,48	4,40	96,5
V_7	95,32	4,68	0,43	3,60	89,5
V_8	93,39	6,61	0,53	4,00	82,8
V_9	94,05	5,95	0,50	3,00	86,2
V_{1mt}	93,39	6,61	0,50	4,00	83,6

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PRELIMINARY RESULTS REGARDING FERTILIZATION WITH CHICKEN MANURE IN POTATOES CULTURE ON SALTY PASTURE-LAND

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Keywords: *doses, yields, quality, Santé*

INTRODUCTION

In potatoes culture, the fertilization in phases represents an extremely important element of technology due to the fact that plants need during the entire period of growth a constant and sufficient supply with nourishing elements in order to ensure them the best growth for a long period of time along with an increased stocking capacity for the benefits of the production achieved. Berindei, Matei, 1984, Ianos I Ioan Sigismund and colab., 2002, Ciofu Ruxandra and colab., 2004.

The half-fermented chicken manure is a complete fertilizer as it contains azote, phosphorus three or four times more than the stable manure, it doesn't pollute because it leaves no residues in the soil. On salty soils, chicken manure fertilization represents a lever which can contribute, in a concrete and certain way, alongside the action of the main agrotechnic works (such as breaking up, ridging, weeds destroying) to obtaining an economic and profitable production. (Davidescu, D., Velicica Davidescu, 1992, Benavides M. P., 2001, Rusu Mihai and colab., 2005).

MATERIALS AND METHODS

The experiment has taken place during the year 2006, in production conditions, on a 1 hectare plot of land, inside the Farm GAZ Amara, situated at 2 km from Slobozia, Ialomita county.

Its main objective was establishing the effects that the fertilization with half-fermented chicken manure has upon the forming of the tubers, upon the production and its quality, all these observed in potatoes culture on salty soils.

Following the exigencies of the experimental techniques, a monophasic experiment was developed based on the method of placing the blocks at random, with 4 recurrences. The plot of land in recurrence had a 13 square meters, using for one variant a 52 square meters surface and the entire area had 208 square meters.

The variants of the experiment consisted in different doses of half-fermented chicken manure applied in phasic fertilizations which have been compared to the unfertilized control variant as following:

V 1= CONTROL VARIANT, unfertilized
V2= fertilized with 10 t/ha manure
V3= fertilized with 15 t/ha manure
V4 =fertilized with 20 t / ha manure

The biological material subjected to study was the Santé variety of potato, of Dutch provenience, half delayed, with a period of vegetation of 100-120 days, which is to be ate in summer and in autumn-winter.

The chicken manure used contained 85% straw and it was acquired from the chicken farm situated near the plot of land.

The agrotechnic works applied in the experiment followed with accuracy the technological phases which ensured the potato culture the necessary conditions for a good development (the works of the soil, the hygiene of the culture, the plant chemical protection). The plantation took place on the 20^{th} of April, on a ridged soil, with a density of 48, 000 plants/ hectare. No plant chemical treatment was required since the plants were not threaten by weeds, diseases or pests.

The chicken manure was applied, in suitable doses for the variants subjected to the study, in 2 phases: the first one when the plants sprang and the second one at their blossoming, in 1:10 dilution.

For all the variants the harvest took place when their exterior (air) part faded, on the 12^{th} of September.

RESULTS AND DISCUSSIONS

At harvest time, there have been done estimations in order to establish the influence that the different doses of chicken manure had on potato production, as following:

- the number of tubers for each hole: there have been counted the tubers from 10 potato holes for each recurrence and it was calculated the average for each variant;
- the total weight of the tubers for a hole: by weighing the tubers from 10 potato holes for each recurrence and the calculation of the average for each variant;
- the average weight of the tubers: it was calculated for each recurrence and for each variant of the experiment;
- the level of the production obtained: by the weighing of the tubers from each recurrent plot of land, by estimating the average for each variant, by relating the data to 1 ha and through a statistic analysis of the results obtained using the multiple comparisons (the Duncan test);
- the quality of the production: it wad established by measuring the tubers from 10 potato shrubs on each recurrence and the percentage assessment on quality ranges, according to the standards in vigour (the STAS).

The applying of half-fermented chicken manure as a phased fertilizer in potato cultures influenced the growth and the plants capacity of producing tubers (Table 1.)

The average number of tubers for a hole has increased from 16.19 (the unfertilized control variant during the vegetation) to 18.5-19.25 in the case of the chicken manure fertilized variants, the biggest percentage of 19.6% being at the dose of 15 t /ha.

The chicken manure fertilization has greatly influenced the average number of the tubers which has grown (in direct proportion with the applied doses) with 25-96% more than the unfertilized control variant.

As result of this combination, the total weight of the tubers for a hole has greatly increased in the case of the fertilized variants as compared to the control variant. The spores between 43% and 130 % were in direct proportion with the increase of the chicken manure doses applied during the phasic fertilization.

In Figure 1 and Figure 2., one can notice the existence of some direct linear correlation between the quantity of the chicken manure doses and the parameters regarding the growing of the tubers. The value of the coefficients of determination proves that in the case of the tubers of a plant, the meaning of the correlation is clearly significant (r^2 =0. 6929), and in the case of the total weight of the tubers the correlation is stronger, very significant (r^2= 0.9776).

As one can see in Figure 3, there is also a direct correlation between the quantity of the chicken manure doses and the level of the potato productions (r^2=0.5).

The mathematic analysis of the production results (Table 2.) proves the strong influence that chicken manure fertilization has as compared to the average of the experiment, which shows that the production potential of Santé variety in the case of cultivation on salty soils (64.52 t/ha), V1 – the unfertilized witness and V2 – fertilized with 10 t/ha, gave smaller productions with 37% (40.39 t/ha), respectively 14 % (56.33t/ha). In comparison, the fertilization with big chicken manure doses in the cases of V3 and V4 determined an increased production with 12% (72.52 t/ha), respectively 38% (88.85 t/ha).

The variant fertilized with chicken manure in proportion of 20t/ha was front rank, determining the biggest production, with very significant differences from the control variant, the average of the experiment, the dose of 10t/ha (V2) and significant as compared to the dose of 15t/ha (V3). This dose determined the very significant increase of the production obtained from the unfertilized control variant, significant as compared to the chicken manure dose of 10 t/ha (V2) and significant in comparison to the average obtained by the variety. The smallest spores in production have been obtained in the fertilization with 10t/ha chicken manure; in this case, although the differences were significantly distinct as compared the unfertilized control variant, they were insignificant as compared to the average of the sort.

It has been noticed that the phased fertilizations with half-fermented chicken manure in the potato culture has a favourable influence upon the quality of the production, in what concerns the uniformity of the calibre (Figure 4). In the case of the fertilized variants the middle tubers category prevailed, with a 6-8 cm diameter (36-44 %), and in the cases of the big chicken manure doses the tubers had over 10 cm diameter (10-11%). Set beside the unfertilized control variant, the small tubers prevailed, with a 4-6 cm diameter (50%) and very small, under the standards (38%).

CONCLUSIONS

1. The applying of half-fermented chicken manure as a phased fertilizer in potato cultures influenced the growth and the plants capacity of producing tubers. The average number of tubers for a hole has grown with 15-20 %, and the average weight of the tubers has grown with 25- 96% set beside the unfertilized control variant, existing a direct correlation with the applied doses.
2. The chicken manure fertilization strongly influenced the production which has grown in direct proportion with the applied doses, with spores up to 12% and respectively 38% as compared to the production potential of the sort and in significant differences from this and from the unfertilized control variant.
3. The phasic fertilization with half-fermented chicken manure influenced the quality of the potato tubers: the average weight increased with 25-96 % set aside the unfertilized control variant, and the weight of the big and very big tubers was superior, the weight of the second quality reducing surprisingly.
4. In order to obtain sustained and quality productions on the salty soils, it is recommended to fertilize the potato cultures in phases with half-fermented chicken manure, in doses of 15-20t/ha.

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Table 1. The influence that chicken manure has on the tubers production

Variants	Number of tubers		The weight of the tubers			
	pcs / hole	%	g / pcs	%	kg / hole	%
V1-control, unfertilized	16.10	100	68.94	100	1.1	100
V2 - 10 t/ha	18.50	114.9	85.95	124.7	1.59	143.2
V3 - 15 t/ha	19.25	119.6	104.41	151.4	2.01	181.1
V4 - 20 t/ha	18.92	117.5	135.31	196.3	2.56	230.6

Table 2. The analysis of the potatoes production in terms of chicken manure fertilization (multiple comparisons – the Duncan test)

Rank	Variant (t manure/ha)	Production (t/ha)	The difference from :			
			V	IV	III	II
I	V4 - 20	88.851	48.461 ^{xxx}	32.523 ^{xxx}	24.328 ^{xxx}	16.326 ^{x}
II	V3 - 15	72.525	32.135 ^{xxx}	16.197 ^{x}	8.002	-
III	The average	64.523	24.133 ^{xxx}	8.195	-	
IV	V2 - 10	56.328	15.938 ^{xx}	-		
V	V1 - Mt	40.390	-			

Dl 5% = 13.028 t/ha; Dl 1% = 15.432 t/ha; Dl 0.1 % = 18.508 t/ha;

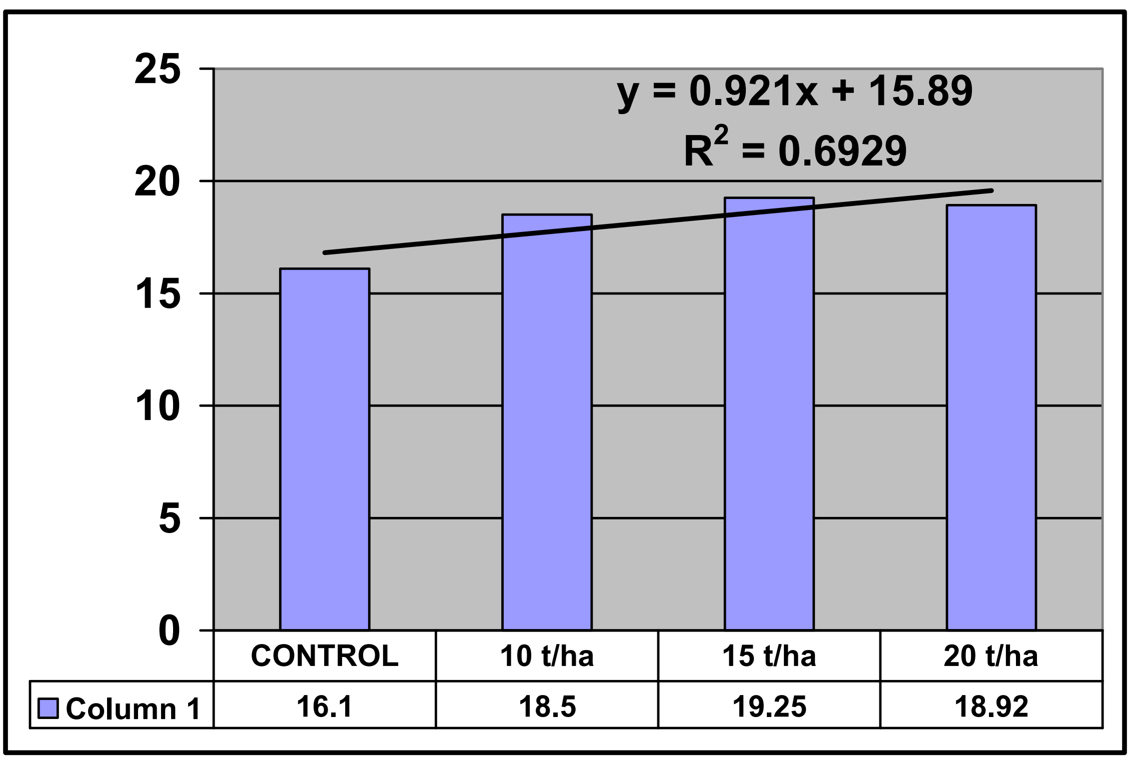


Figure 1. The influence of the phased fertilization with half-fermented chicken upon the number of tubers for a hole

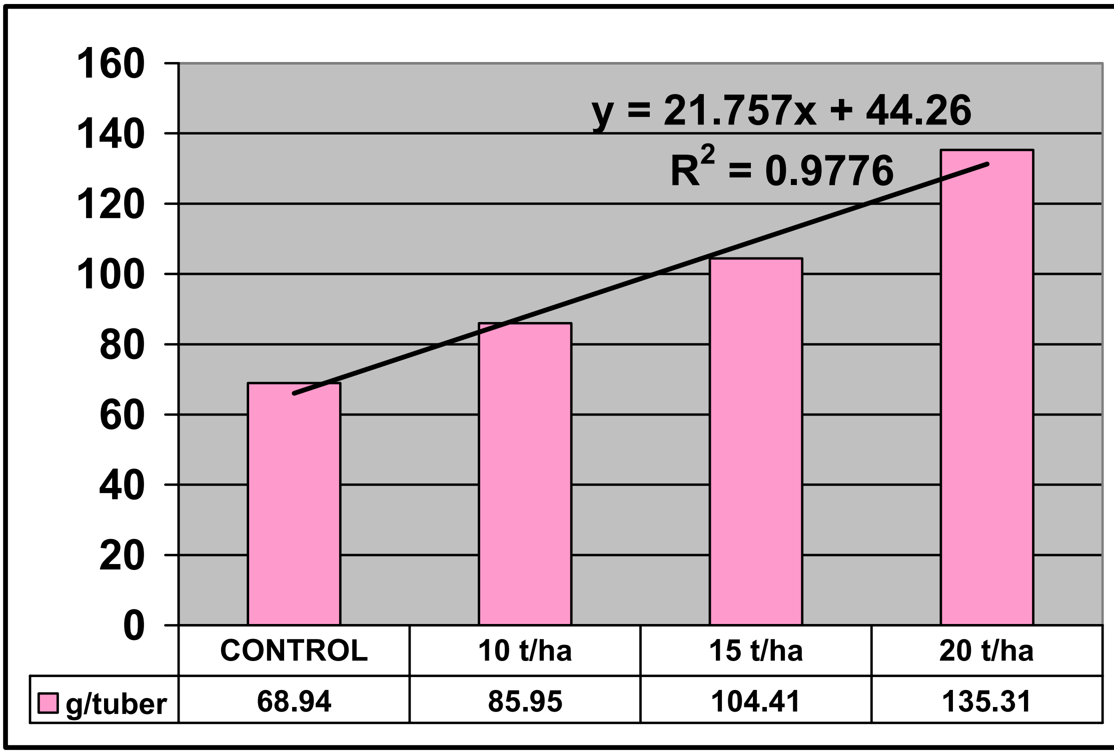


Figure 2. The influence of the phased fertilization with half-fermented chicken upon the average weight of the tubers (g/tuber)

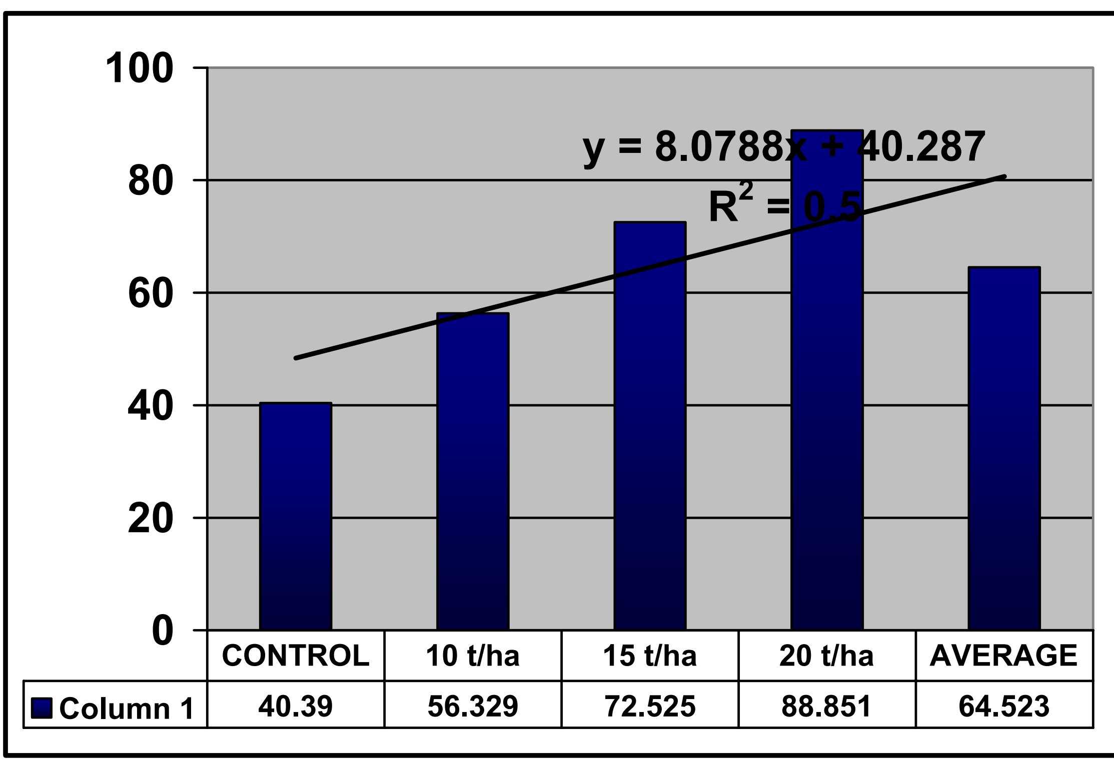


Figure 3. The influence of the phased fertilization with half-fermented chicken upon the potato production (t/ha) – the Santé type

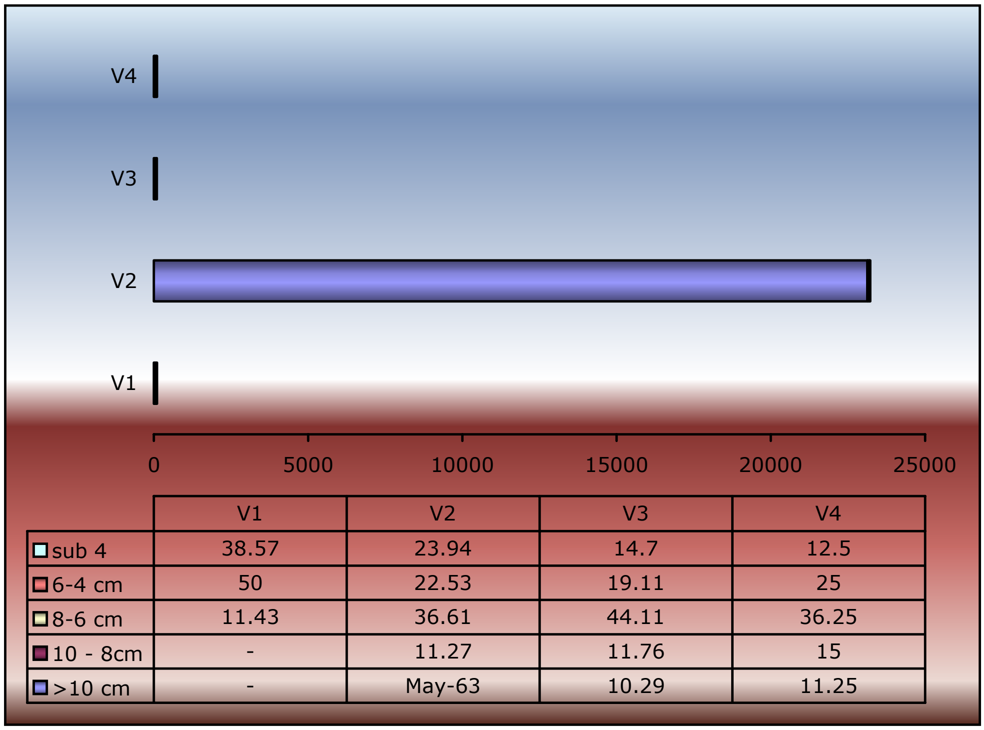


Figure 4. The influence of the fertilization with half-fermented chicken upon the quality of the tubers

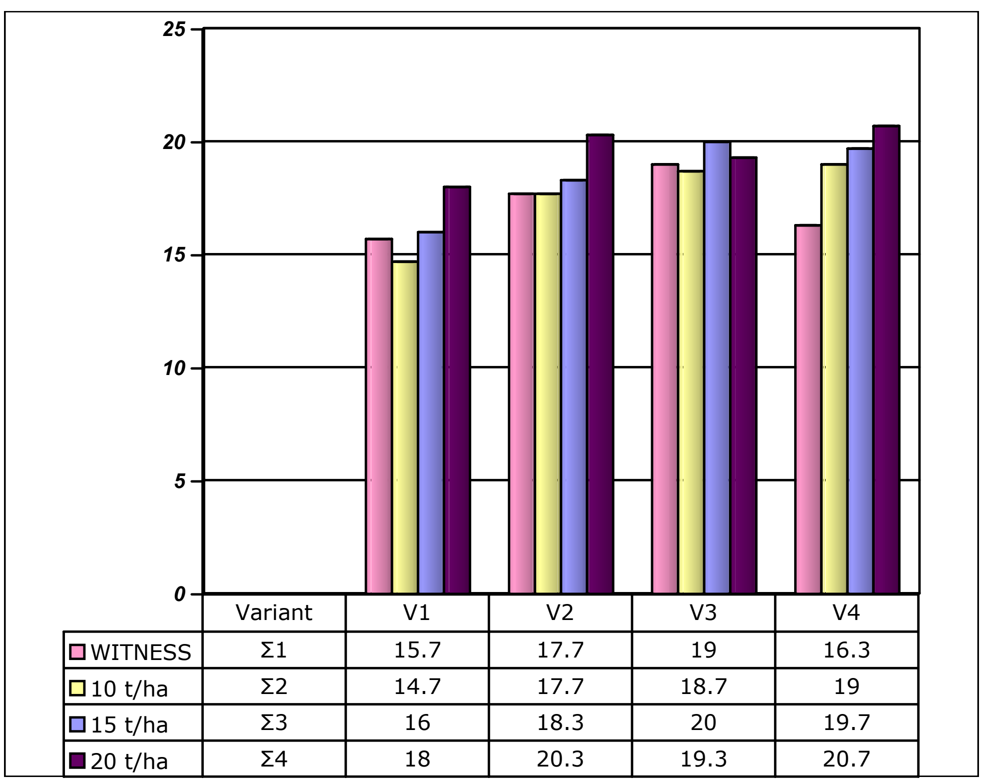
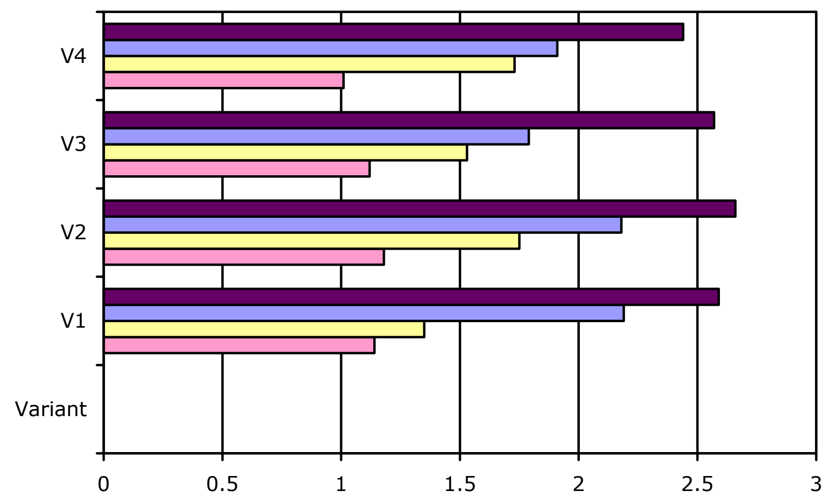
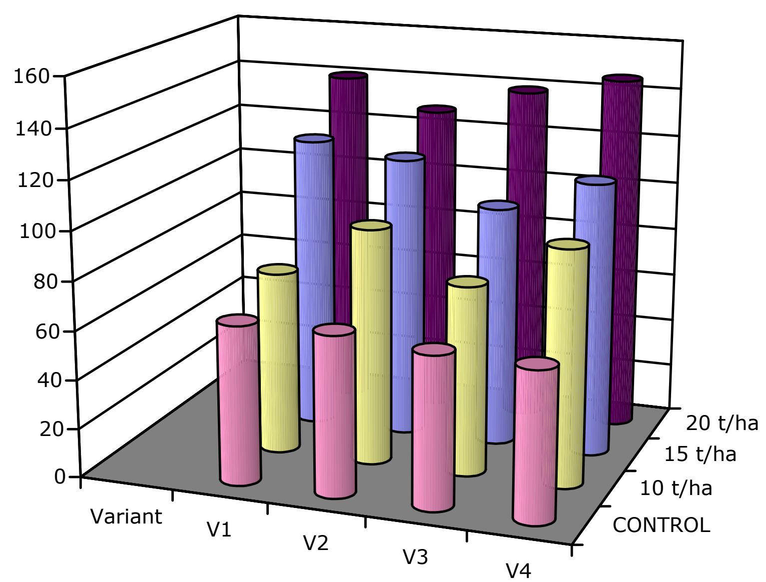


Figure 5. The influence of the phased fertilization with half-fermented chicken upon the number of tubers for a hole



	Variant	V1	V2	V3	V4
20 t/ha	Σ4	2.59	2.66	2.57	2.44
15 t/ha	Σ3	2.19	2.18	1.79	1.91
10 t/ha	Σ2	1.35	1.75	1.53	1.73
WITNESS	Σ1	1.14	1.18	1.12	1.01

Figure 6. The weight of the tubers for a hole according to the applied dose of half-fermented chicken manure (kg)



	Variant	V1	V2	V3	V4
CONTROL	Σ1	65	65.4	62	60.8
10 t/ha	Σ2	75	96.8	77.6	96.3
15 t/ha	Σ3	120.8	116	99	112.5
20 t/ha	Σ4	140.4	128.4	139.2	146.6

Figure 7. The production obtained according to the applied dose of half-fermented chicken manure (kg/plot of land)

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RESEARCHES CONCERNING THE METHODS/PHYSICAL AND CHEMICAL WAYS FOR THE TREATMENT SEEDS OF TOMATOES, CUCUMBER-S AND BEAN TO CONTROL THE PATHOGENS AND THE PESTS OF SOIL, TECHNOLOGICAL INDICATIONS

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Keywords: pathogen, tomato, cucumber, bean, pesticides, seed, treatment, *Pythium ultimum, Phytophthora parasitica, Rhizoctonia solani, Fusarium spp., Agriotes spp.*

ABSTRACT

In the paper are presented the results of the research workers concerning the usefulness of the pesticides: Tiramet 60 PTS, Apron XL 350 ES, Tachigar en 30 L, Previcur energy, Previcur 607 SL, Dithane M 45+Topsin 70 PU and Cruiser 350 FS applied at the seeds of tomatoes, cucumbers and bean, for the protection towards the pathogens of soils: *Pythium ultimum*, *Phytophthora parasitica*, *Rhizoctonia solaui* and *Fusariuma spp*. and towards the wireworms *Agriotes spp*.

INTRODUCTION

The pathogens transmission epiphytely and endophytely was pointed out by many research workers. For both transmission ways, as well as the seeds protection towards the pathogens of soils had been proposed different methods and ways for treatment (Naumann, 1965, Severin, 1971; Popescu Ana, Severin V., Kupferberg Simona, 1973. Marinescu Gh. 1975, 1979, Champion, Brunet, Arselme, Bourdin şi Berthier, 1979; Marinescu Gh. şi Ionescu C., 1980, Marinescu Gh., Costache M., Stoenescu A., 1984).

The seeds treatment of tomatoes, cucumbers and bean for protection towards the pathogens and the pests of soil, represents a significant technological link for establishing the integrated rebuttal of technologies, through the assurance of the optimal farming densities, the decrease of the treatments number for the vegetation period and for to attain some competitive productions, with a low degree of pollution.

MATERIALS AND METHODS

It had been worked with two varieties for each strain: tomatoes (Dacia and Roxana), cucumbers (Samurai and Mondial), and bean (Alena and Prelude), at the greenhouse, phytotron and field states, with the next variants:

a) tomatoes and cucumbers seeds had been treated with: Tiramet 60 PTS (thiophanate methyl 20%+ tiram 40%) applied through dust measuring 2g/kg seed; Apron XL (mefenoxan 350 g/1) applied to seeds through "slurry" measuring 1 ml/kg, Tachigaren 30 L (hymexazol 30%) applied in concentration of 0,15 %, through 60 minutes immersion; Previcur energy (530 g/1 propamocarb + 311 g/1 fosetilat) applied in concentration of 0.1 %, through 60 minutes immersion; Previcur 607 SL (607 propamocarb) applied in concentration of 0.15%, through 60 minutes immersion; Dithane M 45 (mancozeb 80%) applied measuring 1 g/kg seed + Topsin 70 PU (thiophanate methyl 70%) applied measuring 1 g/kg seed; warm water at 530 C hour-long; warm air at 80° C hour-long; Cruiser 350 FS (thiametoxan

350 g/l) measuring 10 ml/kg seed through "slurry".

There were made observations about:

- treatment influence concerning the penetrating power of tomatoes and cucumbers seeds on the 10, 20 and 30 days from sowing,
- the attack frequency (%) as against the pathogens of soils (*Pythium ultimum, Phytophthora parasitica, Rhizoctonia solani, Fusarium spp.*) who cause "the plantlets falling", both at pests where F (%) signify plantlets growing by to spring affected by the worms *Agriotes spp*.

b) at the garden beans, the experimental protocol involved the following methods: Tiramet 60 PTS applied measuring 2 g/kg + 7 ml. water; Apron XL 350 ES applied measuring 1 ml/kg seed through "slurry"; Tachigaren 30 L in concentration of 0,15 %through 10 minutes immersion. Dithane M 45 + Topsin 70 PU (lg + 1 g seed), applied through dust, and the untreated variant (the reference control). There were made observations about: the treatments effect on the getting over power of the bean seeds at 7, 15 and 25 days from sowing and the attack frequency (%) given by the plantlets with attack of *Rhizoctonia solani.*

RESULTS AND DISCUSSIONS

At tomatoes, from the table 1. it perceives the following:

1. the pesticides used in seeds treatment of tomatoes didn't affected the penetrating power as against the materials of reference (variant without treatments);
2. from the viewpoint of the treatment efficiency on the tomatoes seeds it perceived that the products Tiramet 60 PTS, Apron XL 350 ES, Tachigaren 30 L, Previcur energy, Previcur 607 SL, Dithane M 45 + Topsin 70 PU assures a good protection against the pathogens of soil, the attack frequency was below 1.5% relatively speaking 8,75 - 10,97 % for the reference control (untreated variant);
3. the physical treatment (with the warm water or warm air) applied to the tomatoes seeds doesn't solve their protection against the pathogens of soil, the attack frequency was 7,31 - 8,75 %.
4. between the variants treated by pesticides, hasn't perceived significant differences so much in regarding of the influence concerning the penetrating power of seeds as also in regarding of the protection against the pathogens of soil.

Similar results had been obtained also at cucumbers where the pesticides used assured a good protection against the pathogens of soil relatively speaking with the untreated variant where the attack frequency was 3.8 - 13,6% (Table 2). Adding the product Cruiser 350 FS in measuring of 10 ml/kg seed at the treatment variants, it ensures a protection of the cucumbers seeds against the worms *Agriotes spp*.

CONCLUSIONS

The seeds of tomatoes and cucumbers can be protected against soil pathogen agents (*Pythium ultimum, Phvtoplitora parasitica, Rhizoctonia solani, Fusarium spp.*) by treating then, using one of the following: Tiramet 60 PTS in a doses of 2g/kg seed trough dusting; Apron XL 350 ES in a doses of 1 ml/kg seed trough "slurry"; Tachigaren 30 L 0,15 %, Previcur energy 0,1 %, Previcur 607 SL 0,15% applied through 60 minutes immersion; Dithane M 45 1 g/kg seed + Topsin 70 PU 1 g/kg seed applied through dusting.

At cucumber culture made through direct seeding, to the seed treatment formulas it will be added the product Cruiser 350 FS in a doses of 10 ml/kg seed, that will ensure a protection of the seeds against the worms (*Agriotes spp.*).

For the protection against the fungus *Rhizoctonia solani*, the bean seeds will be treated with Tiramet 60 PTS in a doses of 2 g/kg; Apron XL 350 ES 1 ml/kg or Dithane M45 (1 g) + Topsin (1 g).

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Table 1. Methods and ways for the treatment seeds of tomatoes to control the pathogens of soil

Specification			Sowing: a) for seedling b) directly sowing	The used varieties	The penetrating power (%) at 30 days from sowing	The attack frequency (%) „the plantlets falling" determined at the pathogens of soil: *Pythium ultimum, Phytophthora parasitica, Rhizoctonia solani*
Product and active substance	**Dose, concentration**	**The treatment methods**				
Tiramet-60PTS (tiofanat metil 20% + tiram 40%)	2g/kg	dusting	seedling	Dacia	81	0
				Roxana	82	0
			Directly sowing	Dacia	70	0
				Roxana	73	0
Apron XL 350 ES (mefenoxan 350g/l)	1 ml/kg	"slurry"	seedling	Dacia	81	1,23
				Roxana	82	0
			Directly sowing	Dacia	71	0
				Roxana	73	0
Tachigaren 30 L (himexazol 30%)	0,15%	Immersion 60 minutes	seedling	Dacia	81	0
				Roxana	82	0
			Directly sowing	Dacia	70	0
				Roxana	73	0
Previcur energy (530 g/l propamocarb +311 g/1 fosetilat)	0,1%	Immersion 60 minutes	seedling	Dacia	81	1,23
				Roxana	82	1,21
			Directly sowing	Dacia	72	0
				Roxana	75	0
Previcur 607 SL (607g/l propamocarb)	0,15%	Immersion 60 minutes	seedling	Dacia	81	1,23
				Roxana	87	1,21
			Directly sowing	Dacia	73	0
				Roxana	75	0
Dithane M 45 (mancozeb 80%) + Topsin 70 PU (tiofanat metil 70%)	1 g + 1 g/kg	Dusting	seedling	Dacia	80	1,25
				Roxana	82	0
			Directly sowing	Dacia	71	0
				Roxana	73	0
warm water at 53°C/60 minutes	-	The thermal treatments	seedling	Dacia	80	7,50
				Roxana	82	7.31
			Directly sowing	Dacia	71	0
				Roxana	74	0
Warm air at 80°C/60 minutes	-	The thermal treatments	seedling	Dacia	80	7,50
				Roxana	82	7,31
			Directly sowing	Dacia	72	0
				Roxana	74	0
Cruiser 350 FS (thiametoxan 350g/l.)	10 ml/kg	"slurry"	seedling	Dacia	80	7,50
				Roxana	82	8,53
			Directly sowing	Dacia	70	0
				Roxana	74	0
Control (untreated variant)	-	-	seedling	Dacia	80	8,75

Table 2. Methods and ways for the treatment seeds of cucumbers to control the pathogens of soil

Specification: Product and active substance	Specification: Dose, concentration	Specification: The treatment methods	Sowing: a) for seedling b) directly sowing	The used varieties	The penetrating power (%) at 30 days from sowing	The attack frequency (%): The plantlets affected by the pathogens of soil: *Pythium ultimum, Fusarium spp.*	The attack frequency (%): The plantlets affected by the wireworms *Agriotes spp.*
Tiramet-60PTS (tiofanat metil 20% + tiram 40%)	2g/kg	dusting	seedling	Samurai	85	0	0
				Mondial	82	0	0
			Directly sowing	Samurai	74	0	0
				Mondial	73	0	2,7
Apron XL 350 ES (mefenoxan 350g/1)	1 ml/kg	"slurry"	seedling	Samurai	85	0	0
				Mondial	85	0	0
			Directly sowing	Samurai	74	0	1,3
				Mondial	73	0	1.3
Tachigaren 30 L (himexazol 30%)	0,15%	Immersion 60 minutes	seedling	Samurai	87	0	0
				Mondial	85	0	0
			Directly sowing	Samurai	76	0	1,3
				Mondial	75	0	2,6
Previcur energy (530 g/l propamocarb +311 g/1 fosetilat)	0.1%	Immersion 60 minutes	seedling	Samurai	87	0	0
				Mondial	85	0	0
			Directly sowing	Samurai	78	0	2,5
				Mondial	76	0	2,6
Previcur 607 SL (607g/l propamocarb)	0,15%	Immersion 60 minutes	seedling	Samurai	87	0	0
				Mondial	86	0	0
			Directly sowing	Samurai	78	0	1.3
				Mondial	75	0	2,6
Dithane M 45 (mancozeb 80%) + Topsin 70 PU (tiofanat metil 70%)	1 g + 1 g/kg	Dusting	seedling	Samurai	85	0	0
				Mondial	84	0	0
			Directly sowing	Samurai	76	0	1,3
				Mondial	75	0	2,6
warm water at 53°C/60 minutes	-	The thermal treatments	seedling	Samurai	87	10,3	0
				Mondial	86	10,4	0
			Directly sowing	Samurai	79	0	2,5
				Mondial	78	0	2.5
Warm air at 80°C/60 minutes	-	The thermal treatments	seedling	Samurai	87	10,3	0
				Mondial	86	10,4	0
			Directly sowing	Samurai	78	0	2.5
				Mondial	77	0	3,8
Cruiser 350 FS (thiametoxan 350g/l.)	10 ml/kg	"slurry"	seedling	Samurai	87	10,3	0
				Mondial	85	10,5	0
			Directly sowing	Samurai	77	0	0
				Mondial	76	0	0
Control (untreated variant)	-	-	seedling	Samurai	88	12,5	0

Table 3. Methods and ways for the treatment seeds of bean to control the pathogens of soil

<table>
<tr><th colspan="3">Specification</th><th rowspan="2">Used varieties</th><th colspan="3">The penetrating power (%)</th><th rowspan="2">The attack frequency (%)
The plantlets affected by Rhizoctonia solani</th></tr>
<tr><th>Product and active substance</th><th>Dose, concentration</th><th>The treatment method</th><th>7</th><th>15</th><th>25</th></tr>
<tr><td rowspan="2">Tiramet 60 PTS (tiofanat metal 20% + tiram 40%)</td><td rowspan="2">2 g/kg</td><td rowspan="2">dusting</td><td>Alena*</td><td>37</td><td>60</td><td>77</td><td>3,9</td></tr>
<tr><td>Prelude**</td><td>70</td><td>80</td><td>90</td><td>0</td></tr>
<tr><td rowspan="2">Apron XL 350 ES (mefenoxan 350g/l)</td><td rowspan="2">1 ml/kg</td><td rowspan="2">„slurry"</td><td>Alena*</td><td>38</td><td>58</td><td>76</td><td>3,9</td></tr>
<tr><td>Prelude**</td><td>55</td><td>83</td><td>90</td><td>0</td></tr>
<tr><td rowspan="2">Tachigaren 30 L (himexazol 30%)</td><td rowspan="2">0,15%</td><td rowspan="2">Immersion 10 minutes</td><td>Alena*</td><td>54</td><td>67</td><td>78</td><td>5,1</td></tr>
<tr><td>Prelude**</td><td>65</td><td>81</td><td>91</td><td>0</td></tr>
<tr><td rowspan="2">Dithane M 45 (mancozeb 80%) + Topsin 70 PU (tiofanat metil 70%)</td><td rowspan="2">1 g + 1g/kg</td><td rowspan="2">Dusting</td><td>Alena*</td><td>57</td><td>69</td><td>78</td><td>3.8</td></tr>
<tr><td>Prelude**</td><td>70</td><td>86</td><td>91</td><td>0</td></tr>
<tr><td rowspan="2">Control (untreated variant)</td><td rowspan="2">-</td><td rowspan="2">-</td><td>Alena*</td><td>40</td><td>66</td><td>78</td><td>21,8</td></tr>
<tr><td>Prelude**</td><td>63</td><td>86</td><td>91</td><td>0</td></tr>
</table>

Used races: Alena, yellow pod, originated from Romania, yield to years 2004
Prelude, green pod, originated from Dutch, yield to years 2005

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THE USE OF SOME INSECTICIDES IN THE PREVENTION OF GREEN PEA APHID-*ACYRTHOSIPHON PISUM* HARR. (*APHIDIDAE-HOMOPTERA*)

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Keywords: efficiency, treatment, pest, limited, economical ridge of damage

ABSTRACT

Our research regarding green pea aphid control (*Acyrthosiphon pisum* Harr.) have developed during 3 years: 2000, 2001, 2002 on the experimental field from Moara Domneasca.
The first research regarding the fight against this pest were the natural plants extracts. But after 1945 the chemical control of this pest had a wide range of usage.
Lately, it is seen that due to the damage caused through direct and indirect attack, control measures must be immediately be taken, even in cases which indicate that there is no great danger, but a minor one.
We stress this detail because lately the apparition of certain types of aphids which are very resistant to insecticides has been acknowledged. Therefore, it so best that the chemical treatments to be made using various types of active substances, and various methods of doing this, such as “shock doses” but also ensuring the protection of the predators and parasites. This protection can be achieved by using these “shock doses” and insecticides before the apparition of harmful insects.

INTRODUCTION

Our research regarding the fight against the green pea aphid (*Acyrthosiphon pisum* Harr.) were made during 3 years L 2000, 2001, 2002, at Moara Domneasca-Ilfov.

MATERIALS AND METHODS

5 types of treatment were used. The observations were made this way: in pea crop, 5 parcels of 1,2m² each were delimited (one at a time for each type). From this surface (1,2m²) 3 plants were taken randomly.

In 2000 and 2001 Alaska and Ola soils were used, and afterwards, in 2003, in both experimental places we used Isalnita 60 soil.

For the calculation of the efficiency of the chemical products we applied Abbot’s formula.

$$Efficiency\,\% = \frac{C-T}{C} x100$$

in which:
C-alive insects
T-alive insects at the treated version

RESULTS AND DISCUSSIONS

In 2000 the treatment was made on 19 June at Moara Domaneasca.

The observations made after 24 hours after the treatment can be seen in image 1.

Analysing this image, we can see that on the first place is Sumi-Alpha 2,5 EC with 96,29% efficiency and on the last place is Sinoratox 35 CE with 70,66% efficiency.

It is seen that on the first place is the product Talstar 10 EC with a 94,54% efficiency.

On the second place is Mospilan 20 SP with an efficiency of 86,88%.

In this case on the last place was Victenon 50 WP with 61,53% efficiency.

In 2002 the treatments were made on 24 june.

After 24 hours after the treatment efficiencies that have values which can be seen in image 3 were registered. You can see these values in the image below.

Ecalux S with its efficiency of 86,20% can be seen in the table.

The second place is taken by Chees 25 WP with an efficiency of 77,14%

The last place is taken by Chinmix 5 EC with an efficiency of 50%.

CONCLUSIONS

1. Our research regarding green pea aphids have developed during 2000, 2001 and 2002. They were included in the research complex which wants to discover new solutions in the fight against these aphids.
2. In the 3 years of research a number of 15 insecticides were used in order to kill the green pea aphid (*Acyrthosiphon pisum* Harr.)
3. The most efficient products were the following: Talstar 10 EC applied in a 0,04% concentration; Sumi-Alpha 2,5 EC applied in a 0,2% concentration and Ecalux S applied in a 0,1 % concentration.
4. In all cases, the results give us the right to consider that *Acyrthosiphon pisum* Harr. can be kept under control in pea crops in our country.

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Table 1

The efficiency of some insecticides 24 hours after the treatment, on the pest *Acyrthosiphon pisum* Harr. – Moara Domneasca, Ilfov, 2000

No. exp.	Types of treatment	Producing Company	Toxicity Group	Variety *Ola* sowed at 26 IV, and treated at 19 VI		
				C*	T*	E %
1.	Sinoratox 35 CE – 0,4%	SINTEZA S.A. Oradea-România	III	75	22	70,66
2.	Fastac 10 EC – 0,075%	BASF-AGRO BV ARNHEM- Elvetia	III	80	13	83,75
3.	Sumi-Alpha 2,5 EC – 0,2%	OLTCHIM S.A. Rm. Valcea + SUMITOMO CHEM Japonia	IV	81	3	96,29
4.	Diazol 60 EC – 0,08%	MAKHTESHIM-AGAN-Israel	III	79	14	82,27
5.	Actellic 50 EC – 0,10%	SYNGENTA CROP PROTECTION AG Elvetia	IV	69	14	79,71

* living individual sat witness
** living individuals in the case of the treated version

Table 2

The efficiency of some insecticides 24 hours after the treatment, on the pest *Acyrthosiphon pisum* Harr. – Moara Domneasca, Ilfov, 2001

No. exp.	Types of treatment	The producing company	The toxicity group	Variety *Ola* sowed at 22 IV, and treated at 15 VI		
				C*	T**	E %
1.	Mospilan 20 SP – 0,08%	NIPPON SODA – Japonia	III	61	8	86,88
2.	Talstar 10 EC – 0,04%	FMC-S.U.A.	III	55	3	94,54
3.	Supersect 10 EC – 0,03%	MITCHELL COTTS CHEM-Anglia	III	54	8	85,18
4.	Polytrin 20 EC – 0,015%	NOVARTIS CROP PROTECTION-Elvetia	IV	64	12	81,25
5.	Victenon 50 WP – 0,75%	TAKEDA CHEM Japonia	IV	39	15	61,53

* living individual sat witness
** living individuals in the case of the treated version

Table 3

The efficiency of some insecticides 24 hours after the treatment, on the pest *Acyrthosiphon pisum* Harr. – Moara Domneasca) Ilfov, 2002

No. exp.	Types of treatment	The producing company	The toxicity group	Variety Isalnita 60 sowed at 11 IV, and treated at 24 VI		
				C*	T**	E %
1.	Ecalux S – 0,1%	SINTEZA S.A. Oradea + NOVARTIS-Elvetia	III	29	4	86,20
2.	Diazinon 60 EC – 0,8%	NIPPON KAYAKU-Japonia	III	24	6	75,00
3.	Chees 25 WP – 0,04%	NOVARTIS CROP PROTECTION-Elvetia	IV	35	8	77,14
4.	Thionex ULV – 2,0 l/ha	MAKHTESHIM-AGAN-Israel	III	30	11	63,33
5.	Chinmix 5 EC – 0,3%	CHINOIN LTD Ungaria	III	24	12	50,00

* living individual sat witness
** living individuals in the case of the treated version

Lucrări ştiinţifice U.S.A.M.V.B., Seria B, Vol. XLIX, 2006

REZULTATE OBŢINUTE ÎN COMBATEREA PUTREGAIULUI CENUŞIU DIN CULTURA DE CEAPA PRIN ARPAGIC, PRODUSĂ DE CIUPERCA *BOTRYTIS ALLII MUNN.* DIN ZONA DE VEST A ROMÂNIEI

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REZUMAT

Cultura de ceapă este atacată de numeroşi agenţi patogeni şi dăunători care diminuează producţia în condiţii climatice favorabile.
Botrytis allii este unul dintre agenţii patogeni cu incidenţă ridicată în cultura cepei care determină apariţia putregaiului cenuşiu, pierderile ajungând până la 70-80% când sunt întrunite condiţiile favorabile dezvoltării acestuia.
În scopul de a lămuri unele aspecte de combatere, în perioada 2003-2005 am urmărit evoluţia bolii şi combaterea acestei prin folosirea fungicidelor: Antracol 70 WP, Bravo 500 SC 0,15 %, Previcur 607 SL, Folpan 80 WDG, Ridomil Gold MZ 68, Ridomil Gold Plus 42,5 WP, Dithane M45.

Cuvinte cheie: agent patogen, grad de atac, combatere, fungicide.

INTRODUCERE

Această boală, semnalată şi descrisă pentru prima dată în anul 1925 în S.U.A. de către Walker, este astăzi cunoscută în multe ţări din America, Europa şi Asia, unde produce pierderi însemnate, în special în timpul păstrării. De multe ori atacul apare însă şi la culturile din câmp mai ales la ceapă, cauzând o arsură a frunzelor. (DOCEA, E., 1979) Este o boală care se manifestă frecvent la bulbii de ceapă ajunşi la maturitate.

În timpul perioadei de vegetaţie, atacul patogenilor şi al dăunătorilor se poate suprapune, cu efecte dăunătoare sinergice, în ceea ce priveşte diminuarea recoltei.

MATERIAL ŞI METODA DE LUCRU

Studiile întreprinse în condiţiile pedo-climatice ale localităţii Albina, judeţul Timiş, s-au desfăşurat pe parcursul a trei ani (2003-2005). Cultura de ceapă a fost înfiinţată prin arpagic, iar soiul utilizat a fost Andora.

Terenul de experienţă s-a amplasat în cadrul unui asolament de 4 ani: 25% bulboase, 25% legume solano-fructoase, 25% leguminoase şi 25% cereale păioase.

Experimentul repetat în cei trei ani consecutivi a fost structurat identic, folosindu-se sistemul de amplasare dreptunghi latin, 8 variante în 4 repetiţii, o parcelă având 20 m^2.

În vederea calculării gradului de atac, lunar s-au făcut observaţii privind frecvenţa şi intensitatea atacului.

S-au experimentat 7 produse, iar pentru o bună acoperire a plantelor cu fungicidele folosite la toate variantele s-a folosite Detersin 0,3%.

Tratamentele s-au efectuat la avertizare în număr de patru, la care au fost folosite în cele 8 variante următoarele fungicide:

- V_1 – Antracol 70 WP 0,25%.
- V_2 – Bravo 500 SC 0,15 %;
- V_3 – Previcur 607 SL 0,015%;
- V_4 – Folpan 80 WDG 0,15%;
- V_5 – Ridomil Gold MZ 68 0,25 %;

- V_6 – Ridomil Gold Plus 42,5 WP 0,3%;
- V_7 – Dithane M45 0,2%;
- V_8 – Martor netratat;

Valorificarea datelor s-a făcut după metoda analizei varianţei aplicate experienţelor aşezate în dreptunghi latin pe fiecare an în parte şi a seriilor de experienţe monofactoriale executate mai mulţi ani în aceiaşi localitate.

Datele de producţie stabilite în calculul statistic intră în atenţie susţinută de observaţii şi determinări obiect însemnat de interpretare.

REZULTATE ŞI DISCUŢII

În cei trei ani de experienţă au fost condiţii optime de dezvoltare ale agentului patogen, acesta reieşind şi din faptul că la martorul netratat (V_8) s-a înregistrat un grad de atac de peste 11% în cei 3 ani.

Tabelul 1

Gradul de atac al putregaiului cenuşiu (*Botrytis allii)* la soiul de ceapă de arpagic Andora în perioada anilor 2003-2005

Varianta	Concentraţia (%)	Substanţa activă	Gradul de atac (%)			Medie grad atac (%)
			2003	2004	2005	
V_1 – Antracol 70 WP	0,25	Propineb 70%	4,50	5,50	10,00	6,67
V_2 – Bravo 500 SC	0,15	Clorotalonil 500 g/l	2,75	3,25	8,50	4,83
V_3 – Previcur 607 SL	0,015	Propamocarb 607 g/l	2,75	4,50	6,00	4,42
V_4 – Folpan 80 WDG	0,15	Folpet 80%	3,25	6,00	7,25	5,50
V_5 – Ridomil Gold MZ 68	0,25	Mefenoxam 4% + Mancozeb 64%	0,75	0,75	0,25	0,58
V_6 – Ridomil Gold Plus 42,5 WP	0,3	Mefenoxam 2,5% + Cupru metalic 40%	1,00	0,75	0,50	0,75
V_7 – Dithane M45	0,2	Mancozeb 80%	1,75	2,25	3,25	2,42
V_8 – Martor netratat	-	-	11,75	12,50	12,75	12,33

Din datele tabelului 1 reiese că produsele cele mai eficace au fost Ridomil Gold MZ68 (conc. 0,25%) şi Ridomil Gold Plus 42,5 WP (conc.0,3%), în variantele V_5 şi respectiv V_6 înregistrându-se un grad de atac al putregaiului cenuşiu sub 0,7%. În variantele V_1şi V_4 unde s-au utilizat pentru tratament fungicidele Antracol 70 WP şi Folpan 80 WDG, gradul de atac fiind cel mai ridicat (6,67% şi respectiv 5,50%), pentru ca în variantele V_2 , V_3 şi V_7 (Bravo 500 SC, Previcur 607 SL şi Dithane M 45) acesta să fie sub nivelele înregistrate anterior în cele două variante (4,83%, 4,42% şi, respectiv, 2,42%).

Cea mai ridicată valoare medie a gradului de atac, de 12,33% se întâlneşte în varianta V_8 – Martor netratat, cu o maximă de 12,75% în anul 2005 şi o minimă de 11,75% în anul 2003. Diferenţele dintre valorile medii ale gradului de atac înregistrate în cazul variantelor V_1 – V_7, prin comparaţie cu varianta V_8 (martor netratat) sunt evidente, fapt demonstrat şi consolidat de datele cuprinse în tabelul 2.

Rezultă din acest tabel că semnificaţia diferenţelor dintre variantele de tratament experimentate sunt foarte semnificativ negative faţă de martorul netratat, eficacitatea fungicidelor folosite având un impact direct asupra nivelului producţiei realizate. Nu se realizează o corespondenţă de strictă relaţie de inversă proporţionalitate între nivelul gradului de atac şi nivelul producţiei realizate, dar totuşi, în linii generale, ea există (Tabelul 3).

Tabelul 2

Semnificația diferențelor dintre variante sub aspectul gradului atacului patogenului *Botrytis allii* în perioada experimentală 2003- 2005

Varianta	Gradul de atac	Valoarea relativă	Diferența	Semnificație
1	6,67±1,69	54,09	-5,66	000
2	4,83±1,84	39,17	-7,50	000
3	4,42±0,94	35,84	-7,91	000
4	5,50±1,18	44,60	-6,83	000
5	0,58±0,17	4,70	-11,75	000
6	0,75±0,14	6,08	-11,58	000
7	2,42±0,44	19,62	-9,91	000
8	12,33±0,30	100	0,00	Martor

DL 5%	DL 1%	DL 0.1 %
2,45	**3,40**	**4,73**

Tabelul 3

Producția medie realizată la ceapă bulbi (soiul Andora) în perioada anilor 2003-2005

Varianta	Producția (t/ha)			Media 2003-2005
	2003	2004	2005	
V1	23,8	22,1	21,9	22,6
V2	23,6	22,4	22,8	22,9
V3	23,7	24,3	24,1	24,0
V4	21,2	19,6	22,5	21,1
V5	26,5	27,7	26,3	26,8
V6	25,2	26,1	25,9	25,7
V7	17,6	16,9	19,3	17,9
V8 (Mt)	9,7	8,5	9,4	9,0

Astfel, la valorile medii cele mai scăzute ale gradului de atac (V_5 - 0,58%; V_6 - 0,75%) corespund valorile cele mai ridicate ale nivelului de producție realizat, de 26,8 t/ha şi respectiv 25,7%. În cazul celorlalte variante (V_1-V_4 şi V_7) producțiile realizate sunt diferite, diferențierile dintre ele nerespectând în toate cazurile relația „grad de atac mic – producție mare”, ca de exemplu în V_7 – 2,42% grad de atac şi 17,9 t/ha producție prin comparație cu V_1 – 6,67% grad de atac şi 22,6 t/ha şi V_3 – 4,42% grad de atac şi 24,0 t/ha. Faptul se datorează cu certitudine şi influenței altor factori de vegetație pe parcursul celor trei ani de studiu experimental.

În cazul variantei V_8 (martor netratat), la un grad de atac de 12,33 % mai ridicat de 1,8-21,2 ori decât în variantele V_1-V_7 (tabelul 1), producția realizată este de 9,0 t/ha mai scăzută de 1,98 – 2,97 ori decât în variantele amintite (tabelul 3).

Din datele tabelului 4 rezultă că producțiile realizate în variantele V_1-V_7, prin comparație cu V_8 (martor netratat), au acoperire statistică, semnificația diferențelor fiind foarte semnificativ pozitivă.

Tabelul 4

Semnificația diferențelor de producție realizate în diferite variante de tratament ale putregaiului cenuşiu (*Botrytis allii)* la soiul Andora în perioada anilor 2003-2005

Varianta	Producția obținută (t/ha)	Diferența (+- t/ha)	Producția relativă (%)	Semnificația
1	22,6	+13,6	251,1	***
2	22,9	+13,9	254,4	***
3	24,0	+15,0	266,7	***
4	21,1	+12,1	234,4	***
5	26,8	+17,8	297,8	***
6	25,7	+16,7	285,6	***
7	17,9	+8,9	198,9	***
8	9,0	-	100,0	-

DL 5%	DL 1%	DL 0.1 %
1,30 t/ha	**1,76 t/ha**	**2,33 t/ha**

CONCLUZII ŞI RECOMANDĂRI

1. Tratamentele efectuate cu fungicidele Ridomil Gold MZ şi Ridomil Gold Plus 42,5 WP au redus gradul de atac al putregaiului cenuşiu (*Botrytis allii)* la cele mai scăzute valori, de 0,58 şi respectiv 0,75% prin comparație cu *martorul netratat,* unde gradul de atac a fost de 12,33%.
2. Nivelul mediu al gradului de atac în variantele luate în studiu a înregistrat diferențieri mari şi în cazul celor în care s-au utilizat fungicide pentru prevenirea şi combaterea agentului patogen, în limitele valorilor de 0,58-6,67%, cu repercusiuni asupra nivelului producției realizate.
3. Producțiile realizate au fost în mod evident influențate de nivelul gradului de atac, nu neapărat, într-o relație strictă de inversă proporționalitate, cele mai mari fiind de 26,8 t/ha (V_5) şi, respectiv, 25,7 t/ha (V_6), iar cea mai mică, de 9,0 t/ha în varianta V_8 (martor netratat).
4. Se recomandă folosirea fungicidelor Ridomil Gold MZ şi Ridomil Gold Plus 42,5 WP, datorită efectului lor de reducere a gradului de atac în experimentul efectuat.

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RESEARCHES UPON THE MANIFESTATION OF THE PRODUCTIVE POTENTIAL OF TOMATOES CULTIVATED ON MINERAL AND ORGANIC SUBSTRATUM IN VARIOUS RECIPIENTS, UNDER A FORCED SYSTEM WITH UNCONVENTIONAL ENERGETIC INTAKE

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Keywords: hibrid, potenţial productiv, sistem radicular, suprafaţă foliară, substrat de cultură, recipient, îngrăşământ organic, energie neconvenţională.

INTRODUCTION

As high-level achievement within the high technologies, the horticultural cultures without soil, especially vegetables and flowers, were placed on the top of the vegetable production, from a productive and qualitative point of view, related to the worldwide agriculture. The productions for tomatoes – 500-550 t/ha and for cucumbers – 700-800 t/ha obtained in hothouses set the non-conventional cultures in the top of productivity (Horgoş, A., 1998, Atanasiu, N., 2002). These cultures, already present on big surfaces in countries as Holland, France, Belgium, Germany, England, Japan, Denmark, are continuously being expanded due to the high agricultural technologies, being supported by a high-tech industry specialized in such direction. This parallel, specialized industry provides high-tech materials and equipment, smartly designed and created, which confer the same high-tech level to these cultures.

Worldwide, the available information regarding cultures without soil and also their diversity are extremely advanced. The first commercial system of plant cultivation without soil was conceived by Gericke (1930), a professor at the Barkley University, California.

Year 1973 marks the beginning of the century of without soil- cultures, when Cooper (England) published some production results obtained using the technique of the nutritive film (NFI). The Dutch apply for the first time the Danish mineral wadding in horticulture (Verwer, 1975, 1976).

Griin (1988) brings into discussion the problem of soil stress and the fight against soil pests, especially nematodes, because of the impossibility of applying an adequate rotation in countries with big surfaces of hothouses (Holland, France, Belgium, England, Germany), in which the very intensive agricultural systems are present.

In our country, the researches regarding this subject are in small number, although Maier has reached this subject since 1969.

Răuţă *et al.* (1986) published the results obtained for some vegetable cultures on gravel or some other thick substrata, compared to those on soil, with the specification that they had significant average production growths.

Some attempts to found commercial cultures without soil were made for the first time in our country after 1980, using important total technologies in some hothouse assembles.

So, in our country, this culture system has remained in its incipient stage of development, with a shy attempt of research, being not supported by industry.

Black and brown peat, sawdust, rind and shavings, but also domestic compost, coconut fibre, mixes of vermiculite with sand or of peat with perlite were used as organic materials.

At the University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, some researchers adopted tomato culture in polyethylene packs, this system being cheaper, and there was not any need to change the outfits and equipment from hothouses and the soil can be used for successive and interpolated cultures (Maria Apahideanu, 1998).

In the North-Western Europe, 60-70% from the hothouses surface is used for vegetable cultivation, 20-30% for flowers and 5-10% for nursery transplants. The biggest surfaces are cultivated under the system of no soil- cultures with special results for vegetables, but the researchers also try the ornamental species (Clayton, 1981; Tramier, 1988; Mozard, 1994; Morisot, 1997). At the end of `90s, the surfaces cultivated with no soil- cultures in the North-Western Europe represented for vegetables 4658 ha from the total surface of 11868 ha hothouses, namely about 40% (Benoit and Ceustermans, 1989). According to the same authors, in the last 20 years, 39% of the vegetable hothouses have been cultivated within the no soil- culture systems, in France – 47%, and in Holland – 51%. The researches have enhanced in the last years, due to the good results that had been obtained.

Relying on the experience in this field, we initiated some researches taking into account the existence of some industrial hothouses with a non-conventional energetic consumption (geothermal water) and the possibility of using some organic matter at reasonable prices in the experiment field (Curtici area from Arad`s vegetable area).

MATERIAL AND METHOD

The experiment made on tomato cultivation on organic substrata in different recipients using hybrids with a determined growth in the 1st cycle of production was carried out in the hothouses warmed with geothermal water from S.C. Agronin S.A. Curtici. These hothouses, built in the `70s according to Venlo type (3,20 ml width and 2 ml height), with a low technical level compared to the new achievements in this field, influenced negatively the level of the production obtained, because of the impossibility to apply a modern culture technology. The productions obtained according to the old technology of tomato cultivation on soil with outdated technological loops were placed under the profitable level, fact that led to the impossibility to continue the production process by a cyclic and annual reapplication.

Because the soil from the hothouse began to show signs of “tiredness” and we couldn't support any financial expenses for disinfection, we carried out a bifactorial experiment, in which the experimental factors are:

Factor A – Plant recipient and crop nutritive substrata:

a_1 – hothouse soil (control);

a_2 – mineral substrata: 50% river gravel + 50% river sand in PVC buckets;

a_3 – organic substrata: 20% straws + 30% manure + 40% celery soil + 10% river sand in PVC buckets;

a_4 – organic substratum: 20% straws + 40% manure + 40% peat in PVC buckets;

a_5 – organic substrata: 50% black peat + 50% red peat in polyethylene sacks.

Factorul B – Îngrăşământul organic lichid Stimusoil 200:

b_1 – substrat nutritiv nefertilizat;

b_2 – substrat nutritiv fertilizat cu Stimusoil 200 – 1 l/ha.

Within the improved (modern) culture technology that has been applied (drip irrigation, fertirrigation with Kemira-type fertilizers – Cropcare and Ferticare, the use of some high quality hybrids, etc.), we used as fertilization supplement a liquid organic fertilizer – Stimusoil 200, in order to ameliorate and improve the physical-chemical characteristics of the culture substrata, whatever this could be. The experimental results achieved during the cycle I in 2006 are partial, but the researches are going to be continued in the nest years.

Using some calculations of mathematical statistics specific to the method of analysis of variation, we interpreted and evaluated the influence of the experimental factors and also the effect of their interaction upon the productive potential of tomato culture.

RESULTS AND DISCUSSIONS

Table 1 comprise synthetically the yield results expressed through level/variant, and also the characteristic elements (bunch number/plant, fruit number/plant, average bunch and fruit weight). The table also includes the weight of the root system, with different values depending on the used recipient and on the mineral or organic substrata fertilized or not with the liquid organic fertilizer Stimusoil 200. The differentiated development of the root system (with a special remark for the one from the interaction a_2b_2, and also from a_2b_1) might be due so far to a characteristic of the nutritive substratum, which is the capacity of retaining water and nutritive elements. The mineral substrata consisted of 50% gravel and 50% sand has the smallest capacity of retaining water, and, as a supposition, without enough proves of scientific research, plant has developed a corresponding root system, able to use the water and mineral elements which are administrated under the same regime of watering frequency like in the other variants of substratum.

We may observe big yield differences under the influence of the factor A, between 109.6% (a_2 – 120,237 kg/ha) and 142.6% (a_5 – 156,404 kg/ha), while under factor B they are much reduced, between 116.0% ($a_5b_2 \rightarrow a_5b_1$) and 128.9% ($a_1b_2 \rightarrow a_1b_1$).

Table 2 of variance analysis, which presents the singular influences and those caused by the interactions between the experimental factors A and b after calculations of mathematic statistics specific to this type of interpreting experimental results, gives us a detailed image.

The biggest yield is recorded in the case of applying the organic substrata consisted of 50% black peat and 50% red peat in polyethylene sacks (a_5 - 156,404 kg/ha - 142.6% compared to the control variant), being followed by the yields from a_4 and a_3 under the influence of the organic substratum from PVC buckets (a_4 – 139,289 kg/ha – 127% and a_3 – 137,793 kg/ha – 125.6%).

The average yields obtained in recipients (PVC buckets or plastic sacks) have a statistical assurance as being very significantly positive compared to that achieved in hothouse soil. The average yield achieved under the influence of factor b_2 has also a very significantly positive statistical assurance (139,560 kg/ha – 110.94%), compared to that achieved under b_1 (125,800 kg/ha – 100%) (Table 2–2.1 and 2.2). In the case of the interaction between recipient and crop substrata (a_2 – a_5) and the liquid organic fertilizer Stimusoil 200 (b_2), the achieved growths assure a very significantly positive statistical assurance in most cases (Table 2 – 2.3).

Under the influence of factor b_2 in various recipients and crop substratum (a_1 – a_5), the factorial combination a_5b_2 prints a very significantly positive statistical assurance to the achieved yield (Table 2 – 2.4).

Table 2

Singular influences and those carried out by the interactions between experimental factors upon tomato yield in Platus F_1 cultivated on organic substratum in various recipients

Variant	Average yield (Kg/ha)	Relative yield (%)	Difference (±t/ha)	Difference significance
2.1. Recipient's influence upon cultivation				
a2-al	120,25-109,70	109,62	10,55	XXX
a3-al	137,75-109,70	125,57	28,05	XXX
a4-a1	139,30-109,70	126,98	29,60	XXX
a5-a1	156,40-109,70	142,57	46,70	XXX
a3-a2	137,75-120,25	114,55	17,50	XXX
a4-a2	139,30-120,25	115,84	19,05	XXX
a5-a2	156,40-120,25	130,06	36,15	XXX
a4-a3	139,30-137,75	101,13	1,55	-
a5-a3	156,40-137,75	113,54	18,65	XXX
a5-a4	156,40-139,30	112,28	17,10	XXX
DL 5% = 3,267	**DL 1% = 4,586**		**DL 0,1% = 6,478**	
2.2. The influence of the fertilization of crop substrata in recipients with the liquid organic fertilizer Stimusoil 200				
b2-b1	139,56-125,80	110,94	13,76	XXX
DL 5% =2,180	**DL 1% = 3,020**		**DL 0,1% = 6,480**	
2.3. The influence of the interaction between recipient and the crop substrata fertilized or not fertilized with Stimusoil 200				
a1b2-albl	123,60-95,80	129,02	27,80	XXX
a2b2-a2b1	128,80-111,70	115,31	17,10	XXX
a3b2-a3b1	139,10-136,40	101,98	2,70	-
a4b2-a4b1	138,30-140,30	98,57	-2,00	-
a5b2-a5b1	168,00-144,80	116,02	23,20	XXX
DL 5% =4,870	**DL 1% = 6,750**		**DL 0,1% = 9,310**	
2.4. The influence of the interaction between the crop substrata fertilized and not fertilized with Stimusoil 200 in the same crop recipients				
a2b1-a1b1	111,70-95,80	116,60	15,90	XXX
a3b1-a1b1	136,40-95,80	142,38	40,60	XXX
a4b1-a1b1	140,30-95,80	146,45	44,50	XXX
a5b1-a1b1	144,80-95,80	151,15	49,00	XXX
a3b1-a2b1	136,40-111,70	122,11	24,70	XXX
a4b1-a2b1	140,30-111,70	125,60	28,60	XXX
a5b1-a2b1	144,80-111,70	129,63	33,10	XXX
a4b1-a3b1	140,30-136,40	102,86	3,90	-
a5b1-a3b1	144,80-136,40	106,16	8,40	XX
a5b1-a4b1	144,80-140,30	103,21	4,50	-
a2b2-a1b2	128,80-123,60	104,21	5,20	X
a3b2-a1b2	139,10-123,60	112,54	15,50	XXX
a4b2-a1b2	138,30-123,60	111,89	14,70	XXX
a5b2-a1b2	168,00-123,60	135,92	44,40	XXX
a3b2-a2b2	139,10-128,60	108,00	10,30	XXX
a4b2-a2b2	138,30-128,80	107,38	9,50	XXX
a5b2-a2b2	168,00-128,80	130,43	39,20	XXX
a4b2-a3b2	138,30-139,10	99,42	-0,80	-
a5b2-a3b2	168,00-139,10	120,78	28,90	XXX
a5b2-a4b2	168,00-138,30	121,48	29,70	XXX
a2b2-a1b1	128,80-95,80	134,45	33,00	XXX
DL 5% =4,750	**DL 1% = 6,620**		**DL 0,1% = 9,233**	

CONCLUSIONS

1. The use of mineral or organic crop substratum is justified through the average yield growths achieved, between 9.6-42.6%, compared to the greenhouse soil.
2. We remark the organic substrata comprising 50% black peat and 50% red peat in polyethylene sacks, the average yield growth achieved being 42.6%.
3. The yield growths achieved in the case of crop substratum not fertilized with Stimusoil 200 compared to the greenhouse soil, also not fertilized, are between 16.6 and 51.1% (a_2b_1-a_5b_1), and in the case of those fertilized, compared to the greenhouse soil, also fertilized, are 4.2-35.9% ($a_2b_2 \rightarrow a_5b_2$).
4. We recommend the continuation of these researches in order to strengthen the conclusions and the effect of the recipient of crop substrata upon the development of root system in tomato plants.

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Table 1

Yield results in tomato crop on mineral and organic substratum in various recipients (Lemance F_1)

Factor A	Factor B	Root system weight (g/pl.)	Plant height (cm)	Bunch number per plant	Fruit number		Average weight of a		Average yield			Average yield for factor A	
					In bunch	Per plant	Bunch (g)	Fruit (g)	Kg/pl.	Kg/ha	%	Kg/ha	%
a_1- control greenhouse soil	b_1	44,0	180,2	6,0	6,8	40,8	638,8	93,9	3832,8	95.820	100,0	109.698	100,0
	b_2	51,0	170,1	6,5	7,2	46,7	760,5	105,8	4943,0	123.575	100,0		
a_2- s. mineral: 50% gravel + 50% sand	b_1	151,0	152,1	6,4	5,6	35,8	698,3	124,8	4468,9	111.723	116,6	120.237	109,6
	b_2	215,8	179,8	7,3	5,5	40,1	705,5	128,4	5150,0	128.750	104,2		
a_3- s. organic: 20% straws + 30% manure + 40% celery soil + 10% sand	b_1	49,0	180,7	6,6	6,9	45,4	737,6	120,2	5458,0	136.448	142,4	137.793	125,6
	b_2	63,2	171,3	7,1	6,3	44,7	783,9	124,5	5565,5	139.138	112,6		
a_4- s.organic: 20% straws + 40% manure + 40% peat	b_1	68,5	185,5	7,1	5,9	42,0	790,3	133,6	5611,2	140.280	146,4	139.289	127,0
	b_2	59,4	175,8	7,1	6,5	46,1	779,1	120,0	5531,9	138.298	111,9		
a_5 – s.organic: 50% black peat + 50% red peat	b_1	67,4	158,5	6,5	6,6	42,7	891,0	135,6	5792,3	144.808	151,1	156.404	142,6
	b_2	66,7	171,8	6,9	6,9	47,8	973,9	140,6	6720,0	168.000	135,9		

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RESEARCHES ON THE INFLUENCE THE METHOD OF OBTAINING SEEDLINGS HAS ON THE PRODUCTION OF THE LETTUCE CULTIVATED IN PROTECTED

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Keywords: *Lactuca sativa*, seedlings, alveolus pallets, Jiffy pots, Jiffy 7

ABSTRACT

The production of lettuce seedlings for the forced and protected requires their being obligatorily replanted in different types of pots. For a better economical efficiency we can eliminate the replanting by means of direct sowing in alveolus pallets, Jiffy pots and Jiffy 7.

INTRODUCTION

The present paper is a research on the influence the usage of different types of pots has on the lettuce production.

MATERIAL AND METHOD

The experiment took place between 2005-2006 to The Didactic and Research sector of the Vegetable Growing from U.S.A.M.V. Bucharest.

An experiment concerning the production of the lettuce seedlings using the Ilona variety was effectuated, variants as results:

The mounting of the experiment

Species/cultivar	The experiment – the production system of the seedlings	The growing medium volume(cm^3)	Variant
ILONA	Plastic pot with Ø=4.5cm	50.36	V1Mt
	Alveolus pallet with side=3.5cm	37.78	V2
	Jiffy pot with Ø=6cm	89.22	V3
	Jiffy 7 with Ø=4cm	70.36	V4

The experiment was mounted in 4 variants and 4 repetitions.

ILONA is a head lettuce designed for the protected cultures, with a tolerance for low temperatures. It is also, lettuce mosaic virus tolerant and blight resistant.

The obtaining of the seedlings and the maintenance of the cultures have been done according to the specific technology of the plants studied, also being applied uniformity to all the experimental variants.

The sowing was effectuated in wooden small boxes, alveolus pallets and Jiffy pots filled with a mixture of nutritive soil containing 40% rotted manure, 30% celery soil, 20% peat and 10% send. For the replanting in the case of V1Mt witness variant, the pots were filled with a nutritive mixture containing 40% decomposed manure, 40% peat, 10% celery soil and 10% send.

Morph metrical and physiological analysis were effectuated on the seedlings and on the production on 10 plants /repletion, the results being their mean and registered in diagrams and tables.

RESULTS AND DISCUSSIONS

The morph metrical analysis consisted in the measuring of the length, volume and mass of the seedlings before planting.

The maximum volume of the plants was seen at the control variant, but one must take into consideration the cumulated effect of the nutritive substances with in the growing medium utilized in sowing and the one in the replanting pots(table 1);

The highest values of the plants weight and volume and registered (except for the witness) at V2 – alveolus pallets variant (table 1).

Analyzing the variation of the plants volume and the volume of the pots used in the experiment one can notice that there is no correlation between the two as the graph also shows. This can be explained by the fact that there are more ecological environmental factors operating on the seedling (light, temperature) and also technological factors (the density of the plants, the growing medium utilized) (fig 1)

The seedlings production method has influenced in a different but insignificant way the lettuce production (table 2)

As for as the mass is concerned the production has reached maximal values for the V1 Mt control variant, being followed by the experimental variant V3 – Jiffy pot (fig 2);

The diameter of the lettuce head harvested has the highest values for the V4 Jiffy 7 variant, as for as the quality diameter is concerned. By correlating the diameter with the heads mass one can notice that for V4 variant the lettuce heads are as for as quality is concerned, more mellow (fig 2).

High respiration intensity determines a greater heat emission greater which means a reduction of its keeping time period (table 3);

The low water content and the high mineral substances content is explained the loss of the water through the sweat process (table 3).

The greater intensity at the V4 variant B expressed by the fact that the leaves are younger comparison with the other variants (fig. 3).

The respiration high intensity can affect both the photosynthesis process and the substances accumulations in the plait, from this point of view the V2 variant having the best results (fig. 4).

Both, a chlorophyll and b chlorophyll are in optimum parameters (Burzo I. s. a. 2005), existing more b chlorophyll that a chlorophyll (table 4).

The total content of chlorophyll being high, and a/b report being low shows that there is no optimum transformation of the luminous energy into biochemical energy (fig 5).

CONCLUSIONS

1. The only positive correlation between the parameters in the seedlings phase and the grown-up ones is registered at V2 – alveolus pallets variant, between the volume of the plant – seedling in the planting phase and the content in total chlorophyll. This shows the good physiological balance of the grown-up plants, determined by the good nutrition of the seedlings.
2. In the case of the control variant, even though the same positive correlation as in the case of the V2 variant is registered, from the production quality point of view, the values of the

physiological results are not satisfactory (low s. u., high respiration, low pigments content).

3. V2 variant also registers maximum physiological parameters (s. u., carotene pigments).
4. Based on the results of the research, the introduction in the technology the seedling production at the forced lettuce culture does not have as a direct result the production growth but it does determine a higher quality of the aspect (dimensions, color, nutritive value, pigments) and storage resistance.

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Tables

Table 1. The lettuce seedlings dimensions before planting

Variant	V1Mt	V2	V3	V4
Root length(cm)	13.33	10.66	8.66	10.33
The maximum value of the leaves – length(cm)	7.16	9.83	7.83	6.33
The plants weight (g)	3.66	4.66	2.83	1.99
The plants volume ($cm^3/20^0C$)	5.66	5.33	3.32	2.32

Table 2. The weight and the diameter of the heads lettuce harvested

Variant	V1Mt				V2				V3				V4			
	R1	R2	R3	R4	R1	R2	R3	R4	R1	R2	R3	R4	R1	R2	R3	R4
Weight(g)	240	248	242	244	220	216	218	222	228	233	241	225	198	204	214	202
Diam(cm)	30,4	30,7	30,5	30,6	30,5	29,5	28,5	29,0	30,5	32,5	32,0	31,0	30,0	32,5	33,5	33,0

Table 3. The Physiological index at the lettuce leaves immediately after the harvest

Variant	Intensity of respiration ($mgCO_2/kg$ frz/h)	s.u. (%)	Ash (%)	Water (%)
V1Mt	68,83	6,67	1,26	93,33
V2	59,99	8,04	1,72	91,96
V3	47,01	7,13	1,38	92,87
V4	86,46	7,58	1,30	92,42

Table 4. The content in the chlorophyll pigments of the harvested lettuce leaves, the Ilona variety.

Variant	a	b	T	a/b	Car	Cl/car
V1Mt	81,15	28,70	109,86	2,83	25,04	4,39
V2	92,21	31,93	124,14	2,89	28,81	4,31
V3	81,51	29,41	110,92	2,77	24,56	4,52
V4	80,30	37,31	117,6	2,15	28,53	4,12

Figures

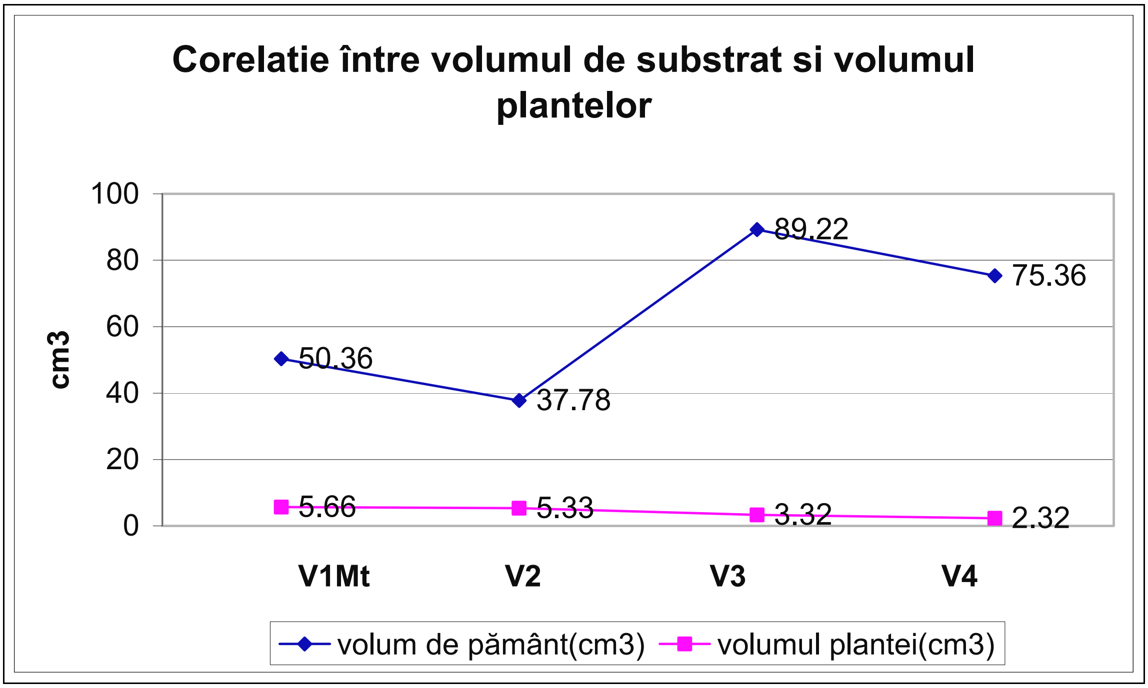


Fig. 1. Correlation between the growing medium volume and the volume of the plants

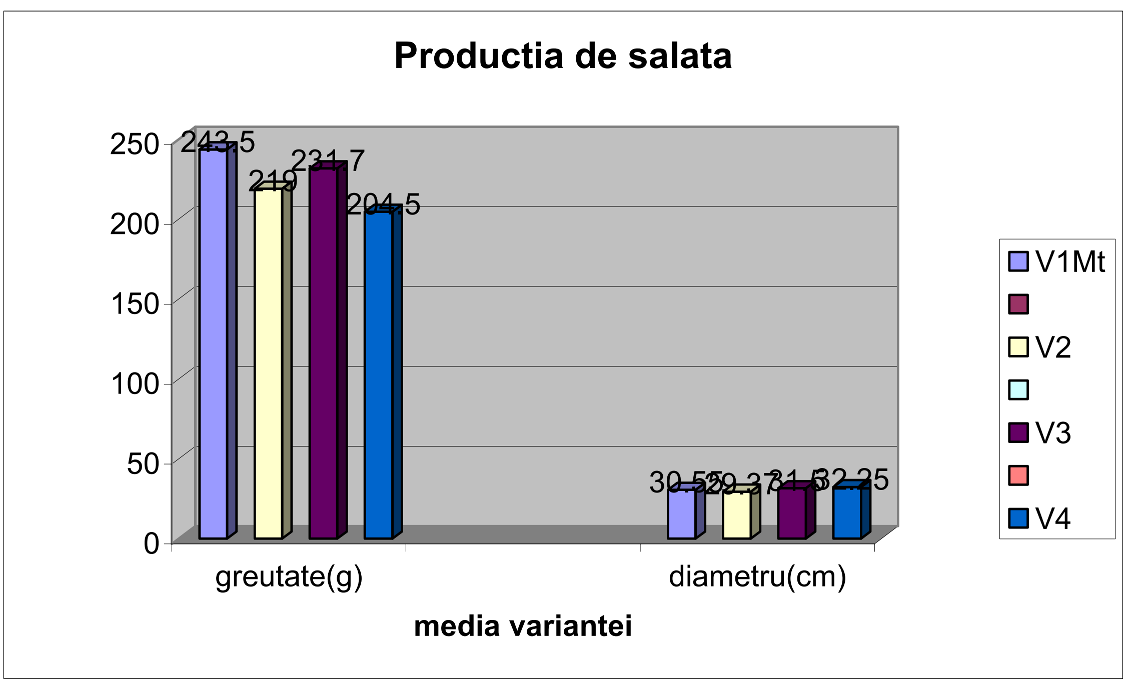


Fig. 2. The lettuce production

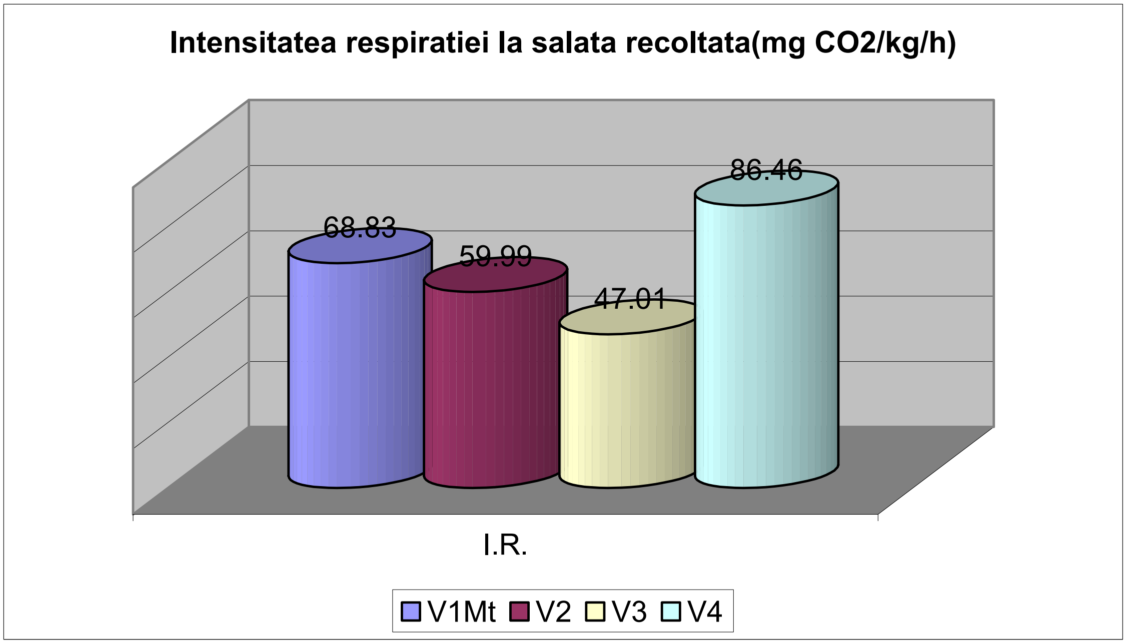


Fig. 3. The intensity of the respiration at the harvested lettuce

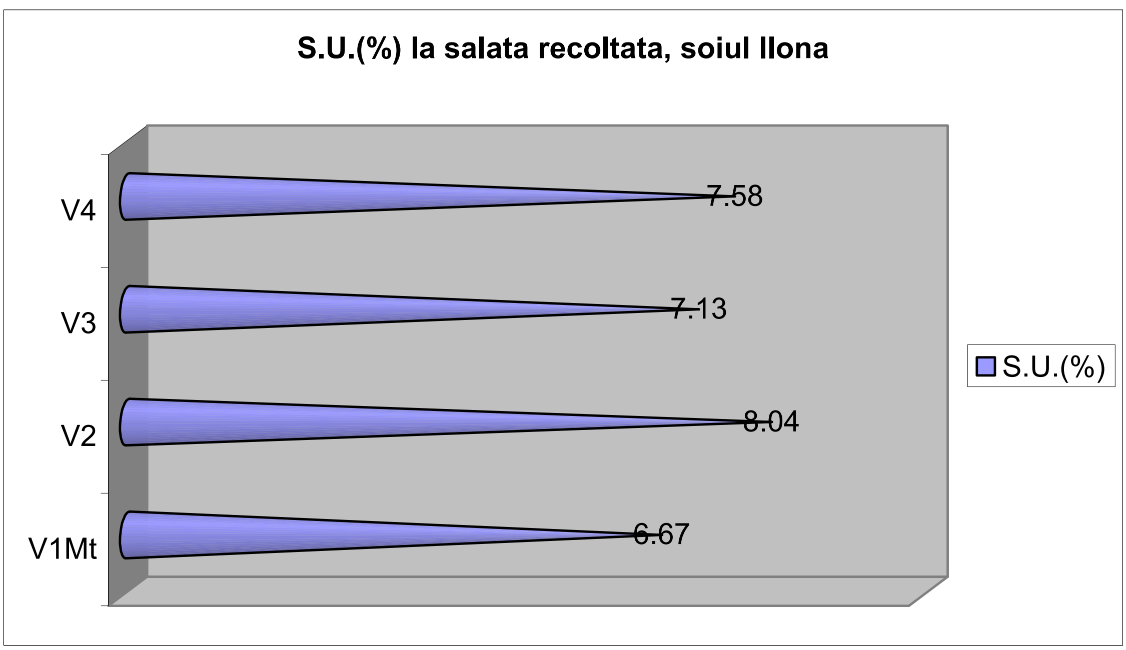


Fig. 4. s.u. (%) at the harvested lettuce, the Ilona soil

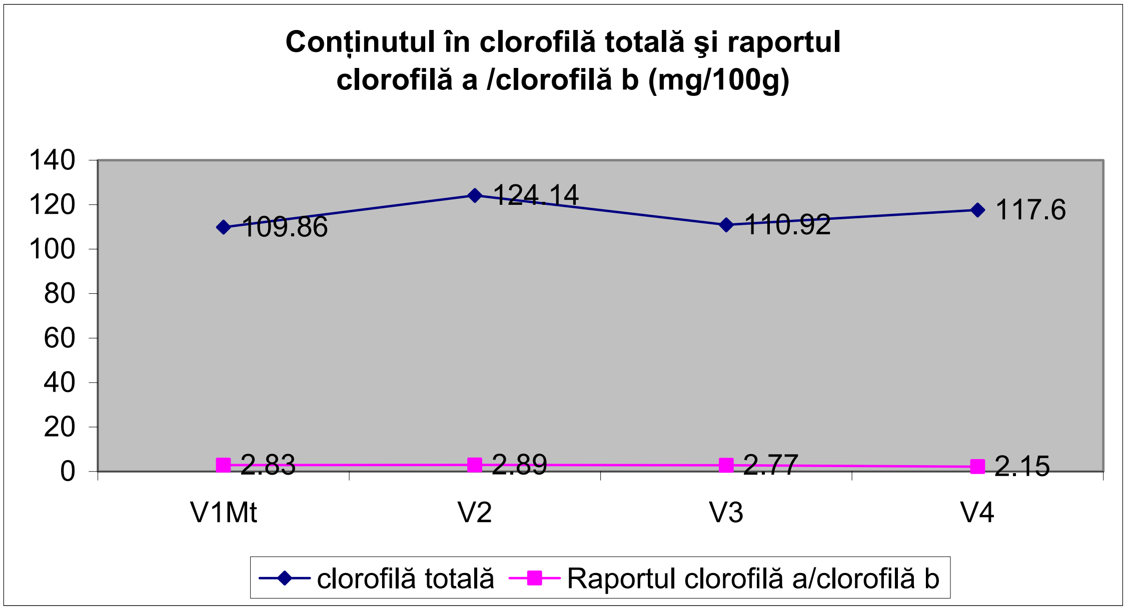
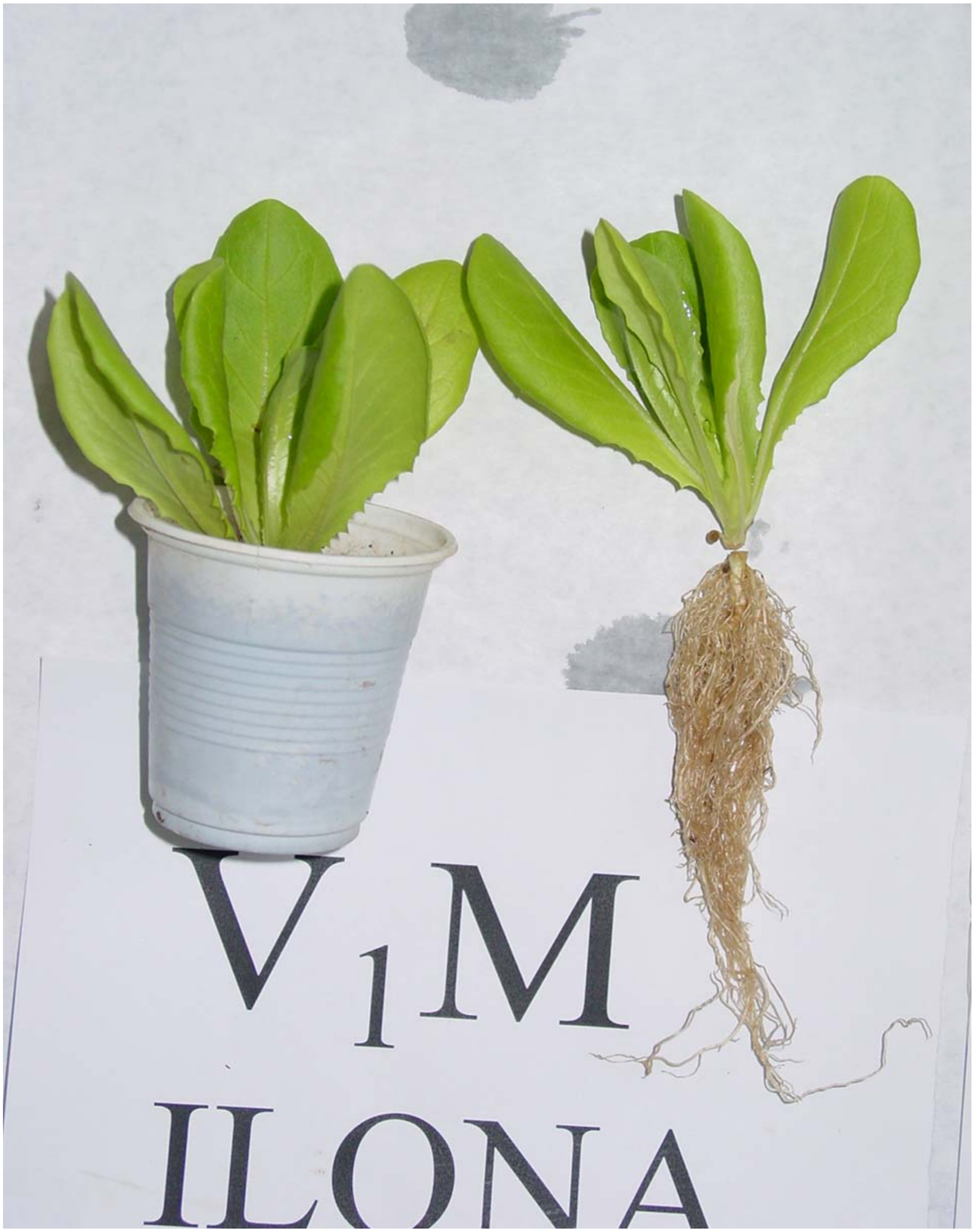
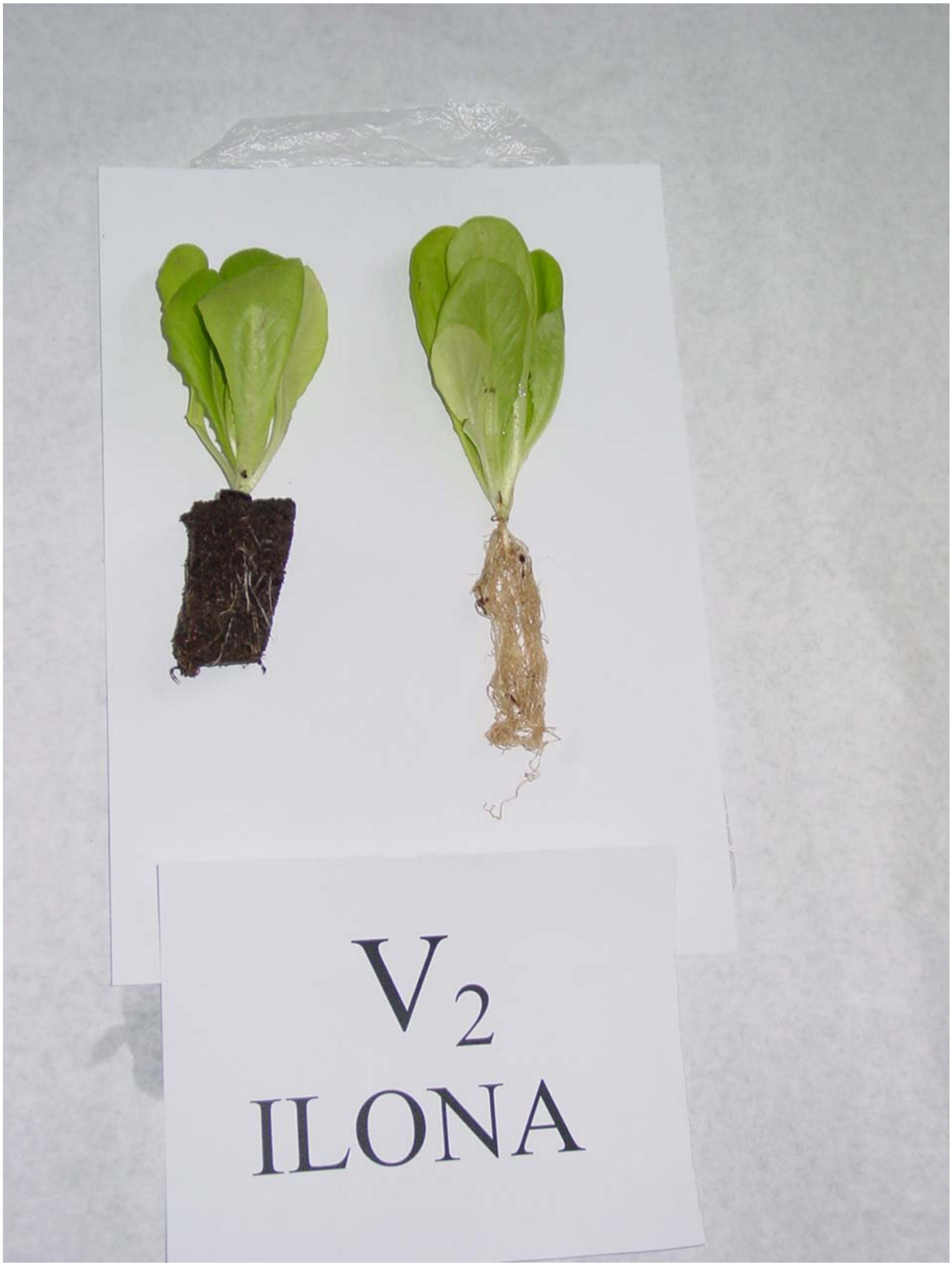
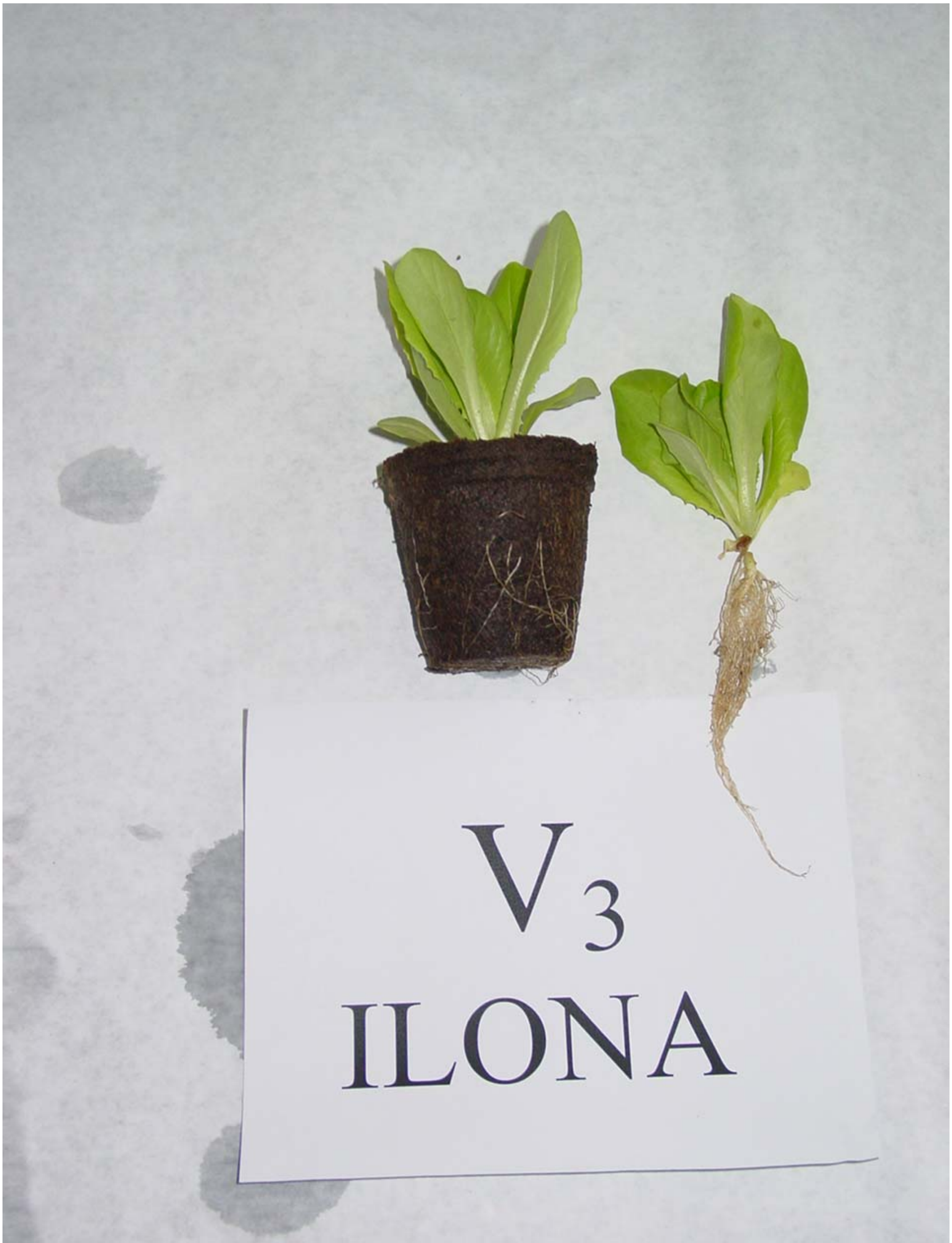


Fig. 5. Content in chlorophyll and the a chlorophyll/b chlorophyll report (mg/100g)


V1M
ILONA


V_2
ILONA


V3
ILONA


V4
ILONA

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A COMPARATIVE STUDY REGARDING NITRATES ANALYZE APPLIED ON BIOLOGICAL PRODUCTS

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Keywords: biological products, vegetables, field experiments, quality

ABSTRACT

The priority for all the national organizations which take part to EU integration processes is represented by the establishment of control activities regarding the quality factors, respectively food quality, plant products quality, the presence of some potential toxically substances with high risk for consumers and environment. Among the agricultural products which must be severe controlled are the nitrates, heavy metals and pesticides.

INTRODUCTION

In Romania, the care of promoting a healthy diet increased the local production of biological products to million euro businesses, representing significant investments in farms, supermarkets, restaurants. Recent studies of Romanian Academy confirmed the two million annual sells of biological agricultural products, which mean almost 1% from total agricultural market. Thus, over 95% of biological vegetables and cereals harvested in Romania are exported to Germany, Switzerland, Netherlands and Italy. Annual export sells exceeds 10-15 millions euro.

In Romania are 10000 manufacturers of biological agricultural products, represented in majority by farms and familial associations of small size. Romanian legislation in the field is whole harmonized with European legislation, respectively with Council Regulations (CEE) no. 2092/91 regarding the biological production of agricultural products. Once this concept is adopted, the control of both "eco" producers and products is required. Consequently, our country assumed a series of laws which distinguish the biological production and the content in some elements and toxically compounds into the final products. The most recent laws are: Urgency Ordnance no. 34 from April 17, 2000, which refer to the biological characteristics of production, Romanian Government Decision no. 1 from January 3, 2002, which presents the security and quality conditions for fresh vegetables intended for human consumption and Order no. 721 from September 26, 2003, regarding the import and export of biological agricultural products. The join of our country to European Community in 2007 claim the application of these orders and decisions.

The priority for all the national organizations which take part to EU integration processes is represented by the establishment of control activities regarding the quality factors, respectively food quality, plant products quality, the presence of some potential toxically substances with high risk for consumers and environment. Among the agricultural products which must be severe controlled are the nitrates, heavy metals and pesticides.

MATERIALS AND METHODS

Experiences take place into a farm from Potlogi Township, Dambovita. The place selected for experiments was a special one, designated for biological cultures, in which the soil was not fertilized for 5 years and no pesticides were used for pest control in the previous cultures. The experiences were started with two vegetables crops: onion and carrot. Organic fertilizers like semi-fermented cow manure and dry chicken manure were applied, in accordance with the biological cultures requirements. These were used in different doses: 40, 60 and 80 t/ cow manure and 20, 30 and 40 t/ chicken manure. The soil involved into the biological cultures was analyzed, as Urgency Ordnance no. 34 from April 17, 2000 establish. Therefore, the main agrochemical indicators were determined – pH, soluble salts and macronutrients. The results (table 1) showed that the soils were supplied middle and poor with nitrogen, poor with phosphorus and middle with potassium.

Both content of heavy metals and pesticides in soils were analyzed in order to establish their convenience for biological culture (table 2)

The content of heavy metals of Potlogi soil was normal, considering their limits into the soils in our country: Cu 50 ppm, Zn 100-300 ppm, Pb 20 ppm and Cd 3-5 ppm. The soil was regarded as appropriate for biological agriculture taking into account its content of pesticides, which is very low.

In order to test the proposed methods, it was experimented in culture Diamant, a cultivar of onion and Nantes, a cultivar of carrot.

Nitrates were determined to certificate the conformity of products obtained from the two cultures. For this, the samples were analyzed using two methods: STAS 11581 -83 method and the extraction method using acetic acid 2% and AFDS dosage and other two methods proposed for investigation to establish the fastest and easiest method to control and certificate the quality. Hence, first method combined the nitrates extraction using STAS method and their dosage with Griess reactive or with AFDS, for comparison. The second method proposed the nitrates extraction with acetic acid 2%, and then their dosage with Griess reactive versus AFDS reactive, for comparison.

RESULTS AND DISCUSSIONS

The results presenting the nitrates content of both onion and carrot samples, collected at harvest stage for consume are presented in table 3 and 4.

The accuracy of dosage methods can be tested by percent calculations of differences among the nitrates values of samples, these being accepted to 3%.

From a preliminary view, the differences involving the results of analysis performed using STAS and ICPA methods (table 3, 4) were between 0.11 and 4.5%. The results were approximately similar for 12 samples, respectively 82.14%, in which the difference between the values was below 3%. For 17.85% of the samples, the difference between the values was bigger then 3% and appeared for the smallest values of nitrates. Generally, bigger values of nitrates were remarked when ICPA extraction, using acetic acid 2% was used, comparing with STAS method, which use slighter concentrations of 0.136% acetic acid.

In order to elucidate if these differences were coming from dosage, for the same extraction, the nitrate ion dosage was made with Griess reactive and AFDS reactive (fig. 1).

The values were nearly close when the nitrates were extracted using the STAS method (fig. 2 and 3). For 4 samples, respectively at 1, 2, 5 and 7, with a low content of nitrates, differences greater then 3% were found. For the rest of the samples these differences were below 3%, value accepted by the methodology. So, in the case of STAS extraction, the dosage method did not create dissimilarities from analytical point of view. Consequently, the dosage using Griess reactive, which contain α- naphthylamine, a carcinogenic compound, may be substituted with AFDS reactive (phenoldisulphonic acid), which is safe for the health of analyst.

The analysis of data obtained after the nitrates extraction with acetic acid 2% (ICPA method) showed that all differences between the two dosage methods were positive or negative, but in accordance with the limit of 3%.

The certification of analysis methods showed that for nitrates determination in biological vegetables is completely necessary to apply ICPA method, which is easy to achieve, fast and without high variations among the values obtained.

Analyzing the values of nitrates obtained by the two methods with the admissible limits for nitrates in biological vegetables established by Order no.1 from January 3, 2002, of National Authority for Consumers Security, one can remark nitrates values no more than 400mg/kg in carrots and 80 mg/kg in onion for the two periods of harvesting. These values obtained for these two vegetable crops confirm the biological quality of those, which is in accordance with the quality required by the European Community.

Heavy metals (Cu, Zn, Pb, and Cd) are another toxically compounds which can occur into the biological vegetables and for this reason their content is supervised by the National Authority for Consumers Security (tables 5, 6).

The analysis of total forms of these elements showed normal levels in onion and carrot samples. The values of copper in onion samples were between 3.7 and 4.6 ppm, comparing with the acceptable limit of 5 ppm Cu. The content in Zn of studied vegetables was varied between 9.3 and 11.2 ppm comparing with the limit of 15 ppm. Lead and cadmium values were undetectable into the samples. The maximum acceptable limits for these elements recommended by the Order no.1 from the 3rd of January 2002 regarding the security requirements for fresh vegetables and fruits designated to human consume are 0.1 ppm for Cd and 5 ppm for Pb.

Cu and Zn are trace elements indispensable for plant growth and development, but in excess they accumulate in plants pollute them. Thus, it is essential to control their presence into the plants that are consumed by humans. Quality certification of products means the analysis of vegetable from the point of view of different components and toxically elements.

CONCLUSIONS

1. STAS 11581/83 method is a laborious method which uses many particular reactive. The method of nitrates dosage is indirect, implying first the reduction of nitrites to nitrates and then the dosage with Griess reactive.
2. For dosage are required some toxically, carcinogen reactive as α- naphthylamine, cadmium and cadmium sulphate, zinc, substances that involve particular management and multiple authorizations.
3. ICPA method for nitrates dosage is simpler and use common reactive, which do not necessitate supervision for their manipulation.
4. Analyzing the extraction methods and the results obtained during 3 years of studies, we observed that the extraction using water is the most suitable, because the other methods remove more nitrogen and offer bigger values.
5. Comparing the two methods for nitrates dosage, we remarked the fact that the easiest and, in the same time, direct method, with constant values and greater accuracy is that using AFDS reactive.
6. The dosage using Griess reactive is an indirect method and for this reason analytical errors may occur.

ACKNOLEDGEMENTS

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Table 1. Agrochemical indicators of the soils

Variant	pH	Soluble salts,%	Content, ppm			
			$N\text{-}NH_4^+$	$N\text{-}NO_3^-$	$P\text{-}PO_4^{3-}$	K^+
Control	7,73	0,053	4,0	3,5	17,7	125
V1-40t/ha *	7,23	0,088	2,75	22,75	12,8	150
V2-60t/ha *	6,90	0,105	trace	25,75	15,0	190
V3-80t/ha *	7,42	0,081	13,75	14,0	14,8	145
V4 -20t/ha **	7,80	0,062	2,0	2,0	4,8	120
V5-30t/ha **	7,71	0,059	4,0	10,0	16,6	130
V6-40t/ha **	7,57	0,065	2,25	17,0	18,6	150

*cow manure
**chicken manure

Table 2. Heavy metals and pesticides analysis

Specification	Heavy metal content, ppm				Pesticide content, µg/kg	
	Cu	Zn	Pb	Cd	DDT	HCH
Potlogi soil	22,74	83,7	8,2	0,27	0,0001	0,0002

Table 3. Nitrates analysis for onion – Diamant cultivar 30.07.2006

Variant	STAS Extraction		ICPA Extraction	
	Griess Dosage	AFDS Dosage	Griess Dosage	AFDS Dosage
Control	36,2	37,3	52,5	57,6
V1	60,3	59,7	65,9	66,2
V2	61,2	62,3	63,5	63,3
V3	52,5	53,4	67,2	67,7
V4	54,6	55,6	68,5	68,8
V5	116	117	65,7	65,5
V6	117	120	70,0	71,0

Table 4. Nitrates analysis for carrot - Nantes cultivar 13.07.2006

Variant	STAS Extraction		ICPA Extraction	
	Griess Dosage	AFDS Dosage	Griess Dosage	AFDS Dosage
Control	201	199	221	223,2
V1	210	211	279	275,7
V2	214	213	360	355,8
V3	208	210	278	281,3
V4	213	215	220	224,7
V5	215	213	256	261,2
V6	222	225	293	288,7

Table 5. The analysis of heavy metals in onion – Diamant cultivar 30.07.2006

Variant	Content, ppm			
	Cu	Zn	Pb	Cd
Control	10,5	25,6	-	-
V1	10,7	20,3	trace	-
V2	10	24,5	-	-
V3	9,6	21,3	-	-
V4	9,8	22,7	trace	-
V5	10,2	24,3	-	-
V6	8,7	22,5	trace	-

Table 6. The analysis of heavy metals in carrot – Nantes cultivar 13.07.2006

Variant	Content, ppm			
	Cu	Zn	Pb	Cd
Control	4,2	11,2	trace	-
V1	3,7	10,9	-	-
V2	4,6	10,3	-	-
V3	3,9	9,6	-	-
V4	4,1	11,2	-	-
V5	3,8	9,3	-	-
V6	4,2	10,6	trace	-

Fig. 1. Procentual variation of nitrates using the two extraction methods

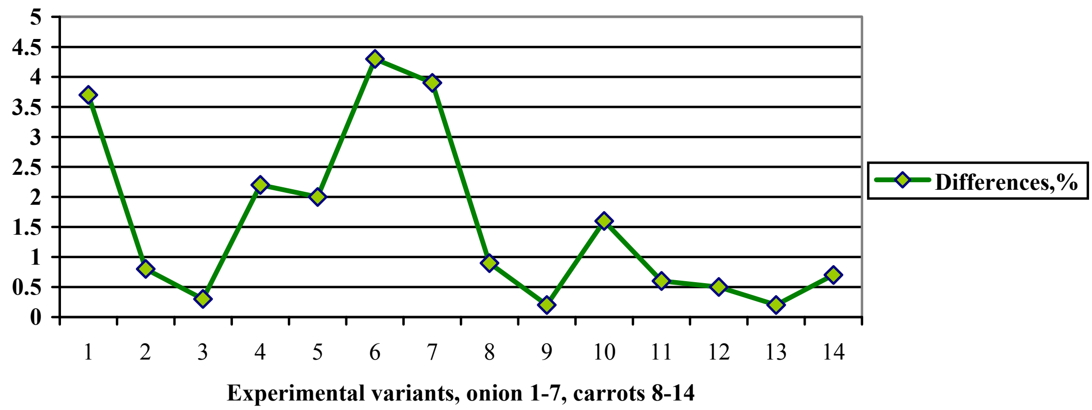


Fig. 2. The procentual differences of nitrates obtained from STAS extraction and determined with Griess si AFDS reactives

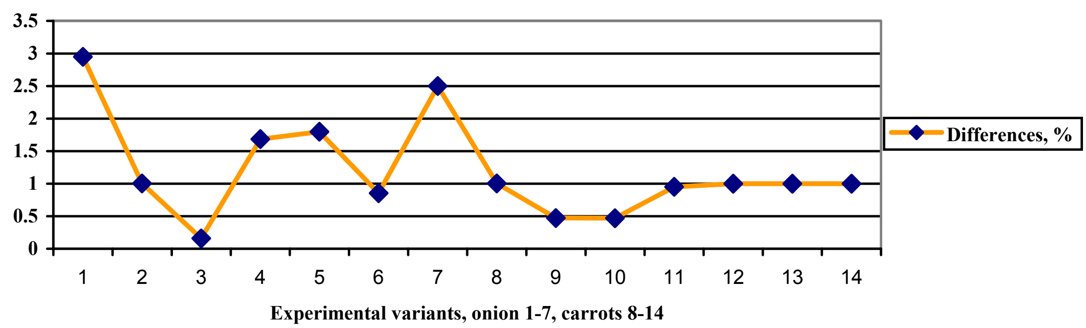
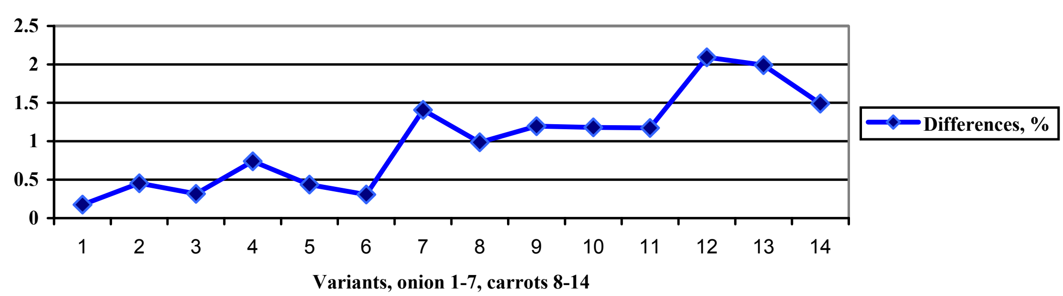


Fig. 3. Nitrates procentual differences obtained with acetic acid extraction and determined with Griess si AFDS reactives



Lucrări ştiinţifice U.S.A.M.V.B., Seria B, Vol. XLIX, 2006

ORNAMENTAL PLANTS & LANDSCAPE ARCHITECTURE

PRELIMINARY RESULTS REGARDING THE GROWING AND BLOSSOMING OF THE *JASMINUM* SP IN DIFFERENT SUBSTRATES

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Keywords: substrates, cuttings, blossom, grow

ABSTRACT

The study aim to surprise the influence of different types of substrates upon the growing and blossom of *Jasminum* sp. The main compounds of the substrates were white peat, red peat, lawn soil and perlit. Also it was tested in different percentages the marc of grapes added to the control substrate. The marc of grapes presence in the substrate induced a decrease of the plants high and a lower number of ramifications. Regarding the blossoming of the plants, it was establishes the phenophase periods and the blossoming wave.

INTRODUCTION

Jasminum is a very large appreciated flower and has many uses. Generally, the jasmine plants are decorating with all the flower's parts but the centre of the attraction is the flower and its incredible scent. Most people, who see the flower for the first time, instantly fall in love with its perfume and elegant shape.

MATERIALS AND METHODS

The experiment was carried out in the frame of the Floriculture Department of the Horticulture Faculty, Bucharest. The biological material was represented by *Jasminum*. The rooted cuttings previous obtained were replanted in 10 cm pots on July 7th, 2007 (fig. 1), the substrates used being composed by different mixture in distinct proportions: white peat, red peat, lawn soil and perlite. Thus, it results the first experimental variants (table 1). Another part of cuttings was transplanted also in 10 cm pots, but in the the control substrate was added marc of grapes in different amounts (fig.2,3) and from different years.

It were made a several observation and measures regarding the high of the plants, the number and the length of the primary and secondary ramifications, the number of leaves, leaflets, all in dynamic. It were established the phenophases of the *Jasminum* flower development.

RESULTS AND DISCUSSIONS

Observing the plants evolution on the different substrates from the transplanting moment (July 7th, 2006) to present, we note an evident influence on the vegetative growth and blossoming. The presence of the marc of grapes in the substrates induced a decrease of the plants vigour and a lower number of the leaves, but the number and the length of the ramifications were similar to the other substrates (table 3).

V1a variant recorded the highest grows. The biggest number of ramifications was obtained by V3a variant with 5,2 ramifications/plant, 2 primary and 3,2 secondary ramifications (at 80 days after transplantation). At the end of September, the growing rhythm decreased because of the temperature and daylight hours decrease.

Regarding the blossoming of jasmine, it was established the time of each phenophase, as follows:

- from green bud to white bud, is necessary aprox. 4 days;
- from white bud to open flower, it passed aprox 3 days;
- from open flower to faded flower, it takes aprox 2,5 days;
- the total number of days from green bud to faded flower is around 9,5 days.

First observations were made in August 21th, 2006 when almost all plants presented initiated flower buds in the top of the shoots and some plants had flowers in different stages of development. At that date, it were found a bigger open flowers at V4A and V5a variants and only few at V3a, V6a, V7a, V7A, V8A and V9A, the rest of the plants had only green and white buds (tab 4). Concerning the total number of flowers on plant, it remarks V6A variant next by V4A and V8A.

Observing the dynamic variation of the total number of flowers/plant, designate the 25th of September, as blossom wave for the substrates containing marc of grapes (table 4) (fig. 4). Analysing the flower distribution on the 4 development types (phenophases), we observe the fact that depending on variant (substrate), there are distinguished different dates of waves for each phenophase of the flowers on plant. Thus, at most of the variants, the maximum number of flowers in the green bud stage was recorded in the 28-31 August period, except the V1a, V6a, V1A, V5A and V7A variants, which registered the highest number of green buds in 7 th of September.

On August 28, it were registered 28% of total number of green buds, in August 31 – 27% and in 7 th of September – 19%, observing that in the 28-31 August period it were recorded 50% of the total number of green buds. (fig. 5).

Regarding the white buds, September 7th date remarks with 29%, except some variants which recorded the highest percentage in 25th of September (V1a, V1A) and August 31 (V3a) (fig. 6).

Concerning the presence of open flowers on the plant (fig. 7), we see that for almost variants, the 7th day of September represents the date when it were registered the biggest number of open flowers/plant. For the faded flower, the significant date was September 25th (fig. 8).

CONCLUSIONS

1. Regarding the growing of the *Jasminum*
   - the marc of grapes presence in the substrate induced the high decrease of the plants and a lower number of ramifications
   - V1a variant (white peat:red peat:lawn soil:perlite=2:0:1:0,5) recorded the biggest growth and the V3a variant (white peat:red peat:lawn soil:perlite=0:1:1:0,5) obtained the biggest ramification number
   - At the end of September, the growing rhythm was slowed down.
2. Regarding the blossoming of *Jasminum:*
   - It was established the phenophases periods:
     - from green bud to white bud, is necessary aprox. 4 days;
     - from white bud tu open flower, it passed aprox 3 days;
     - from open flower to faded flower, it takes aprox 2,5 days;
     - the total number of days from green bud to faded flower is around 9,5 days.
   - The blossoming wave was recorded in:
     - September 16th – for the substrates with marc of grapes;

- September 25 th – for the substrates without marc of grapes;
- the highest number of green buds was recorded in 28-31 August period; the highest number of white buds and open flowers was recorded in September 7th, the highest number of faded flowers was recorded in September 25th.

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Table 1

Experimental variants - diferent mixture of substrates

Substrate component	V1a	V2a	V3a	V4a	V5a	V6a	V7a	V8a (C)
White peat	1	1	-	1	-	2	-	1
Red peat	1	-	1	-	1	-	2	1
Lawn soil	-	1	1	2	2	1	1	1
Perlite	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5

Table 2

Experimental variants - rooting substrates with added marc of grapes

Marc of grapes	V1A	V2A	V3A	V4A	V5A	V6A	V7A	V8A	V9A	V10A (C)
2003	10%	25%	50%							
2004				10%	25%	50%				
2005							10%	25%	50%	

Fig. 1. *Jasminum* cuttings transplanted in 10 cm pots – 7.07.2006

Fig. 2. Rooting substrates with added marc of grapes from 2003 in different proportions

Fig. 3. Rooting substrates with added marc of grapes in different proportions

Table 3

The *Jasminum* plants growing at 89 days after transplantation (October 4, 2006)

Variant	Height (cm)	Ramifications (no)			Ramifications length (cm)			Leaves (no)	Leaflets (no)
		primary	secondary	Total	primary	secondary	Total		
V1 a	43,2	2,8	1,6	4,4	20,0	24,0	44,0	19,6	47,4
V2 a	36,8	3,4	1,2	4,6	15,8	13,0	28,8	16,4	36,8
V3 a	32,0	2,0	3,2	5,2	13,0	13,2	26,2	14,6	34,8
V4 a	32,2	3,0	1,8	4,8	14,2	13,0	27,2	16,0	33,0
V5 a	41,2	2,4	2,4	4,8	15,2	10,8	26,0	18,2	43,2
V6 a	25,8	2,6	0,4	3,0	11,4	9,0	20,4	12,6	32,6
V7 a	25,0	2,8	0,8	3,6	14,4	6,0	20,4	13,8	38,0
V8 a	24,2	2,8	1,0	3,8	14,4	5,0	19,4	13,0	37,4
X	**32,55**	**2,73**	**1,55**	**4,28**	**14,80**	**11,75**	**26,55**	**15,53**	**37,90**
V1 A	24,2	2,8	0	2,8	16,6	0	16,6	11,2	29,8
V2 A	23,8	2,0	1,8	3,8	13,2	10,8	24,0	13,4	35,0
V3 A	20,0	2,8	0,8	3,6	11,8	8,6	20,4	12,0	34,8
V4 A	24,4	2,6	1,4	4,0	13,0	13,6	26,6	9,8	27,8
V5 A	30,4	3,2	0,4	3,6	15,0	6,4	21,4	10,6	32,6
V6 A	19,8	3,8	0,4	4,2	12,4	5,6	18,0	10,8	28,4
V7 A	25,8	2,0	2,2	4,2	13,8	9,0	22,8	14,2	43,6
V8 A	22,0	2,4	1,6	4,0	9,6	9,6	19,2	10,2	29,6
V9 A	23,6	2,2	1,4	3,6	9,6	8,4	18,0	8,4	22,0
V10 A	34,0	3,0	0,6	3,6	12,2	8,4	20,6	13,0	28,4
X	**24,80**	**2,68**	**1,06**	**3,74**	**12,72**	**8,04**	**20,76**	**11,36**	**31,20**

Table 4

The dynamic variation of the total number of flowers/plant depending on substrate type

Variant	Observation date						
	Aug 21	Aug 28	Aug 31	Sep 7	Sep 16	Sep 25	Oct 4
V1a	0	0	0	2,8	3,8	6,6	0,4
V2a	0,9	1,8	1,8	4,4	5,8	8,4	0,4
V3a	2,6	5,2	6,4	8,8	12	13	0,4
V4a	0,8	1,6	1,8	3,8	3,2	5,6	0,4
V5a	2,7	5,4	5	13,2	13,6	15,4	0,2
V6a	2,1	4,2	6,4	16,6	13,2	18,8	0,2
V7a	2	4	5,4	9,2	15	17	0,2
V8a	1,8	3,6	5	7,2	10,4	11,48	0
V1A	1,6	3,2	4	6,4	12,2	12,2	1,4
V2A	1,9	3,8	4,6	6,4	9,6	8,4	1
V3A	2,6	5,2	5,6	10,8	12,4	12,4	0
V4A	2,9	5,8	5	12,2	11,8	14,8	0,6
V5A	0,9	1,8	0,8	3,8	3,4	5,2	0,4
V6A	3,1	6,2	6,6	10,8	12,8	12,6	0,6
V7A	2,6	5,2	6,6	12,4	15	12,8	0,2
V8A	2,8	5,6	6	8,8	8,8	6,8	0,4
V9A	2,1	4,2	4,8	7,8	10	7,4	0,2
V10A	2,3	4,6	4,4	11,4	10,4	8	0,2

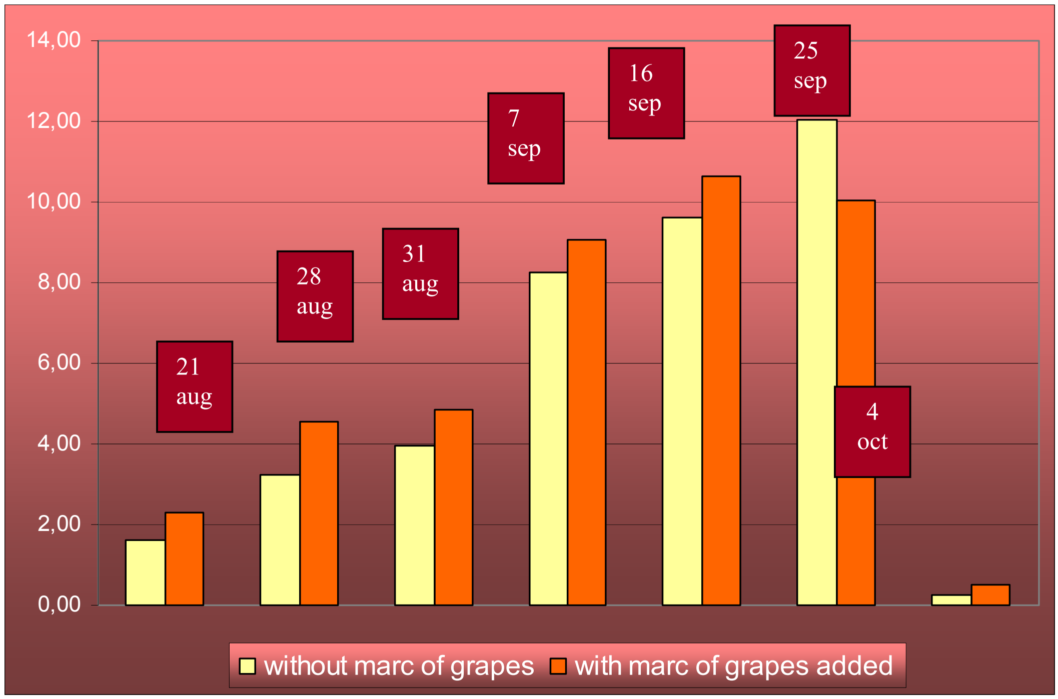

Fig. 4 The dynamic variation of the total number of flowers/plant depending on substrate type

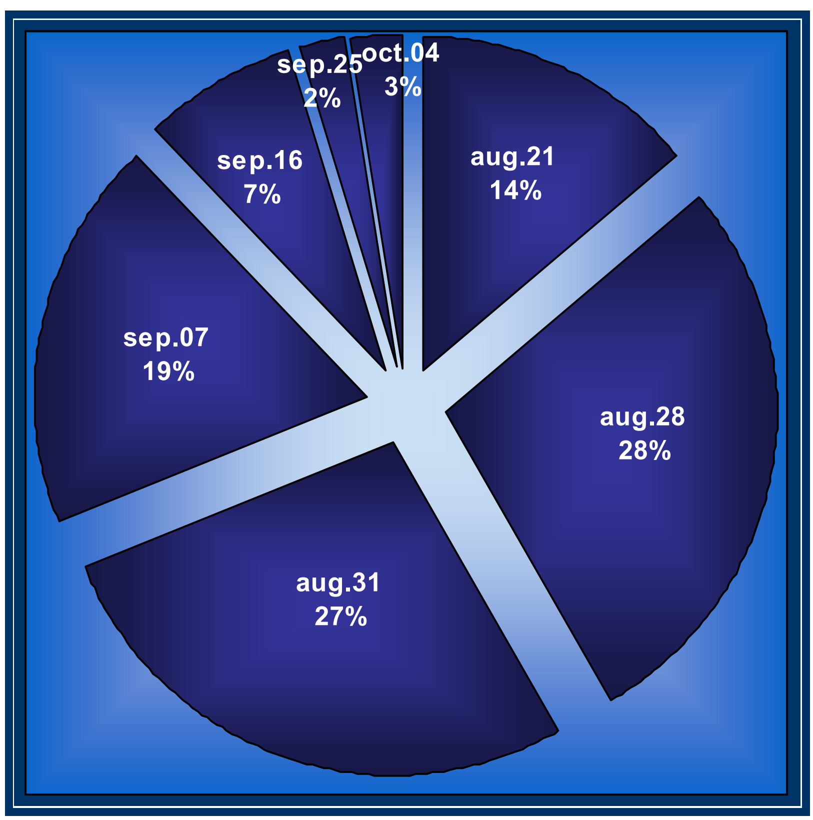

Fig. 5 The percentage of the green buds in different dates of observation

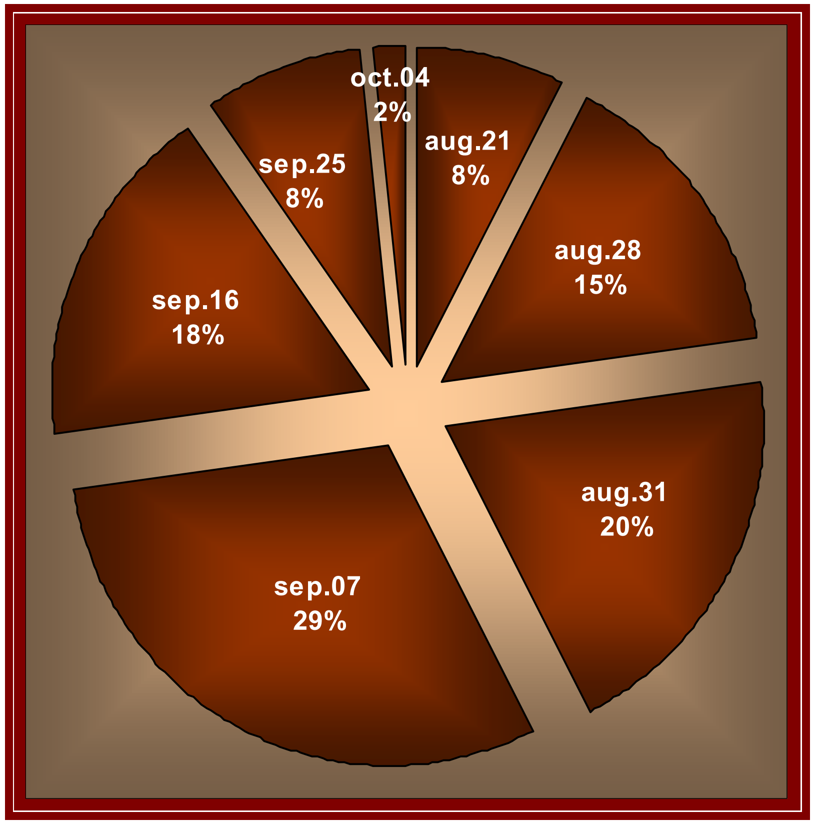

Fig. 6 The percentage of the white buds in different dates of observation

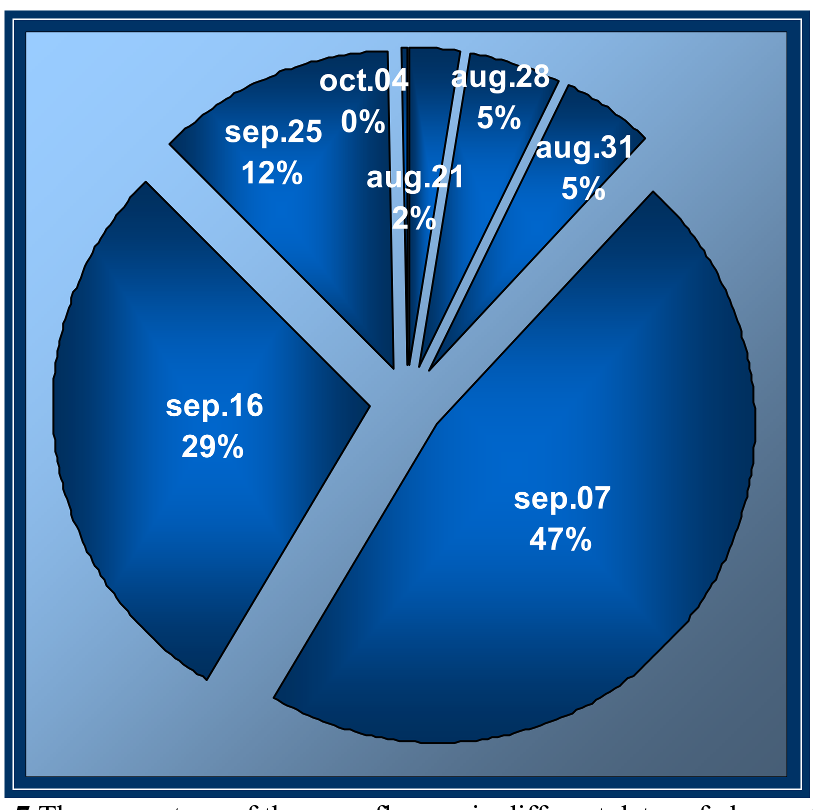

Fig. 7 The percentage of the open flowers in different dates of observation

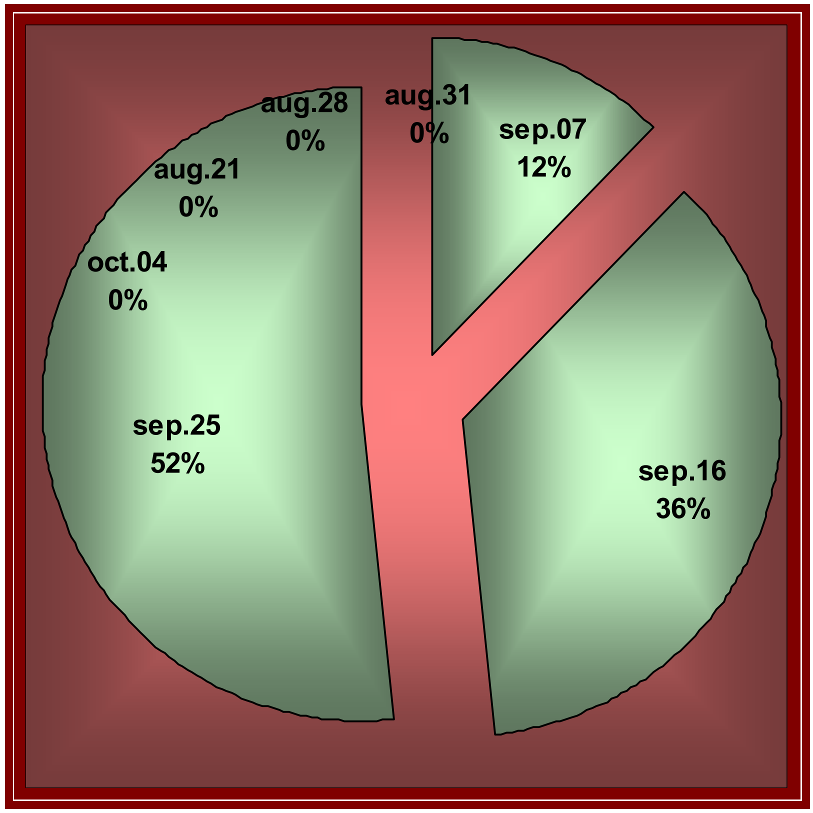

Fig. 8 The percentage of the faded flowers in different dates of observation

Fig. 9 *Jasminum* – initiated floral buds and green buds (August 31)

Fig. 10 *Jasminum* – flowers în white buds phenophase (Septembrie 4, 2006)

Fig. 11 *Jasminum* blossom wave (Septembrie 7, 2006)

Fig. 12 Faded and dropped flowers (Octomber 1, 2006)

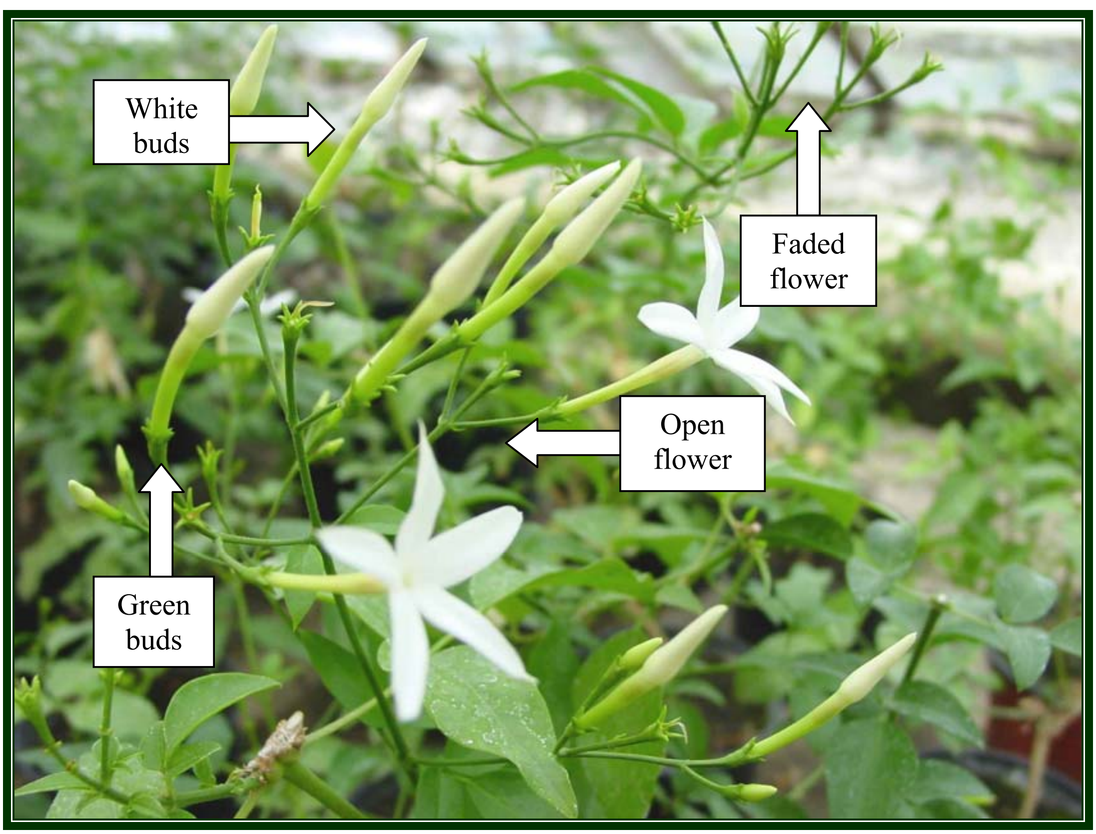

Fig. 13 *Jasminum*– different phenophases of flowers

Lucrări ştiinţifice U.S.A.M.V.B., Seria B, Vol. XLIX, 2006

PRELIMINARY RESULTS REGARDING THE GROWING AND BLOSSOMING OF THE *MURRAYA EXOTICA* L. IN DIFFERENT SUBSTRATES

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Keywords: substrates, flower phenophase, blossom, grow

ABSTRACT

In the present study we propose to register the influence of different types of substrates upon the growing and blossom of *Murraya exotica* L. The main compounds of the substrates were white peat, red peat, lawn soil and perlit. Also it was tested in different percentages the marc of grapes added to the control substrate. The marc of grapes presence in the substrate induced a decrease of the plants high and a lower number of ramifications. Regarding the blossoming of the plants, it was establishes the phenophase periods and the blossoming wave.

INTRODUCTION

Originary from India and Malaesia, *Murraya exotica* L. (Rutaceae) is a branch outed shrubby pot plant with beautiful and fragrance white flowers, very appreciated for interior decoration (decorate through all plant parts). The main objectives are to develop in shortest time, plants with optimal size and bunch of flowers, eventually with colour fruits. For this reason it is necessary to initiate studies regarding the growing and blossoming process, the substrate of culture influence them by composition.

MATERIALS AND METHODS

The experiment was carried out in the frame of the Floriculture Department of the Horticulture Faculty, Bucharest. The biological material was represented by *Murraya exotica* L.

The plants were obtained from seeds in 2005. It were used fruits which had been sown in March, full emerged in July and moved in 10 cm pots in September in a substrate composed by peat, leaf soil, manure and perlite. This year, in July the plants were removed in 13 cm pots (fig.1), the substrates used being composed by different mixture in distinct proportion: white peat, red peat, lawn soli and perlite. Thus, it comes the first experimental variants. Another part of the plants was transplanted also in 13 cm pots, but in the control substrate was added marc of grapes in different amounts (fig.2)

During the experiment, it were made several observations and measures regarding the high of the plants, the number of the primary and secondary ramifications, the number of leaves, leaflets, all in dynamic. Also, it were established the phenophases of the flowers development. This was made by the weight of the most important flower development category, being collected dates and observations in a variable period of time depending on their evolution.

RESULTS AND DISCUSSIONS

Following the plants evolutions on different substrates from the transplanting moments (July 7, 2006) to present, we note an evident influence upon the vegetative growth and blossoming. The presence of the marc of grapes in the substrates induced a decrease of the vigour and a lower number of ramifications (table 3). V3a variant, recorded the highest grows. The highest number of ramifications was obtained by V1a, with 5,8 ramifications/plant, 5,2 primary and 0,6 secondary (at 14 weeks after transplantation). During the summer and autumn season, the growth rhythm was relatively constant and unimportant, the differences between the variants been only in few cm.

Regarding the blossoming of *Murraya exotica* L., it was established the time of each phenophase (fig 9ABC), as follows:

- from green bud to white bud, there are necessary aprox 2 days;
- from white bud to open flower, it passed aprox 0,5–1 days;
- from open flower to faded flower, it takes aprox 2 days;
- the total number of days from green bud to faded flower is around 5 days;
- from the faded flower to the spring of the green fruit it passes aprox 7,5 days.

Observing the dynamic variation of the total number of flower/plant, the September 7th is designate as blossom wave for both substrates (table 4, fig 3).

Looking at the flowers distribution – with four development stage (phenophase) - we noted for each different domination dates correlated with the level of flower development/plant.

Thus, at most of the variants, the maximum number of flowers in the green stage was recorded in 28-31 August period, when in both dates, in average it were recorded 36% of the total number of green buds (fig. 5). Regarding the white buds/plants (fig. 6), it were registered a significant presence in September 4th (36%) and analysing the dates for the open flowers, the September 4th and September 7th remarks with the most open flower/plants (fig. 7). The same conclusion concerning the faded flowers phenophase (fig. 8).

CONCLUSIONS

1. Regarding the growing of the Murraya exotica L. plants:
   - the marc of grapes presence in the substrate induced a decrease of the plants high and a lower number of ramifications;
   - V3a variant (white peat:red peat:lawn soil:perlit = 0:1:1:0,5) recorded the biggest growth;
   - V1a variant (white peat:red peat:lawn soil:perlit = 2:0:1:0,5) obtained the biggest ramifications;
2. Regarding the blossoming of Murraya exotica L.
   - It was establishes the phenophase periods:
     - from green bud to white bud, there are necessary aprox 2 days;
     - from white bud to open flower, it passed aprox 0,5–1 days;
     - from open flower to faded flower, it takes aprox 2 days;
     - the total number of days from green bud to faded flower is around 5 days;
     - from the faded flower to the spring of the green fruit it passes aprox 7,5 days.
   - The blossoming wave was recorded in September 4th:
     - the highest number of green buds was recorded 28-31 August period;
     - the highest number of white buds was recorded in September 4th;
     - the highest number of the open flowers was recorded in 4-7 September period;
     - the highest number of faded flowers was recorded in September 7th.

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Table 1

Experimental variants - diferent mixture of substrates

Substrate component	V1a	V2a	V3a	V4a	V5a	V6a	V7a	V8a (C)
White peat	1	1	-	1	-	2	-	1
Red peat	1	-	1	-	1	-	2	1
Lawn soil	-	1	1	2	2	1	1	1
Perlite	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5

Table 2

Experimental variants - rooting substrates with added marc of grapes

Marc of grapes	V1A	V2A	V3A	V4A	V5A	V6A	V7A	V8A	V9A	V10A (C)
2003	10%	25%	50%							
2004				10%	25%	50%				
2005							10%	25%	50%	

Fig. 1 *Murraya exotica* L. plants transplanted in 13 cm pots – 7.07.2006

Fig. 2 Rooting substrates with added marc of grapes in different proportions

Fig 3 *Murraya exotica* L. – blossoming wave – 7.09.2006

Table 3

The *Murraya exotica* L. plants growing at 14 weeks days after transplantation

Variant	Hight (cm)	Ramifications (no)			Nodes (no)	Leaves (no)	Leaflets (no)
		primary	secondary	Total			
V1 a	26,2	5,2	0,6	5,8	10,2	16,4	64,0
V2 a	25,2	3,0	1,2	4,0	12,0	15,4	60,4
V3 a	26,8	2,6	0,4	3,0	11,0	11,8	43,4
V4 a	23,2	4,0	0,4	4,4	8,0	12,4	42,2
V5 a	22,6	4,2	0,6	4,0	8,0	14,4	41,4
V6 a	21,0	4,6	0,4	5,0	8,8	13,6	48,6
V7 a	24,2	2,8	0,4	3,2	8,8	12,6	40,0
V8 a	23,2	3,4	0,4	3,6	8,8	10,8	37,6
X	**24,05**	**3,73**	**0,55**	**4,13**	**9,45**	**13,43**	**47,20**
V1 A	19,4	2,0	0,8	2,8	8,0	11,6	37,6
V2 A	19,2	2,4	0,8	3,2	6,8	11,2	39,8
V3 A	21,4	2,2	0,4	2,6	6,8	11,6	34,0
V4 A	20,8	2,6	0,6	3,2	9,0	10,6	35,4
V5 A	20,6	3,2	0,2	3,4	7,4	13,2	35,4
V6 A	19,2	2,8	0,2	3,0	6,6	10,8	27,8
V7 A	18,0	2,2	1,0	3,2	5,0	9,6	29,6
V8 A	22,8	2,4	0,8	3,2	6,8	12,4	35,0
V9 A	19,4	2,0	0,4	2,4	6,8	12,0	40,0
V10 A	21,6	1,8	0,2	2,0	9,0	10,4	35,6
X	**22,65**	**2,73**	**0,60**	**3,31**	**8,17**	**12,68**	**39,74**

Table 4

The dinamic variation of the total number of flowers/plant depending on the substrate

Variant	Observation date				
	28.aug	31.aug	04.sep	07.sep	11.sep
V1a	0	0	2,4	3,3	0,4
V2a	2,8	2,8	3,8	4,8	0,6
V3a	6,3	6,5	7,8	12	0,4
V4a	2,6	2,8	3,6	3,6	0,3
V5a	6,4	6,7	12,5	12,5	0,2
V6a	5,2	5,2	17,3	14,5	0,2
V7a	4	4	9,1	14,8	0
V8a	3,8	3,8	7,3	11,3	1,2
V1A	5,2	5,2	6,9	12,3	1
V2A	3,8	3,8	6,5	13,2	0
V3A	7,1	7,1	11,2	12,2	0,4
V4A	6,8	6,8	14,1	11,9	0,3
V5A	3,3	3,3	3,5	3,5	0,6
V6A	8	8	10,5	9,6	0,3
V7A	7,8	7,8	14,3	11,7	0,4
V8A	7,2	7,2	9,2	7,9	0,2
V9A	6	6	8,3	8,9	0,3
V10A	4,6	4,6	10,7	11,7	0,1

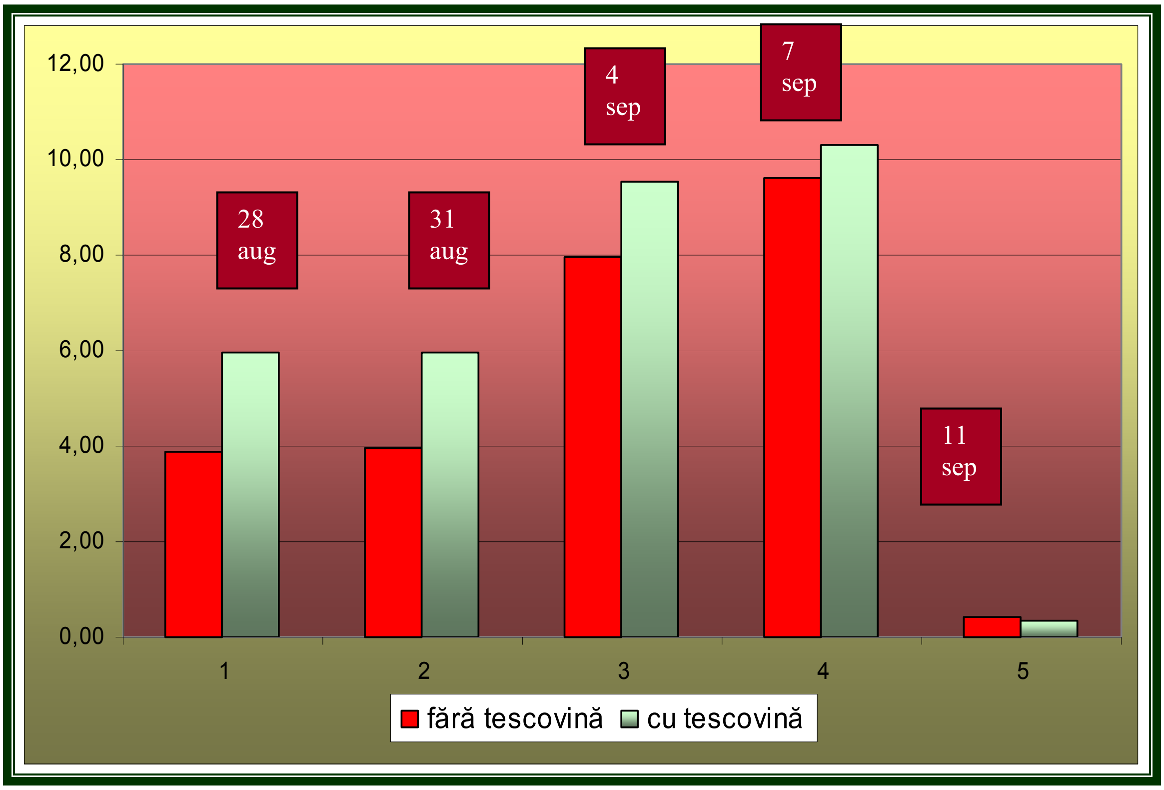


Fig. 4. The dinamic variation of the total number of flowers/plant depending on substrate

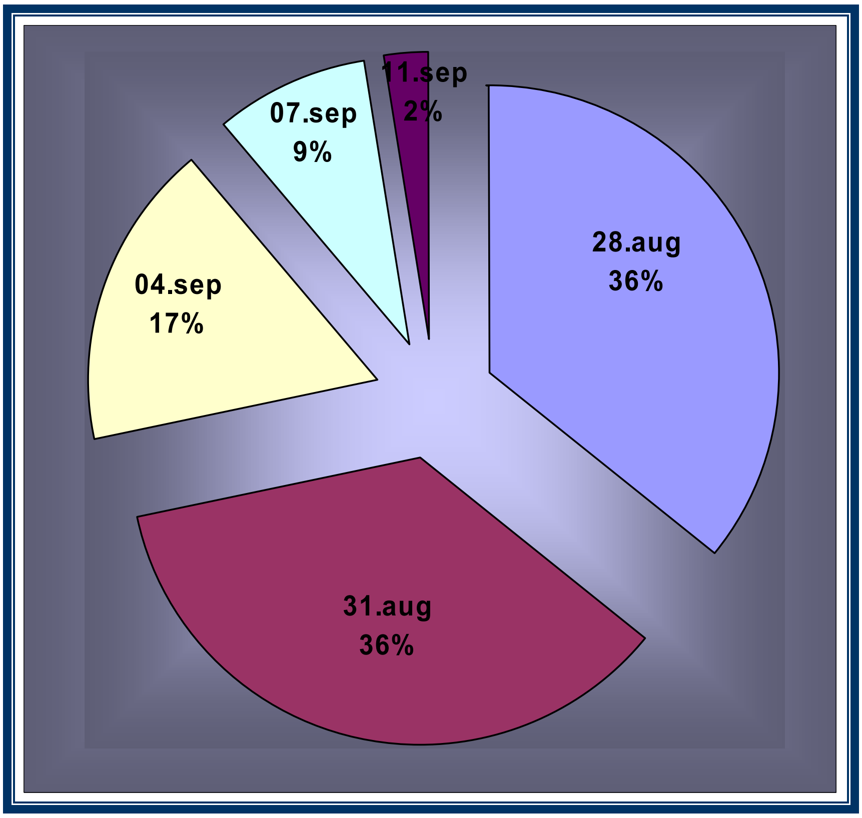


Fig. 5 The percentage of the green buds in different dates of observation

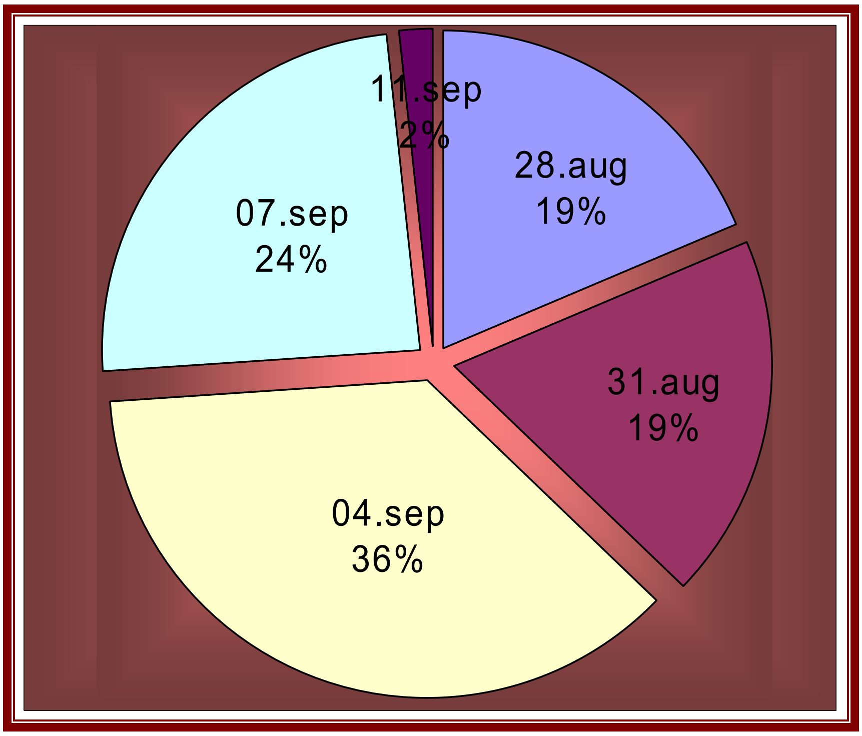


Fig. 6 The percentage of the white buds in different dates of observation

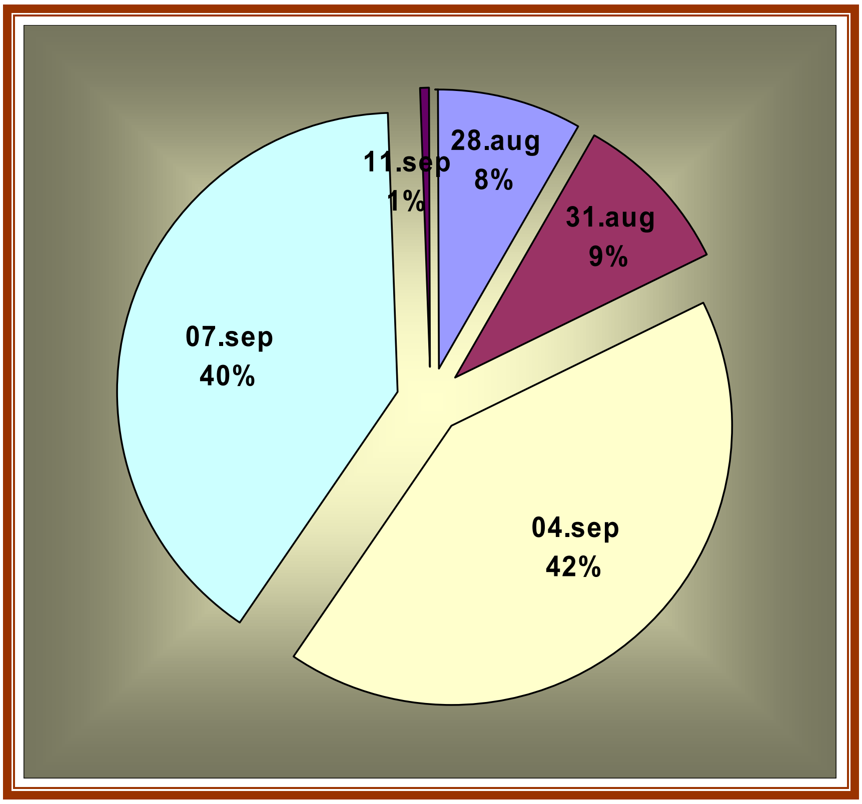


Fig. 7 The percentage of the open flowers in different dates of observation

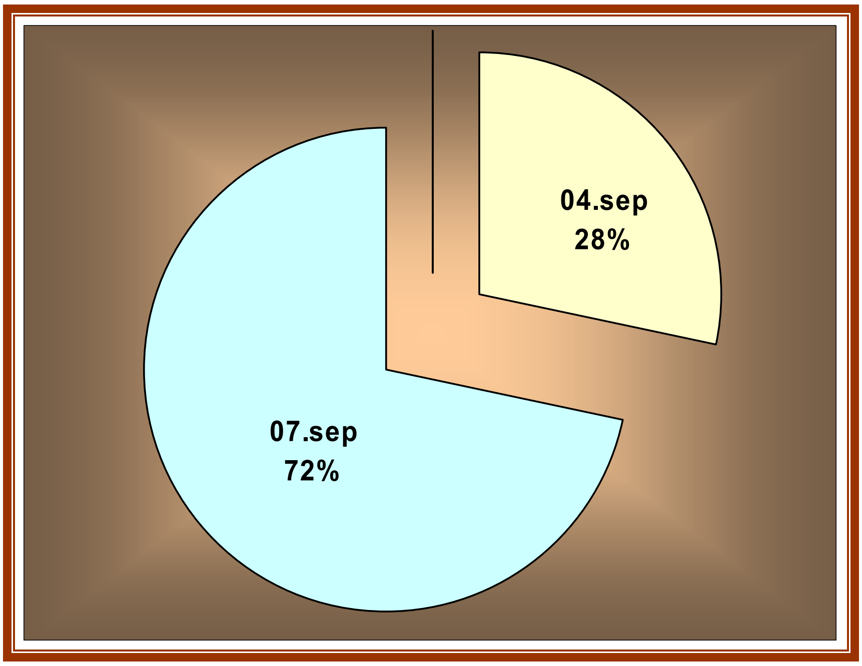
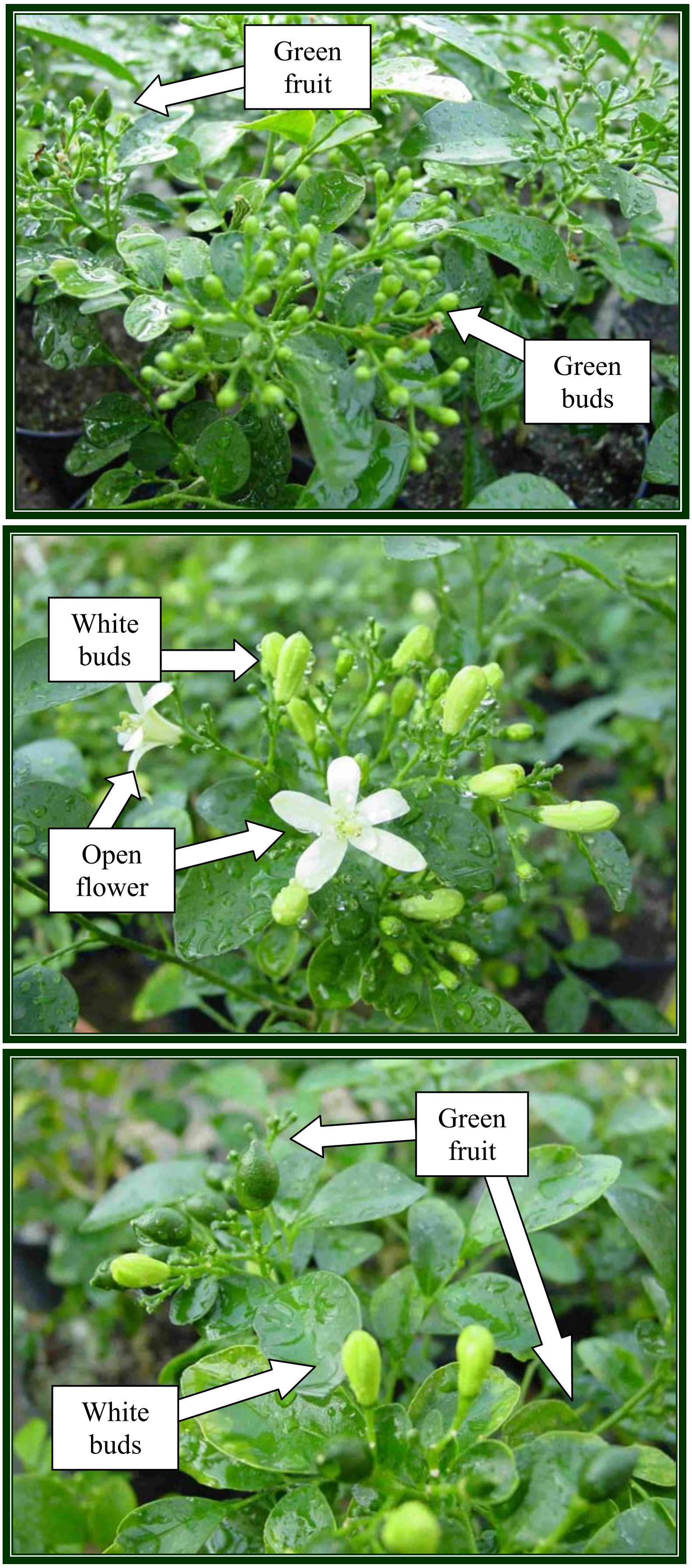


Fig. 8 The percentage of the faded flowers in different dates of observation



A

B

C

Fig. 9 A.B.C. *Murraya exotica* L. - different phenophases of flowers

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MINERAL NUTRITION OF URBAN TREES

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Keywords: broadleaf trees, traffic, pollution, air quality, plantations

ABSTRACT

Stationary factors as result of urbanization, can affect the trees and shrubs in urban areas. The stress coming from these combined with air pollution has a significant impact on the growth and development of woody plants, shortening their life-time. With the aim of study the influence of air pollution on the mineral nutrition of street trees, plant and soil samples were collected during the vegetation period from trees located in two sites with different level of pollution in Bucharest. The results showed that air quality was influenced the nutrition of three species of broadleaf trees – *Acer negundo*, *Prunus cerasifera* and *Tilia tomentosa*.

INTRODUCTION

Polluted air is one of the stress factors of the greatest importance for woody plants, because it may determine acute damages, which are immediate visible and chronic damages, which induce their decline in time. In Romania the researches concerning the resistance of autochthon dendrological species to air pollution are modest. Summary information concerning the plants requirements for air quality in cities create problems when selecting species for street plantation, exposed to pollution. Furthermore, the soils in urban areas offer a limited rooting volume and present a low fertility and a poor aeration. Hence, the influence of air pollution on the mineral nutrition of some broadleaf trees species was studied in the present work. The research considered the trees level of exposure to the air pollution and the moment of sampling and then the content of nitrogen, phosphorus and potassium in leaves and soil were measured.

MATERIALS AND METHODS

The subject of experiences was represented by three species of mature broadleaf trees - *Acer negundo*, *Prunus cerasifera* and *Tilia tomentosa* located in two sites with different level of air pollution from Bucharest – Calea Dorobanţilor and Herăstrău Park. Soil and plant samples were collected and analyzed at three critical stages of trees – beginning of vegetation (May), full growth (July) and at the end of vegetation (September). At each site all plant samples were collected from the same trees, from the median part of the shoots and soil samples were collected from the four cardinal points of each tree and then mixed to form merged samples.

In the laboratory, half of each plant sample was washed with distilled water and then dried with filter paper, and the other half remained unwashed. Unmetabolized forms of nitrogen, phosphorus and potassium were extracted with acetic acid 2% (Davidescu et al., 1984), and expressed in ppm. In order to establish the total forms of N, P, K (%) in leaves, 0.2 g of dry plant was digested in sulphuric acid and hydrogen peroxide following the methods described by Davidescu et al. (1984). The leaves total surface area and the soluble solids were determined.

Soil samples analysis involved the following parameters: pH, soluble salts content, nitrogen, phosphorus and potassium contents (soluble forms).

RESULTS AND DISCUSSIONS

Agrochemical analysis of soil samples performed in May (table 1) showed that the development of urban trees take place on alkaline soils, the pH values of the soils collected from the two sites varying between 7.30 and 7.81. The soluble salts content of soils were slightly higher for the samples resided in street plantation comparing with those from park. These differences may be explained by the impact on street soils of de-icing salts used to improve the safety of the streets during winter. Anyway, the highest value of soluble salts of 0.121% indicates a low salinity of soils.

The soils from street plantation presented higher concentration of nitrogen as nitrate and ammonium than those from park. Consequently, soil samples collected from Calea Dorobanților recorded a content of nitrogen between 21 ppm and 48.75 ppm, these values showing a good supply with this element. All the soil samples from park and street contained small quantities of phosphorus and normal quantities of potassium.

The macronutrients concentration (N, P, K) of washed and unwashed leaves of the three broadleaf species studied was different with species, site and moment of sampling.

In all the moments of analysis the unmetabolised nitrogen (fig. 1) was slightly higher in unwashed leaves of *Acer* collected from park, comparing with those from street. The highest values of $N\text{-}NO_3$ in maple leaves were recorded in May – 175 ppm at park samples and 131 ppm at street samples.

For the other two species, *Prunus* and *Tilia*, it can be remarked that in September, the values of $N\text{-}NO_3$ are very high into the leaves of Calea Dorobanților trees, comparing with those from park. The values of nitrogen in leaves were 160 ppm in park and 249 ppm in street for *Prunus,* and 90 ppm in park and 235 in street for *Tilia*. These results indicate a possible influence of air pollution on the nitrogen nutrition of *Prunus* and *Tilia*. Considering more the data, it was observed that the nitrogen concentration dropped to autumn into the leaves of park trees due to its conversion in complex compounds, phenomena which was totally reversed for the leaves of street trees, which recorded the maximum values of nitrogen in autumn. Although air pollution with nitrogen oxides represent a source for increasing the nitrogen concentration in trees leaves, van Leeuwen and Krzyzanowski (2000) showed that nitrogen accumulation is rarely reported in research studies, even if it is surely an intermediary stage. After the exposure to NO_2, nitrates can accumulate in leaves for several weeks (Leeuwen and Krzyzanowski, 2000).

Concerning the total nitrogen in leaves, one can observe high values in May, which decrease in July and September for all the species independently of site (fig.2), due to its metabolism and resorption. For street trees of *Prunus* and *Tilia* was remarked a distinct decrease of total nitrogen in leaves starting from July, which show that the leaves senescence was prematurely initiated, as a result of air pollution. Furthermore, injury symptoms as severe edge killing and leaf rolling were observed at the leaves collected from street trees in July.

The variation of total phosphorus in leaves is presented in fig. 3. The values follow the same dynamics as nitrogen. Nutrient resorption, in broadleaves species, allows leaf nutrients to be preserved rather than lost with leaf fall. This process enables plants to reuse nitrogen and phosphorus in spring to form new leaves, flowers or later to develop fruits and seeds (Wright and Westoby, 2003).

Potassium content of leaves varied among species, with a maximum value of 14200 ppm at *Prunus cerasifera*, recorded on May in both sites (fig. 4). The analysis of total potassium in leaves indicated high values in July for street trees. The highest content of total potassium was found in *Acer* leaves collected from street - 4.20%, comparing with 0.70% in leaves collected from park. Total potassium, accumulated into the leaves by the rest of street trees studied, reach a value of 2.25% for *Prunus* (comparing with 1.25% in park trees) and 1.25% for *Tilia* (comparing with 0.65% in park trees).

Potassium is involved in the regulation of water use in plant. During summer, by the reason of heating radiation of asphalt and combustion processes from vehicles, street trees are exposed to high temperatures. Thus, potassium accumulates in leaves forcing stomata to close in order to reduce the water loss by evaporation. On long-term, this reaction of plants to heat can cause the dead of leaf tissues, as it happened in July with the *Acer* leaves. Moreover, the content of dry matter recorded in July on maple leaves collected from street trees was 58.54%, comparing with 32.93% in park trees (fig. 5).

These data referring to leaves with high content of potassium and dry matter indicate an early senescence process induced by the stress factors to the leaves of street trees. Air pollution has a significant contribution to this process, because in July, the high temperatures, low humidity and lack of air flow determine a concentration of pollutants in Calea Dorobanților area.

Studying the differences between the content of nutrients in washed and unwashed leaves, one can observe a reduction of these at all species into washed leaves. So, in July a reduction of nutrients in washed leaves of 10.12 % to 66.94 % for nitrogen, 17.12 % to 57.70 % for phosphorus and 1.87 % to 27.93 % for potassium was recorded (table 2).

Differences in concentration of nitrogen and phosphorus in washed and unwashed leaves appeared as a result of their dilution into the washed leaves.

Mineral nutrition of the trees exposed to pollution was also analyzed from the point of view of the leaves size. In consequence, the correlations between surface area and the content of nutrients (N, P, K) in leaves were studied. For *Acer negundo* were identified very significant correlations between the leaves surface area and their nitrates (R=0.9226) and phosphorus (R= 0.9772) content. These correlations show that for this species the higher the leaves surface area, the higher the nitrates content and the smallest phosphorus content in leaves (fig. 6 and 7).

The leaves surface area and the content of potassium in leaves were positive correlated for *Prunus cerasifera* (R=0.6037) and negative correlated for *Tilia tomentosa* (R=0.6750). A negative very significant correlation (R=0.9206) was observed for *Tilia tomentosa* between leaves surface area and the total phosphorus content (fig.8).

CONCLUSIONS

Mineral nutrition of urban trees is influenced by the air quality. The results of this study showed that the broadleaf trees of three species - *Acer negundo*, *Prunus cerasifera* and *Tilia tomentosa*, exposed to air pollution caused by an intense traffic flow registered different values of nitrogen, phosphorus and potassium in metabolized and unmetabolized forms comparing with threes of same species from a less polluted area.

1. The higher content of nitrogen in metabolized and unmetabolized forms into the leaves of street trees of *Prunus cerasifera* and *Tilia tomentosa* suggest that the nitrogen nutrition of these species was influenced by the air pollution with nitrogen oxides. In September, the nitrates concentration in *Prunus* leaves was of 249 ppm into the street samples and 160 ppm into the park ones, and in *Tilia* leaves of 235 ppm in street samples and, respectively, 90 ppm in park. In the same month, total nitrogen into the leaves of street trees was between 2.61%-2.77%, comparing with those of park trees, which contained 2.38%-2.62% total nitrogen.
2. An early senescence induced by the air pollution occurred to the street trees leaves. This phenomenon was indicated by a decrease of total nitrogen content in street trees leaves starting from July at *Prunus* and *Tilia*. This idea was also suggested by the higher content

of total potassium recorded for the street trees leaves in July. A very high content in total potassium of 4.20 % was found in *Acer* leaves collected from street, comparing with 0.70 % in those collected from park.
3. Leaves washing determined the reduction of nitrogen, phosphorus and potassium values for all the species studied. Potassium content in leaves was less reduced by this procedure, comparing with nitrogen and phosphorus.
4. Leaves surface area was influenced by the content of nitrogen, phosphorus and potassium content in leaves. Thus, the *Acer negundo* leaves surface area was positive correlated with the nitrogen content of leaves and negative with their content in phosphorus. A negative very significant correlation between leaves surface area and the content of total phosphorus was found for *Tilia tomentosa* (R= 0.9206).

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Tables

Table 1. Agrochemical characteristics of soils collected from the two sites (May 2004)

Location	Species	pH	Soluble salts %	$N-NH_4$ ppm	$N-NO_3$ ppm	$P-PO_4$ ppm	K ppm
Herăstrău Park	Acer	7.58	0.060	1.00	10.00	trace	25
	Prunus	7.81	0.060	4.75	3.25	3.5	40
	Tilia	7.76	0.069	5.25	6.00	11.2	70
Calea Dorobanților	Acer	7.66	0.111	6.50	40.50	8.9	90
	Prunus	7.30	0.076	4.50	21.00	6.2	55
	Tilia	7.72	0.121	4.50	48.75	3.7	90

Table 2. Differences between the content of nitrogen, phosphorus and potassium in washed and unwashed leaves – in July

Location	Species	$N-NO_3$ (%)	$P-PO_4$ (%)	K (%)
Herăstrău Park	Acer negundo	10.12	26.86	23.01
	Prunus cerasifera	55.17	36.57	8.81
	Tilia tomentosa	50.70	57.70	27.93
Calea Dorobanților	Acer negundo	66.94	19.12	3.14
	Prunus cerasifera	46.74	44.20	10.56
	Tilia tomentosa	25.84	17.12	1.87

Figures

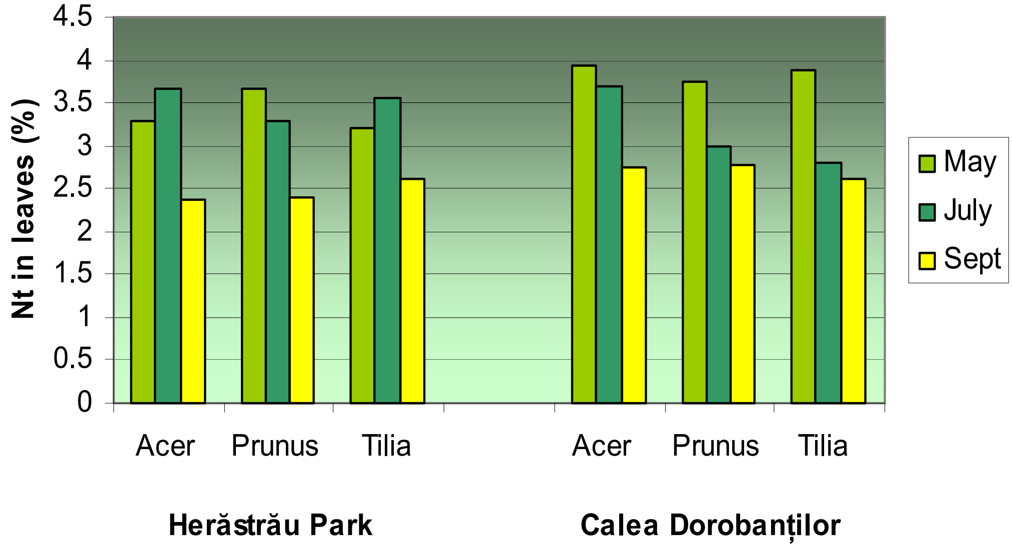

Fig. 1. Nitrates in unwashed leaves

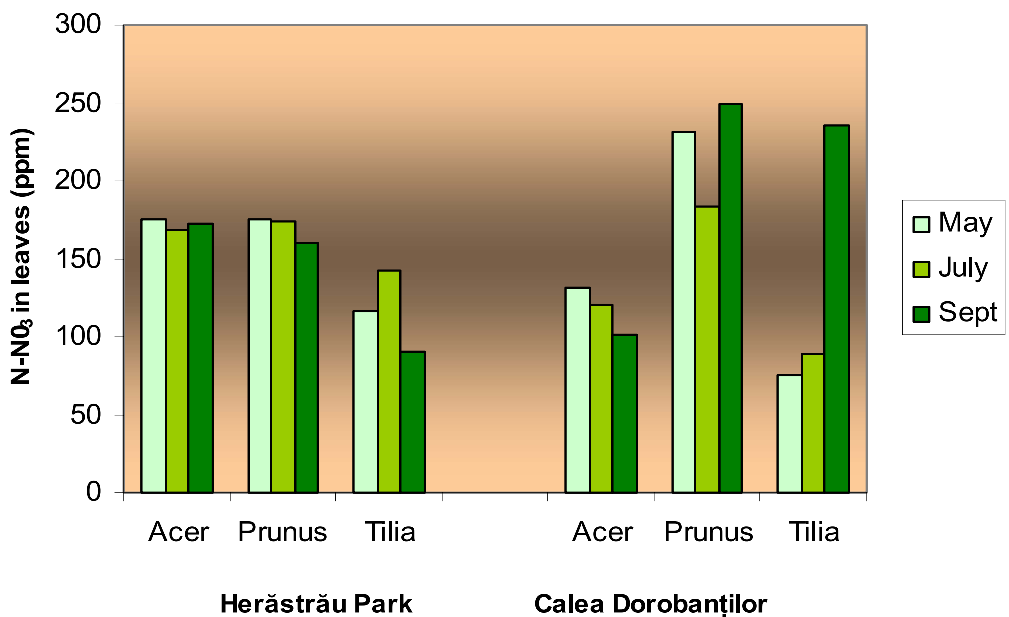

Fig. 2. Total nitrogen in unwashed leaves

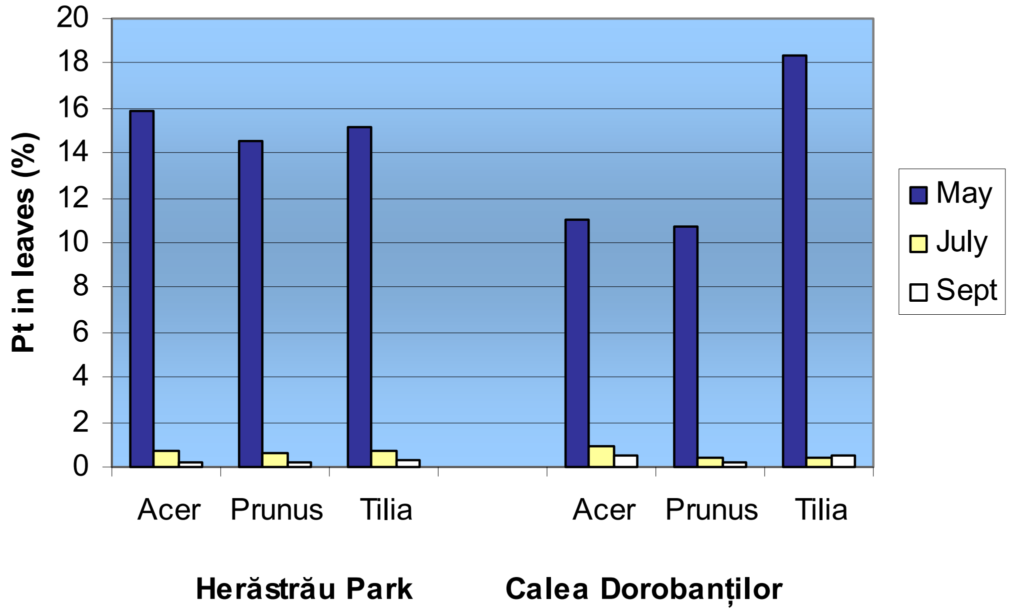

Fig. 3. Variation of phosphorus in leaves

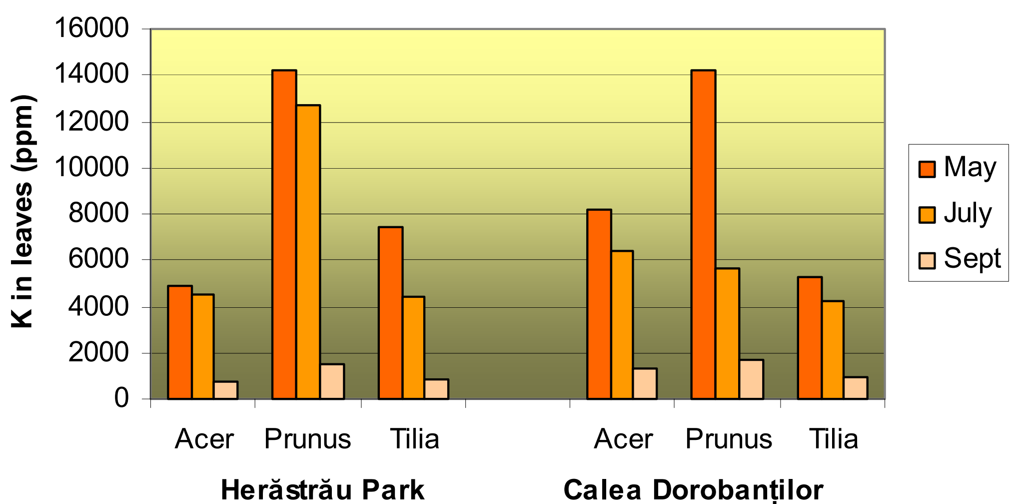

Fig. 4. Potassium content in leaves

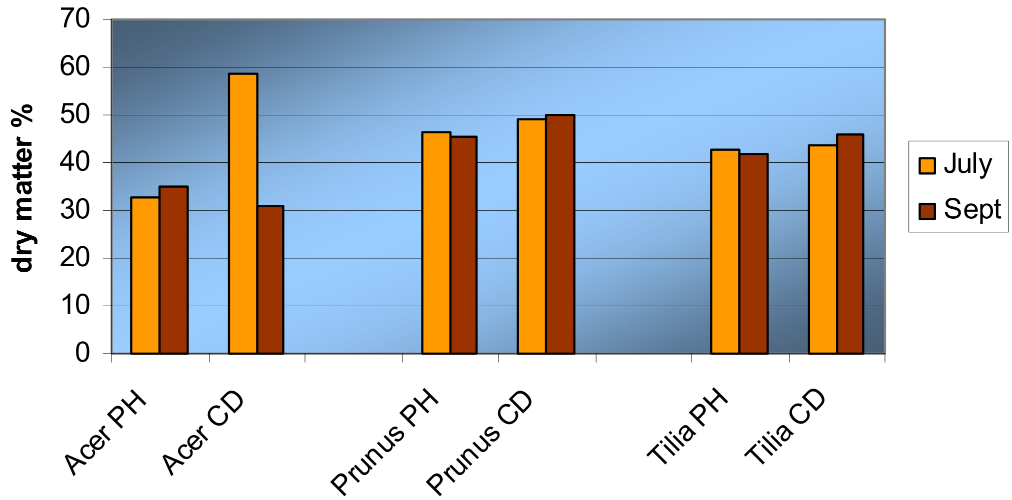

Fig. 5. Dry matter variation of leaves
(PH – Herăstrău Park, CD – Calea Dorobanților)

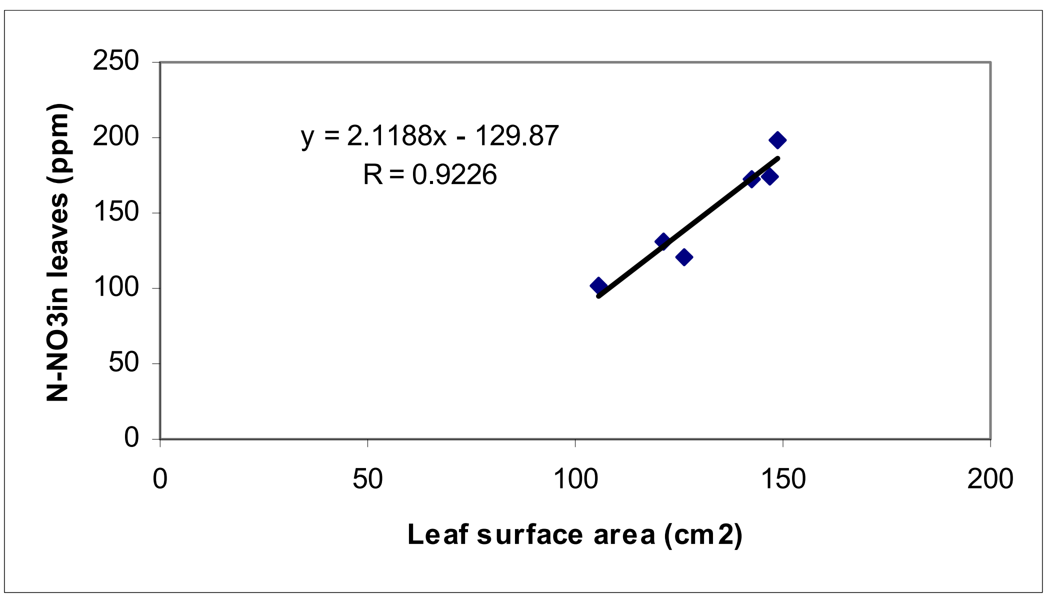

Fig. 6. Relationship between leaf surface area and nitrates content of *Acer negundo* leaves

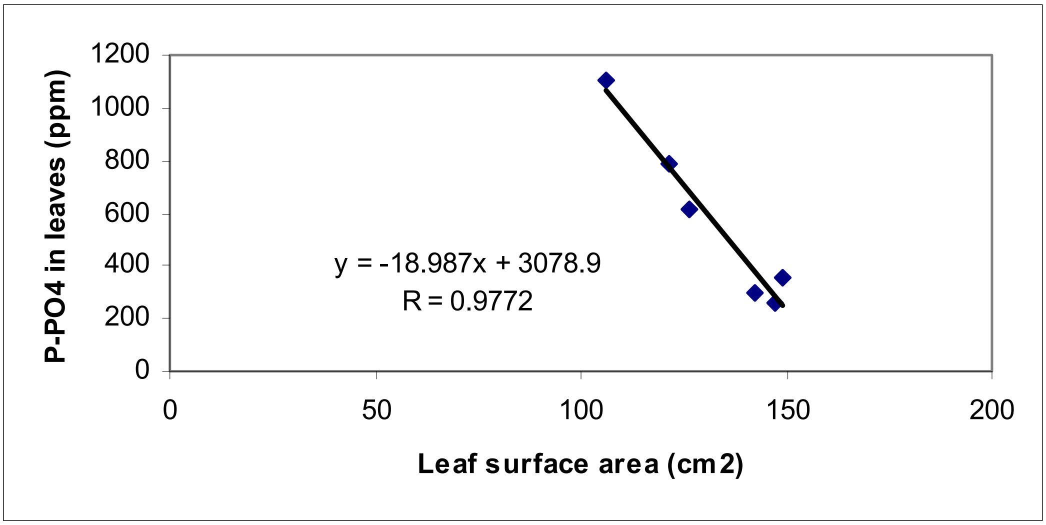

Fig. 7. Relationship between leaf surface area and phosphorus content of *Acer negundo* leaves

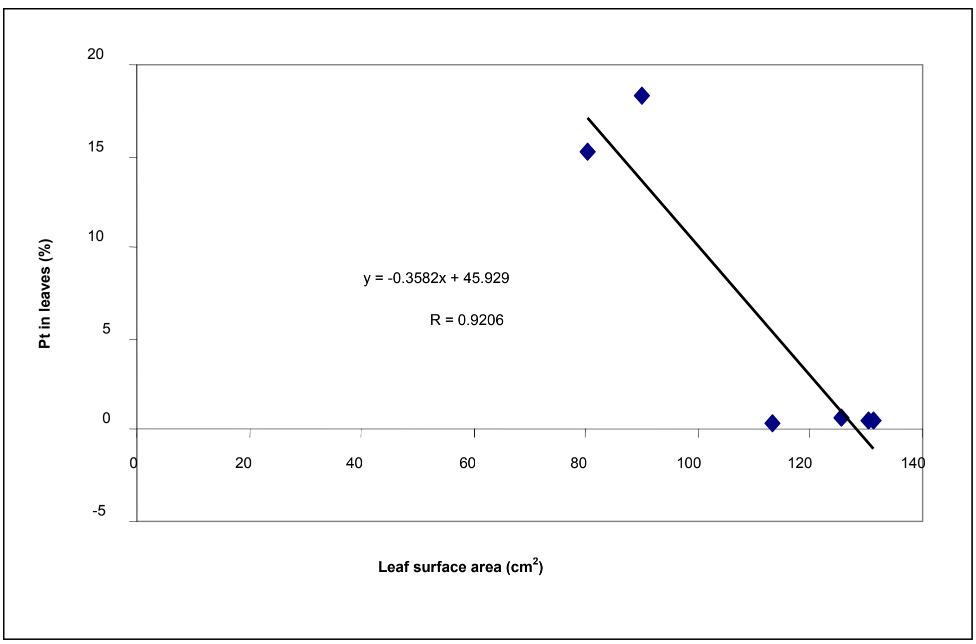

Fig. 8. Relationship between leaf surface area and total phosphorus content of *Tilia tomentosa* leaves

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A STUDY REGARDING THE POSSIBILITY OF USING DENDROLOGICAL SPECIES AS INDICATORS OF SULPHUR AIR POLLUTION

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Keywords: intense traffic, ornamental trees, ornamental shrubs, sensibility, sulphur oxides

ABSTRACT

The implications of air pollution with sulphur oxides on some dendrological species used for street plantation were investigated. The results showed that some of the native species are sensitive to these pollutants, and the pollution of street plantation with sulphur oxides involves sulphur accumulation in soil and leaves.

INTRODUCTION

Lately in urban space more and more sulphur oxides emissions were reported due to an increasing in vehicles number and a congestion of traffic flow. The presence of sulphur oxides in the atmosphere have negative implications on the environment – acid rains – which determine its acidification, phenomena with negative impact not only on vegetation but also on human health, buildings and installations. Dendrological species have diverse reaction to this pollutant. The purpose of the present research was to identify some dendrological species as reliable indicators of SO_2 pollution level in air. Moreover, the effects of air pollution with sulphur oxides on the pH of the exposed soils and the level of sulphur accumulation into the leaves were studied.

MATERIALS AND METHODS

Leaves of five broadleaves species - *Acer negundo*, *Philadelphus coronarius*, *Prunus cerasifera*, *Symphoricarpos albus*, *Tilia tometosa* and two conifer species - *Pinus nigra* and *Thuja orientalis* were collected in May, July and September 2004 from trees growing in two sites with different sulphur oxides exposure - Calea Dorobanţilor – with an intense traffic flow and Herăstrău Park. Sulphur content in leaves was analysed following the mineralization of 1g plant material (ICPA method) and expressed in ppm. Soil samples were collected in the same time and analysed from the point of view of pH, soluble salts and sulphates content. The sulphates content of soil samples was determined after the extraction with acetic acid – ammonium acetate, a method described by Davidescu Velicica and Neaţă Gabriela (1992), and the results were expressed in ppm.

RESULTS AND DISCUSSIONS

Data concerning the sulphur content in soils confirm the distinction among the samples collected from the two sites, Herăstrău Park and Calea Dorobanţilor (table 1).

It can be noted that for all the moments of analysis the lower values for sulphates were recorded for the samples collected from park; the values in September varied between 0.43 ppm (*Philadelphus*) and 5.46 ppm (*Prunus*).

Sulphur content in soil samples collected from Calea Dorobanţilor changed along the study period and differences among species were observed. Consequently, for *Acer*, *Pinus*, *Symphoricarpos* and *Thuja* the highest values of sulphur were recorded in May, while for *Philadelphus*, *Prunus* and *Tilia* these were in autumn. Sulphur is an essential plant nutrient and thus, its decreasing concentration in soil from May to September is the result of plant uptake. Contrary, sulphur accumulation in soil from spring to autumn (*Philadelphus*, *Prunus* and *Tilia*) may be the result of sulphur dioxide pollution, coming from the vehicle exhaust.

Sulphur values up to 10 ppm in soil, the maximum limit for considering the soil pollution with sulphur was observed at *Tilia tomentosa* (12.35 ppm) and *Thuja orientalis* (10.89 ppm) collected in September from Calea Dorobanților. Furthermore, the soils recorded decreasing values of pH to autumn, from 7.72 to 7.03 for *Tilia* and from 7.72 to 7.37 for *Thuja* (table 2). A decrease of pH values was remarked also for the rest of the soil samples collected from Calea Dorobanților. The content of soluble salts of the soils from street plantation was higher comparing with those from park and the values were increasing from May to September (table 2).

Sulphur content in leaves varied with plant location, sampling moment and species. The leaves of trees and shrubs from Calea Dorobanților accumulated more sulphur then those from Herăstrău Park (fig. 1). The greatest differences among sulphur concentration into the plants leaves collected from the two sites were recorded in July, with a maximum of 31% at *Acer*, followed by *Symphoricarpos* with a difference of 27% and *Prunus*, 19%. These differences among the sulphur values recorded for these two locations were maintained also in September, but at a lower level of 5% (*Philadelphus*) to 23% (*Acer*).

The highest values of sulphur on leaves were recorded in September at the trees from Calea Dorobanților. Sulphur accumulated more into the leaves of *Acer negundo* with 3185 ppm, followed by *Symphoricarpos albus* -2935 ppm and *Prunus cerasifera* – 2820 ppm. The lowest values of this element into the leaves collected from Calea Dorobanților were recorded at the conifers species - 1762 ppm on *Thuja orientalis* and 1232 ppm on *Pinus nigra*. Data showed that broadleaves species accumulated more sulphur into their leaves that conifers species. Differences between broadleaves species and conifers species were also observed by Reimann et al. (2003), who studied the content of sulphur in several species and found an average total sulphur content of 990 ppm in conifers, 1490 ppm in shrubs and 1900 ppm in deciduous trees. Anyway, differences between shrubs and trees of broadleaves species were not found in the present study.

In spite the lower sulphur content in the leaves of *Pinus* (936 ppm), scorch leaves were observed at this species in July, as a symptom of intense air pollution with sulphur dioxide. In the same month, scorch leaves were also observed at *Acer negundo* and *Tilia tomentosa*. Indeed all these species are more sensitive to sulphur dioxide concentration in air.

CONCLUSIONS

1. Sulphur dioxide pollution on Calea Dorobantilor has an important impact on the soil from this site. The highest values of sulphur in soils, over the maximum limit of 10 ppm were recorded in September, near to the trees of *Tilia tomentosa*, (12.35 ppm in Calea Dorobanților comparing with 3.32 ppm in Herăstrău Park) and *Thuja orientalis* (10.89 ppm in street comparing with 1.28 ppm in park).
2. High content of sulphates of street soils samples influenced their pH and soluble salts content.
3. In September were recorded the highest values of sulphur at broadleaves species. The highest content of total sulphur was found in *Acer negundo* leaves - 3185 ppm, followed by *Symphoricarpos albus* -2935 ppm and *Prunus cerasifera* – 2820 ppm.
4. Conifers leaves recorded a lower quantity of total sulphur comparing with those of broadleaves species: 1762 ppm in *Thuja orientalis* and 1232 ppm in *Pinus nigra*.

5. The results did not show a differentiation between the total content of sulphur in trees leaves and shrubs leaves.
6. Symptoms of sulphur dioxide pollution were observed at *Pinus nigra*, *Acer negundo* and *Tilia tomentosa* leaves collected in July from the plants situated on Calea Dorobanților, when the sulphur concentration on leaves reach values of 936 ppm, 3155 ppm and respectively 2215 ppm.

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Table 1. Concentration of sulphur as sulphates in soils collected from Herăstrău Park and Calea Dorobanților.

Location	Species	May (ppm)	July (ppm)	Sept. (ppm)
Herăstrău Park	Acer	2.09	2.96	2.51
	Philadelphus	0.70	0.38	0.43
	Pinus	0.96	1.07	0.88
	Prunus	5.05	4.45	5.46
	Symphoricarpos	1.34	1.20	1.33
	Thuja	2.08	1.72	1.28
	Tilia	2.11	2.83	3.32
Calea Dorobanților	Acer	11.40	6.63	7.02
	Philadelphus	2.07	1.40	3.02
	Pinus	4.29	2.68	3.94
	Prunus	2.63	2.40	7.28
	Symphoricarpos	3.16	2.36	2.00
	Thuja	11.56	10.55	10.89
	Tilia	10.11	7.45	12.35

Table 2. The pH values and soluble solids content of Calea Dorobanților soils

Location	Species	pH			Soluble salts (%)		
		May	July	Sept.	May	July	Sept.
Calea Dorobanților	Acer	7.66	7.37	7.45	0.111	0.106	0.173
	Philadelphus	7.06	7.46	7.06	0.066	0.063	0.173
	Pinus	7.74	7.26	7.65	0.080	0.086	0.118
	Prunus	7.30	6.98	7.35	0.076	0.060	0.144
	Symporicarpos	7.97	7.72	7.33	0.070	0.059	0.086
	Thuja	7.72	7.47	7.37	0.106	0.115	0.147
	Tilia	7.72	7.44	7.03	0.121	0.173	0.361

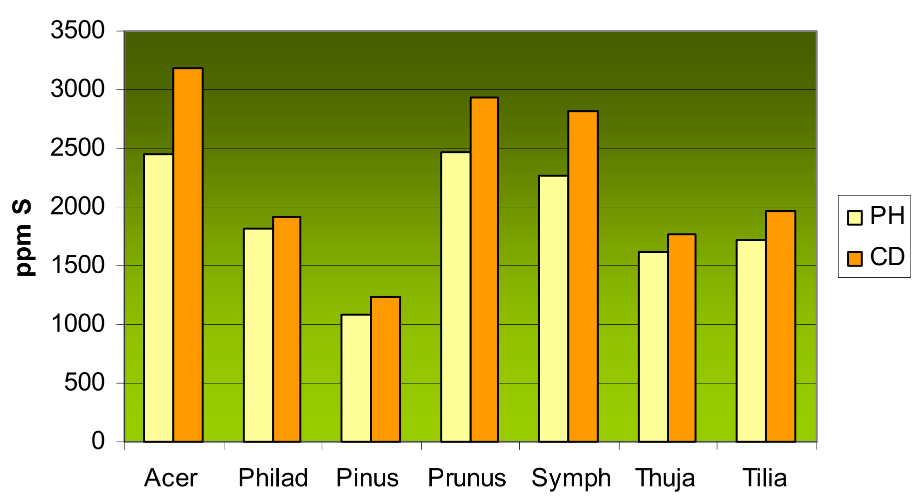

Fig. 1. Sulphur content in leaves in September
(PH – Herastrau Park, CD – Calea Dorobanților)

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INFLUENCE OF PRESERVATION SOLUTION RECEIPTS ON THE *SPATHIPHYLLUM* CUT FLOWERS

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Keywords: *Spathiphyllum* sp., preserving duration, preservation receipts, cut flowers.

ABSTRACT

Present researches aim the *Spathiphyllum* cut flower behavior, preservated in different solutions recipes for a longer period conservation.
During the experiment, there were made biometric measurements of initial vegetable material (height of flower stem, spatha and spadix length), agrochemical analysis (pH, soluble salts content and mineral residue) and the temperature of preservation solutions studied.

INTRODUCTION

From the speciality literature is known that preservation solutions are wide used in all the main flower producing countries for maintaining and extending the lifes of cut flowers.

In our country, the preservation of the flowers at the producer, in the sale shops and at the consumer is done in water and preservation solutions.

In order to reduce qualitative depreciations when temporary stored in shops and to extend the life of embellishment flowers at the consumer, special solutions where prepared for maintaining the various species of flowers.

In all the main flower producing countries there were preoccupations for creating preservation solutions for the species with cultural gravity (carnations and roses), yet in the last years other species where studied also.

The experiment pursued the influence of some solutions receipts in various concentrations on cut *Spathiphyllum* flowers preservation.

MATERIALS AND METHODS

The experiment was initiated on May 12th, 2006.

As byological material where used 56 *Spathiphyllum* cut flowers, imported from Netherland.

Each variant had 8 flower stems, in bud stage.

The solutions where assigned in Erlenmayer glasses with 200 ml of solution each.

There where used receipts of preservation solutions recommended in the speciality literature for some other species.

The pH of the solutions during the experiment was measured with a HANNA HI 9321 pH-meter. The pH - meter is equipped with a thermometer also, so that the temperature of the solutions was determined at each measurement.

The soluble salts have been measured during the experiment with a HACH – sensIon 7 conductometer, in mS/cm.

The mineral residue was determined for each 100 ml of solution through dry vaporization on sand bath and weighing of the residue.

In table 1 are presented the initial characteristics of the flowers that where used for the experiment.

In table 2 are presented the experiment variants, the receipts and the concentrations of preservation solutions.

RESULTS AND DISCUSSIONS

The concentrations of soluble salts and the pH of the solutions used for preservation have been determined in three moments: the beginning of the experiment, after 4 days, and after 10 days from the initiation of the experiment. The results are presented in tables 3, 4 and 5.

In figure 1 is presented the pH evolution of the solutions in all three moments of analysis. pH of solution V1 has increased during the experiment from a very acid pH (3.76) to an alcaline one (8.28) ,close to the pH of the control (7.28). In this case, the use of boric and citric acids could not maintain a low pH, enduring a high tamponing capacity, the acids being weak.

In the case of variants with saccharose V2,V3,V5 and V6, the pH was maintained constant during the entire experiment, close to a value of 4.

In the case of variants V4, V5 and V6 the aluminium sulphate interferes, which caused an ionic blocking, so that pH maintains at the same value close to the beginning one.

Figure 2 presents the soluble salts evolution during the experiment.

Concerning the salts concentration (fig. 2), the control value is situated between the values of the other experimental variants. Plants has elimineted salts in solution, therefore the salts concentration has increased from 0,428 at the beginning of experiment, to 0,673 at the final stage.

The variants of Rt1 receipt (V4, V5 and V6) had a salts content almost invariable during the entire experiment.

The variants of Rt2 receipt (V1, V2 and V3) had a initially disposition (days of determination) of decreasing, therefore of absorption of some salts through the flower stem, and later (10 days) plants had eliminated in solution a salts content of almost 0,1 mS/cm.

The solutions temperature was determinate at the same time with pH measurement. The solutions temperature has increased also due the air temperature. In proportion as higher temperature, the reactions of solutions are more severe, the salts absorption is stronger, leading at a shorter period of flower preservation.

The mineral residue has been determinate at the beginning of the experiment (table 3).

Variants with the highest value of mineral residue were V3 (Rt1) and V6 (Rt2) which contain the higher quantity of saccharose (1,5g).

The smaller value of mineral residue is at the control, variant that contains only plain water.

In the case of the control Mt – from town water supply, *Spathiphyllum* plants are well preserved for a week so at 19.05.2006, 50% stems are buds in part falling-off and in part brown and then, after 3 days the buds are fade away totally.

At variant V1(Rt1) for the first days of experiment the flower became to wide open. This process continued for 6 days, period that we could observed the buds falling-off (1 stem), brown buds (2 stems) and also brown partial open flower. This process continued till 22.05. when flower lost there vigour. The preservation period for this variant lasts 10 days till the total fade.

Another variant at which we observe modifications during the preservation period has been V2 (Rt1), which on 18.05 (6 days) has shown 50% of the flowers with the falling-off phenomenon and partially brown, and even 3/8 of the falling-off buds where totally brown. During the following period, all the plants in the V2 have became brown until drying. The preservation period in the V2 solution was about 6 days.

At the V3 (Rt1) variant, which contains 1.5% saccharose, boric acid and citric acid, the browning process has been more conspicuous , so that more than 50% (5/8 of the buds) got to the phase of falling-off bud and became brown in a 6 days period. The process fastened so that in the 7th day all the plants where mass becoming brown.

At the V4 (Rt2) variant which contains 0% saccharose, aluminium sulphate, ferrous sulphate, calcium chloride, the preservation process has lasted until the finish of the experiment, initially having in 6 days 10% of the flowers bloomed, without brown parts. In the 10th day the percent of bloomed flowers has risen with another 10% and has maintained itself until the finish of the experiment.

In the case of the V5 (Rt2) variant, until the 10th day no important modification has been observed, neither related to the blooming of the flowers or falling-off phenomenon. In ten days the brown parts are present at 3/8 of the plants. The other plants have manifested different other phenomenon (partial browning, partial falling-off).

The last variant - V6 (Rt2) , which contains 1.5% saccharose, aluminium sulphate, ferrous sulphate, calcium chloride, is showing major changes in 7 days from the beginning of the experiment. The partial brown phenomenon is present at 25% of the plants, and falling-off and brown parts at another 25%. The phenomenon continues, the brown plants drying, and the phenomenon continues in 2 weeks from the beginning of the experiment.

CONCLUSIONS

1. *Spathiphyllum* is a plant that doesn't endure a dry preserving of cut flowers;
2. If the preservation stage is of a full open flower, the plants have a longer period of preservation. The bud is more sensitive;
3. The variants V4 (Rt2) and V5 (Rt2) which contain saccharose 0% and respectively 0.75 % and also aluminium sulphate, ferrous sulphate and calcium chloride are viable variants because the losses through drying are about 12.5%;
4. The variants that recorded the highest losses have been V2 (Rt1) - 100%, followed by V1 (Rt1) and V3 (Rt1) with losses about 87.5%;
5. If we consider the substances that are included in the composition of the solutions we can affirm that recipe 1, in all of the 3 variants does not adapt for preserving the *Spathiphyllum* flowers.
6. The variants of the recipe 2 also had losses, but fewer and can encourage us in choosing this recipe for a future research, following that this to be improved in order to have a lower percent of losses;
7. The 2nd recipe, in compare with the Mt control had fewer losses, which shows us that the flowers have adapted to this solution;
8. For the preservation of the cut *Spathiphyllum* flowers is recommended V4, which contains 0% succharose, 0.075% aluminium sulphate, 0.001% ferrous sulphate and 0.003% calcium chloride, and has given the best results.
9. It is call for continuing the researches in order to improve this recipe.

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Tables

Table 1. Characteristics of plants used in initial phase of experiment

VARIANTS	Average height (cm)	Average lenght of stem (cm)	Number of stems in bud stage	Number of stem with partial open flowers	Average lenght of spatha (cm)	Average lenght of spadix (cm)
Mt - Apa Nova watter supply	46,63	29,88	6	2	16,75	5,75
V1 (Rt1)	44,25	28,19	7	1	16,06	3,50
V2 (Rt1)	42,69	27,06	8	-	15,63	-
V3 (Rt1)	45,69	29,31	7	1	16,38	3,00
V4 (Rt2)	47,06	29,38	7	1	17,69	6,00
V5 (Rt2)	45,25	28,13	7	1	17,13	3,50
V6 (Rt2)	47,25	29,25	7	1	18,00	5,50

Table 2. Experimental variants

VARIANTS	CONSTITUENTS *	CONCENTRATION %
Mt – ApaNova watter supply	---	---
V1 (Rt1)	Saccharose $\mathbf{C_{12}H_{22}O_{11}}$	0
	Boric acid $\mathbf{H_3BO_3}$	0,01
	Citric acid $\mathbf{C_6H_7O_8 \cdot H_2O}$	0,05
V2 (Rt1)	Saccharose $\mathbf{C_{12}H_{22}O_{11}}$	0,75
	Boric acid $\mathbf{H_3BO_3}$	0,01
	Citric acid $\mathbf{C_6H_7O_8 \cdot H_2O}$	0,05
V3 (Rt1)	Saccharose $\mathbf{C_{12}H_{22}O_{11}}$	1,5
	Boric acid $\mathbf{H_3BO_3}$	0,01
	Citric acid $\mathbf{C_6H_7O_8 \cdot H_2O}$	0,05
V4 (Rt2)	Saccharose $\mathbf{C_{12}H_{22}O_{11}}$	0
	Aluminium sulphate $\mathbf{Al_2(SO_4)}$	0,075
	Ferrous sulphate $\mathbf{FeSO_4 \cdot 7H_2O}$	0,001
	Calcium chloride $\mathbf{CaCl_2 + nH_2O}$	0,003
V5 (Rt2)	Saccharose $\mathbf{C_{12}H_{22}O_{11}}$	0,75
	Aluminium sulphate $\mathbf{Al_2(SO_4)}$	0,075
	Ferrous sulphate $\mathbf{FeSO_4 \cdot 7H_2O}$	0,001
	Calcium chloride $\mathbf{CaCl_2 + nH_2O}$	0,003
V6 (Rt2)	Saccharose $\mathbf{C_{12}H_{22}O_{11}}$	1,5
	Aluminium sulphate $\mathbf{Al_2(SO_4)}$	0,075
	Ferrous sulphate $\mathbf{FeSO_4 \cdot 7H_2O}$	0,001
	Calcium chloride $\mathbf{CaCl_2 + nH_2O}$	0,003

*The constituents were dissolved in 1000 ml watter from town watter supply.

Table 3. Temperature, pH, mineral residue and soluble salts of solutions at initial stage of experiment

VARIANTS	Temperature of solution (˚C)*	pH	Mineral residue (g)	Soluble salts (mS/cm)
Mt – ApaNova watter supply	19,2	6,52	0,041	0,428
V1 (Rt1)	19,1	3,76	0,082	0,371
V2 (Rt1)	19,1	3,68	0,887	0,371
V3 (Rt1)	19,1	3,67	1,673	0,383
V4 (Rt2)	19,1	3,37	0,082	0,693
V5 (Rt2)	19,0	3,86	0,883	0,689
V6 (Rt2)	19,0	4,07	1,924	0,663

*Air temperature 26˚C.

Table 4. Temperature, pH and soluble salts of solutions after 4 days

VARIANTS	Temperature of solution (˚C)	pH	Soluble salts (mS/cm)
Mt – ApaNova watter supply	24,3	6,87	0,508
V1 (Rt1)	24,4	4,03	0,330
V2 (Rt1)	24,3	3,72	0,375
V3 (Rt1)	24,4	3,75	0,367
V4 (Rt2)	24,6	3,90	0,722
V5 (Rt2)	24,5	3,93	0,692
V6 (Rt2)	24,5	4,02	0,671

Table 5. Temperature, pH and soluble salts of solutions at 10 days from the beginnig of the experiment (final stage of experiment)

VARIANTS	Temperature of solution (˚C)	pH	Soluble salts (mS/cm)
Mt – ApaNova watter supply	27,4	7,28	0,673
V1 (Rt1)	27,2	8,28	0,667
V2 (Rt1)	27,2	3,85	0,487
V3 (Rt1)	27,2	3,54	0,445
V4 (Rt2)	26,8	3,88	0,738
V5 (Rt2)	27,0	3,94	0,697
V6 (Rt2)	27,3	3,92	0,677

Figures

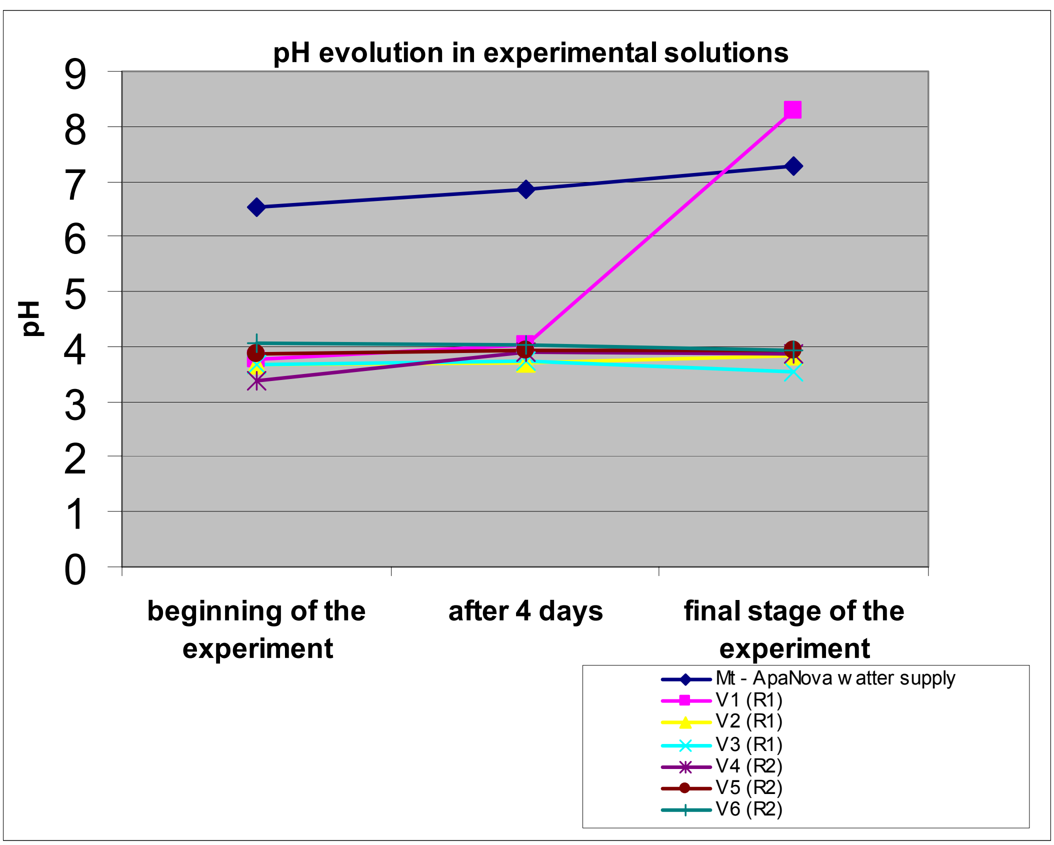

Figure 1

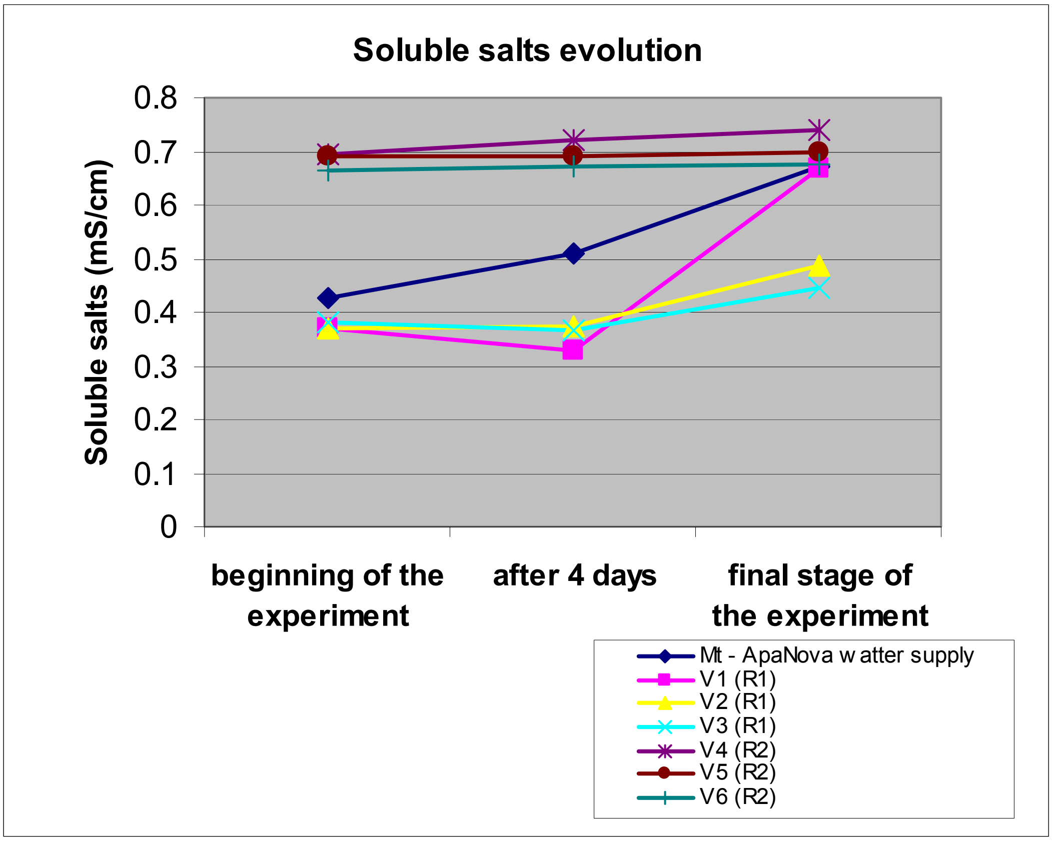

Figure 2

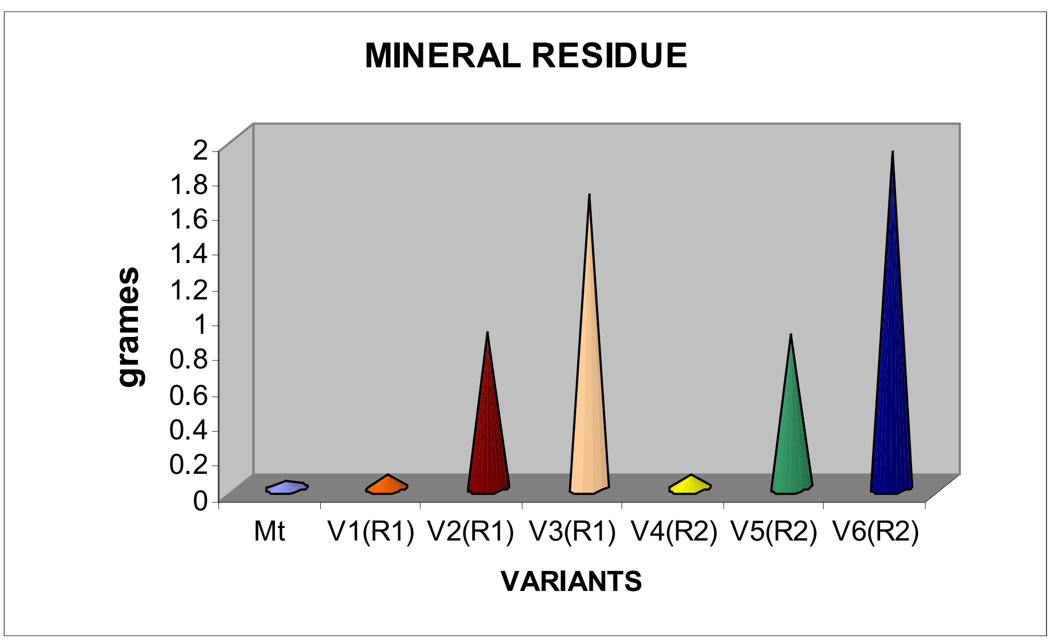

Figure 3

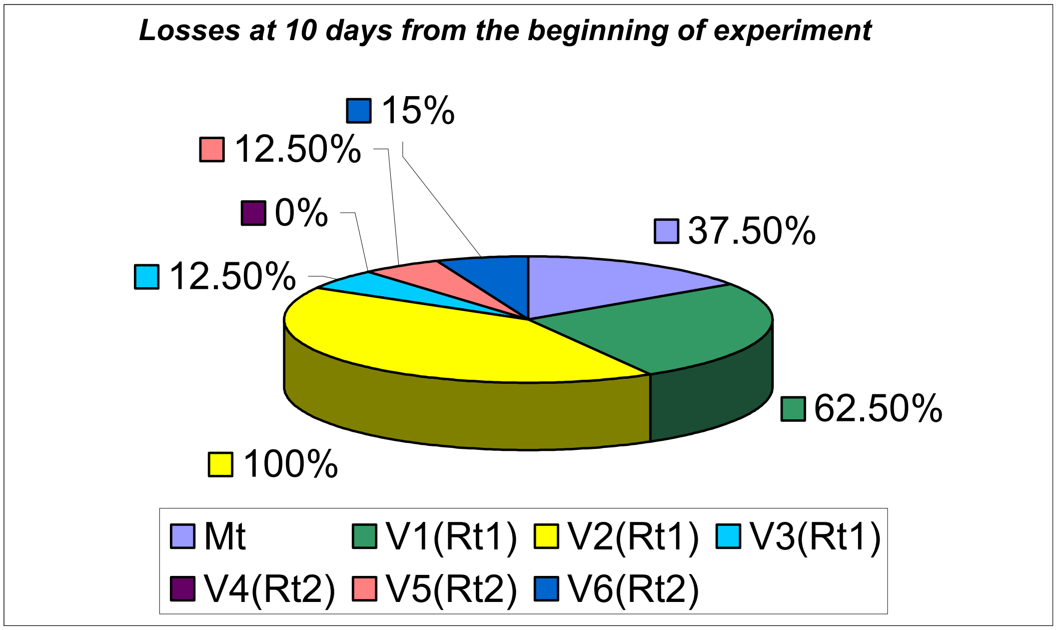

Figure 4

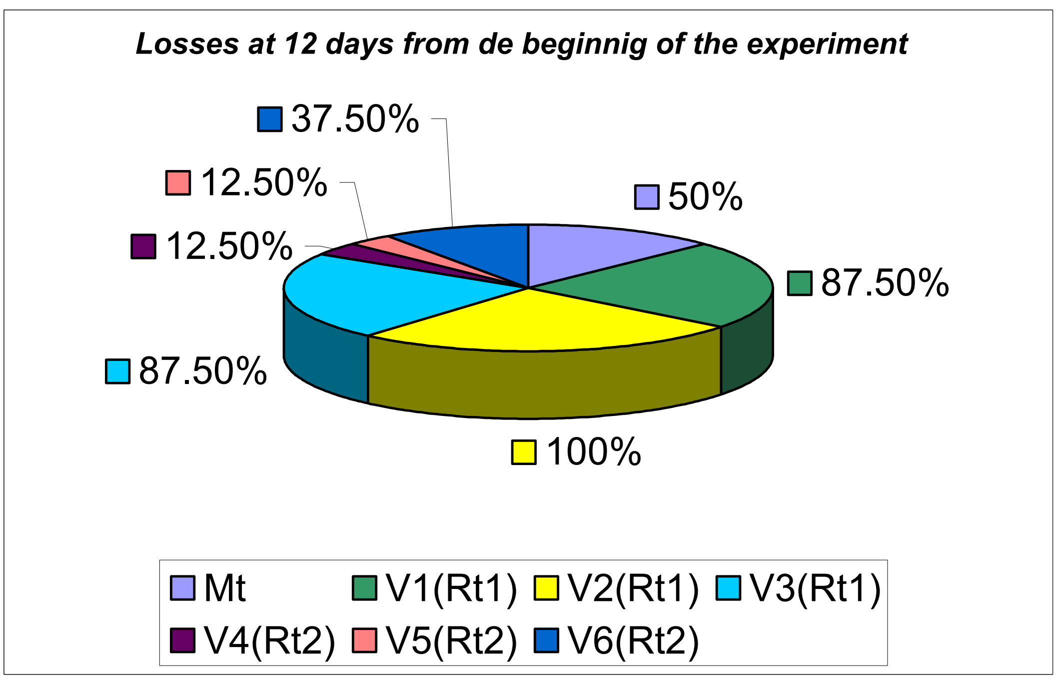

Figure 5

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THE BEHAVIOUR OF *CHAMAECYPARIS* SP. CULTIVATED IN CONTAINER ON DIFFERENT SUBSTRATES

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Keywords: *Chamaecyparis* sp., substrate pH, sulphur acidifying substance, plants development.

ABSTRACT

Ornamental plants producing technology in container system with superior advantages compared with classical nursery need to solve the technology specifics problems as: the proper choose of substrate for culture, the physical and chemical substrate characteristics control, plant fertilizer system, to diminish the dendrological material producing period, with best results in obtaining the vegetal material for planting in optimum time. One of the most important factors in culture technology is represented by the substrate pH. The ornamental plants requirements of the pH are different depending on each species development results for the environmental conditions.

INTRODUCTION

The technology of producing ornamental plants in containers and pots used the substrates of culture obtained frequently from mixed mineral and organic materials (compost, peat, manure, sand, perlite, etc.). Among the chemistry of the substrate in our nutrient contents, pH represents a very important agrochemical index, because the cultivated species are very numerous and their exigencies concerning the pH value in substrate are very different; therefore it is obligatory to maintain the pH value in progress vegetations between the limits requested by each species (Ansorena, 1994; Conover, 1996; Costea et al., 1998). The research aim was to find solutions of maintaining the pH substrate during the vegetation period in natural limits for *Chamaecyparis* sp. (Davidescu et al., 2001)

MATERIALS AND METHODS

The research performed during the year 2006 was aimed to establish the substrate proper compounds for optimum development of the *Chamaecyparis* sp. Were studied four substrate with different organic waste materials compounds. The aim of research was to obtain substrates with physical characteristics (the granulometric composition, the porosity, aeration and hydric conditions) that can be optimum for the plants cultivated in containers (Davidescu et al., 2004; Madjar et al., 2004). The control variant, V1, was substrate made of fallow soil, manure and sand in volumetric ratio of 2:2:1. (Table 1) During the experiment, the pH was modified with sulphur applied in containers with plants. The dose was of 3g S/L. Periodically, the substrate agrochemical characteristics were determined and the pH evolution was established. The plant biometrical measurements were made (high growing) and determined at the end of the research the dry matter (%) and the total forms of N, P and K.

RESULTS AND DISCUSSIONS

The substrates variants agrochemical characteristics are presented in table 1.

At the end of vegetation period, in 2005 (the first year of experiment), the agrochemical characteristics presented pH values varying between 5.26 in variant V2 (peat + sand) to 7.75 (moderate alkaline) in V1 with highest content in nitrogen (49.25 ppm), phosphorous (15.8 ppm) and potassium (260 ppm) because of manure and follow soil compounds.

In the spring of 2006, after repose period, at the beginning of experiment, the substrates pH had lower values according to acids and enzymes elimination through the roots and with continued acidifying process starting in anterior year.

Table 2 presents in dynamics the pH evolution in substrate until the end of the experiment, October 2006.

The pH decreasing depended on the initial substrate pH value, and was different because of some substrate compounds with a rich content in organic matter and with higher buffer capacity, with better pH modification resistances. (V2 and V5) (Table 2, Fig.1)

The different substrates composition is reflected also in different contents in soluble nitrogen (NH_4+NO_3), the forestry compost and leaves compost having low mineralized nitrogen content. The variants 3, 4 and 5 presented the lowest nitrogen content at the experiment beginning compared with classic substrate, V1, fallow soil, manure and sand, where the soluble nitrogen content was 49.25 ppm. (Table 3, Fig.2)

From the results presented in table 4 the substrate different effect on the plant nitrogen total content (%) was observed. In variant 1 (fallow soil + manure + sand) registered the highest nitrogen total content (2.17%) in plant and in variant 3 (forestry compost + sand) the total nitrogen content was 1.88%, in this variant the plants registered the lowest height (53.5 cm).

The plant dry matter content varied between 37.93% in V2 (peat + sand) and 40.29 % in V5 (forestry compost + leaves compost + sand), in this variant the highest plant height (73.75 cm) was registered. (Fig.3)

CONCLUSIONS

1. All substrate variants reacted to the pH modification after the sulphur 3 g/L dose was applied.
2. The vegetable waste substrate compounds as forestry compost, leaves compost or a mixture of these could be used as an alternative in container culture on *Chamaecyparis* sp.
3. pH correction can be made in the container culture during the plant vegetation period.
4. Substrates in variant 1 (fallow soil + manure + sand) and variant 5 (forestry compost + leaves compost + sand) positively reacted to the substrate pH modification, the plant height growing being 70.25 cm and respectively 73.75 cm.
5. The forestry and leaves compost compounds can be recyclable and used as substrate compounds in container culture of *Chamaeciparis* sp.

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Tables

Table 1 Substrate agrochemical compounds and characteristics at the end of the first experimental year (2005) and before starting the experiment

Variant no.	Variant	Ratio compounds	pH	NH_4+NO_3 ppm	PO_4 ppm	K ppm
V1	Fallow soil + manure + sand	2:2:1	7,75	49,25	15,8	260
V2	Peat + sand	4:1	5,26	18,50	4,85	35
V3	Forestry compost + sand	4:1	6,88	9,75	2,20	85
V4	Leaves compost + sand	4:1	7,59	2,25	21,2	160
V5	Forestry compost + leaves compost + sand	2:2:1	7,47	10,75	28,6	130

Table 2 Substrate pH variation at *Chamaeciparis* species cultivated in container

V no.	pH values						
	Before start	1 day	3 days	7 days	10 days	14 days	At the end
V1	5,03	5,41	5,33	4,28	4,74	3,63	6,21
V2	7,50	6,92	6,91	5,66	4,54	4,96	5,60
V3	6,04	5,42	5,85	4,88	4,61	2,80	5,21
V4	6,00	5,98	5,35	5,00	5,47	3,83	6,69
V5	4,86	4,74	4,15	2,50	3,32	2,44	5,09

Table 3 Nitrite and ammonium nitrogen **NH_4+NO_3** (ppm) soluble forms substrate content evolution during the experiment

V no.	NH_4+NO_3 (ppm)						
	Before start	1 day	3 days	7 days	10 days	14 days	At the end
V1	49,25	39,50	68,0	84,5	21,2	55,0	10,43
V2	18,50	16,25	8,0	16,0	7,75	50,7	10,74
V3	9,75	20,75	4,5	56,0	10,5	35,7	8,86
V4	2,25	59,21	27,2	69,5	37,5	101	17,55
V5	10,75	44,75	36,0	66,7	23,0	80,5	13,74

Table 4 Dry matter and nutritive elements (N, P, K) total forms (%) plant content and plant height (cm)

V no.	Variant	Ratio compounds	Dry matter %	N %	P %	K %	Height cm
V1	Fallow soil + manure + sand	2:2:1	40,36	2,17	0,44	1,52	70,25
V2	Peat + sand	4:1	37,93	2,05	0,39	1,10	64,25
V3	Forestry compost + sand	4:1	40,79	1,88	0,30	0,96	53,50
V4	Leaves compost + sand	4:1	42,26	1,90	0,30	0,97	67,50
V5	Forestry compost + leaves compost + sand	2:2:1	46,29	1,91	0,47	1,13	73,75

Figures

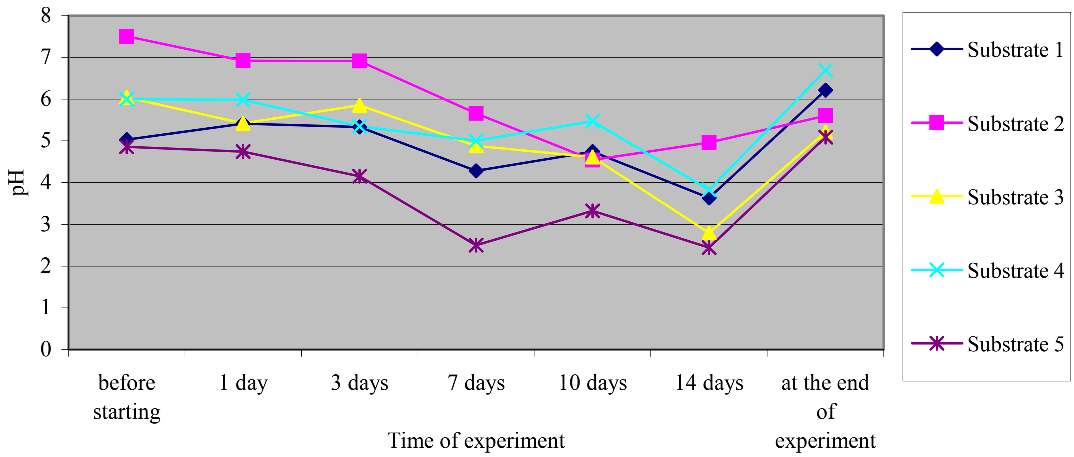

Fig. 1 The substrate pH evolution after the sulphur correction

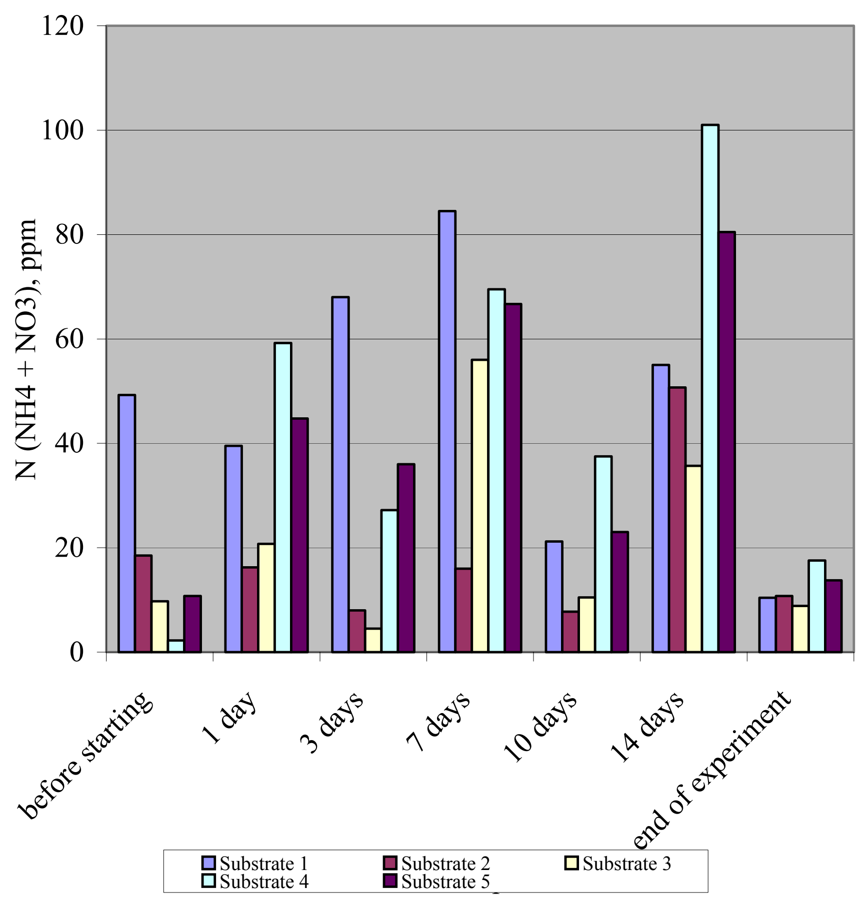

Fig. 2 The soluble nitrogen content evolution (NH_4 + NO_3, ppm) in substrate during the experiment

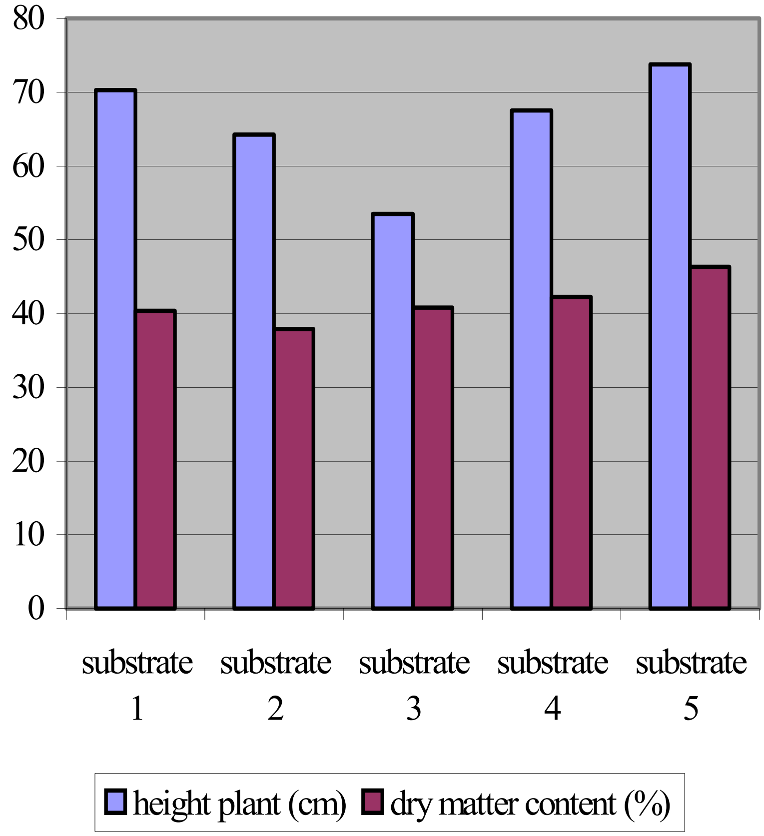

Fig. 3 Dry matter accumulation (%) and in height plant growing (cm) influenced by different substrate

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THE INFLUENCE OF THE CORMS SIZE AND OF SOME SPECIFIC TREATMENT IN PRODUCING THE PLANTING MATERIAL FOR GLADIOLUS

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Keywords: gladiolus, corm, size

ABSTRACT

In Romania, gladiolus is one of the first flower assortment planted on a field in order to obtain cut flowers. Since the quality of the planting material is one of the main factors which influence the flowers quality, it has experimented many technological ways to get the maximum corms quality.
The results prove that the smallest tuber bulbs have a low percentage in springing; the corms size used for replanting material influences the quantity and the quality of the future corms production; the moistening of tuber bulbs before planting influences (in a positive way), the uniformity and duration of springing.
The result of the present experiment is a part of a bigger experimental program, made for re-evaluation and development of gladiolus crops in Romania.

INTRODUCTION

Gladiolus is the kind of cut flowers produced on the field in two seasons: summer and autumn.

This experiment is motivated by the fact that in the last twenty years it was noticed a regress not only for planted field but also for the quality and quantity of the flowers production.

The main intervention factors used for improving the situation aim the ornamental and biological qualities of the variety, the corms multiplication capacity and their quality.

MATERIALS AND METHODS

The variety which has been experimented was „Priscila”, planted in Romania for over 20 years.

Variable factors were the tuber bulbs size used as a planting material, their moistening or not for 24 hours before planting and the distances between corms during their planting (Table 1).

The corms were disinfected with Topsin 0,1 % and Faster 0,1 %, a day before planting for 24 hours, after that they were dried and planted.

The planting was made on 24th of April 2005.

During the summer there were applied three fertilizers with Nutrilife and four treatments with Atomic 5 ml /10 l water.

The irrigation wasn’t necessary because 2005 was a rainy year.

The corms harvesting time was at the end of October. There can be mentioned that the autumn of 2005 was rainy. That was the reason why the corms harvesting and cleaning was very difficult.

After drying and cleaning, corms were stored in a room (well aerated) with a temperature between 5-7 ^{o}C.

RESULTS AND DISCUSSIONS

The springing dynamic: springing started about 3 weeks after planting and ended in the first decade of June (table 2) after 25-33 days.

The best springing percentage (55) was obtained at V6 (tuberbulbs with a diameter of 1,5-2 cm); the worst at V2 and V1 (12,36 and 17,36 cm diameter) with very small tuberbulbs, less than 0,5 cm diameter. As a remark, not all the springing plants survive (they aren't viable and die in the first week after springing); the tuberbulbs maturity and dehydration during the storage are two possible causes.

The tuberbulbs moistening fastens springing but doesn't rise the entire capacity of springing.

Regarding corms production: the dates written in table 3 reffers to corms quality and quantity.

That is the reason why, with experimental variants we can obtain between 35,7-90,9 corms, with a diameter over 2 cm.

Their number is positively influenced by the planting materials quality, their moistening and the distances between them.

Regarding corms' weight (grams/100 plants): the biggest for corms category over 2 cm can be obtained at variant V6 (corms planted at 5 cm distance on row and diameter between 1,5-2 cm) followed by variants V5, V3, V2, V4, an influence having corms decreasing diameter.

For tuberbulbs' category with a diameter less than 0,5 good results were obtained at variant V7 with corms planted at 10 cm and variant V1 (moistened corms); so, the distance when planting and moistening treatment had a positive influence.

For corms with a diameter between 0,5-0,9 cm good results were obtained at V6 (corms planted at 5 cm and diameter > 1,5 cm).

For the category 1,5 -2 cm moistening treatments gave the best results (V2 si V4).

CONCLUSIONS

1. Based on the experimental results above presented there can be extracted the following conclusions:
2. Not only the corms size used for planting, but also their density (at planting time), influence both production and quality for the future planting material.
3. Using corms with 1-2 cm diameter and keeping a distance on row between 5-10 cm, we can expect for a production around 88,4 (V5) and 90,9 (V7) flowering corms for 100 plants.
4. They have 5-5,6 cm diameter and 3 buds which anticipate up to 3 flower stems per corm.
5. As for the tuberbulbs moistening, for both variants (V2,V4) the results were better.
6. The corms quality obtained from „young" material are evidently superior.

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Tables

Table 1. The experimental variants

Experimental variants	Specification
V_1	Corms < 0,5 cm; unmoistened
V_2	Corms< 0,5 cm; moistened
V_3	Corms 0,5-0,9 cm; unmoistened
V_4	Corms 0,5-0,9 cm; moistened
V_5	Corms 1 cm; 5 cm, distance on the row
V_6	Corms 1,5 -2 cm, 5 cm; distance on the row
V_7	Corms 1,5-2 cm; 10 cm; distance on the row

Table 2. Parameters regarding the temperature, rainfalls, humidity, potential evapoperspiration for 2005

Month	Temperature yearly average	Rainfalls (mm)			ETP(mm) Monthly average	Relative humidity (%)	
		every month	max. In 24 hours	max. during the day		max.	min.
January	0.6	61.1	17	30	1	100	37
February	-2.2	58.3	14.8	27	-	100	41
March	3	29.7	10.8	28	11	97	23
April	10.5	35.2	27.2	22	49	76	18
May	16.8	76.9	27.1	7	97	88	24
June	18.4	82.1	15.6	7	116	96	27
July	21.6	50.6	14.7	11	139	99	41
August	20.8	147.6	65.8	6	122	95	30
September	16.0	269.6	126.4	20	78	100	29

Table 3. Springing dynamics

Experimental variants	The number of planted corms	Springing percent (%)			
		11 May	18 May	5 June	12 June
V_1	1100	0,45	9,2	17,36	22,63
V_2	1100	0,72	9	12,36	9,72
V_3	425	3,52	13,17	24,47	27,52
V_4	425	4,23	14,35	24,7	24,7
V_5	70	18,57	25,71	37,14	37,14
V_6	40	7,5	42,5	55	42,5
V_7	40	7,5	25	32,5	27,5

Table 4. Corms production on hundred plants

Experimental variant	Total corms for 100 plants	Corms diameters (cm)					Multiplication rate
		>2	1,5-2	1	0,5-0,9	<0,5	
V_1	630	35,7	39	25	127	401	6,3
V_2	1202	85,0	47	89	196	785	12
V_3	820	75,2	12	63	132	538	8,2
V_4	962	78,1	26	29	246	583	9,6
V_5	1103	88,4	15	69	300	631	11
V_6	1029	76,4	29	294	206	424	10,3
V_7	940	90,4	0	5	127	718	9,9

Table 5. Corms' weight (grams /100 plants)

Experimental variant	Corms size category (cm)					Total weight (g)
	>2	1,5-2	1	0,5-0,9	<0,5	
V_1	880	221	36	56	96	1289
V_2	2336	280	93	75	206	2990
V_3	2658	111	60	77	162	3068
V_4	2133	190	48	95	105	2571
V_5	2846	38	38	185	150	3257
V_6	3000	118	353	118	159	3748
V_7	236	0	91	91	182	600

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THE INFLUENCE OF CUTTINGS ON ROOTING OF SOME ORNAMENTAL SPECIES WITH DECORATIVE VALUE

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Keywords: micropropagation, ornamental varieties, tip cutting

ABSTRACT

The ornamental varieties of Cotinus and Acer have proved to be of high interest as ornamentals and have grown as individuals, groups, groups arrangements or hedgerow (1. 2). The studies carried out at the Research Institute for Fruit Growing have had in view the response of two Cotinus and two acer ornamental varieties to propagation by softwood cuttings, employing Radistim 2, Banoriz, using two cutting types (top and bottom cuttings) under artificial mist.

INTRODUCTION

The ornamental species and varieties of *Cotinus* and *Acer* genera are of great decorative interest, being utilized in landscape arrangements as simple samples or in together with others. The propagation of these ornamental varieties is usually difficult due to their specific biological features. The commercial extension of these varieties was done into a less extent due to a low rate of propagation, although these was a great demand as well as their difficult propagation on studies will be focused on: 1) behaviour of the ornamental varieties *Cotinus* and *Acer* , during the initial multiplication process, 2) new modern systems for utilization of the studied varieties in the landscape decorations and enrichment of *Cotinus, Acer* varieties with other valuable types. Achievements of our objectives will go to prove a better development of the ornamental varieties in the special nurseries bringing about a better improvement and balance of the environment, a major factor in the social life (Alina Posedaru, 2005, Stănică F. şi colab., 2002).

MATERIAL AND METHOD

The experiments were performed in the plastic tunnels at the Research Institute for Fruit Growing Pitesti – Maracineni, during 2004-2006.

We used two ornamental varieties of *Cotinus: Cotinus coggygria `Simfonia verii`* and *Cotinus coggygria `Royal Purple`* and two ornamental varieties of *Acer: Acer platanoides „Globosum”* and *Acer negundo „Variegatum”* as biological material.

The biological material involved consisted in simple, tip and bottom cuttings in the phase of semi-hard cuttings (bottom) and herbaceous cutting (top).

The summer cottage was done between June 30 – July 10.

After propagation, the cuttings defoliated at the bottom were treated by the biostimulators: Radistim 2 and Banoriz and then planted in a rooting perlite substrate.

After planting, the artificial mist was used.

According to biometric measurements on the rooting system the data were statistically analyzed using t test and Duncan.

The experiments were bifactoral (4 x 2) with 8 treatments in 3 replications arranged as subdivided plots.

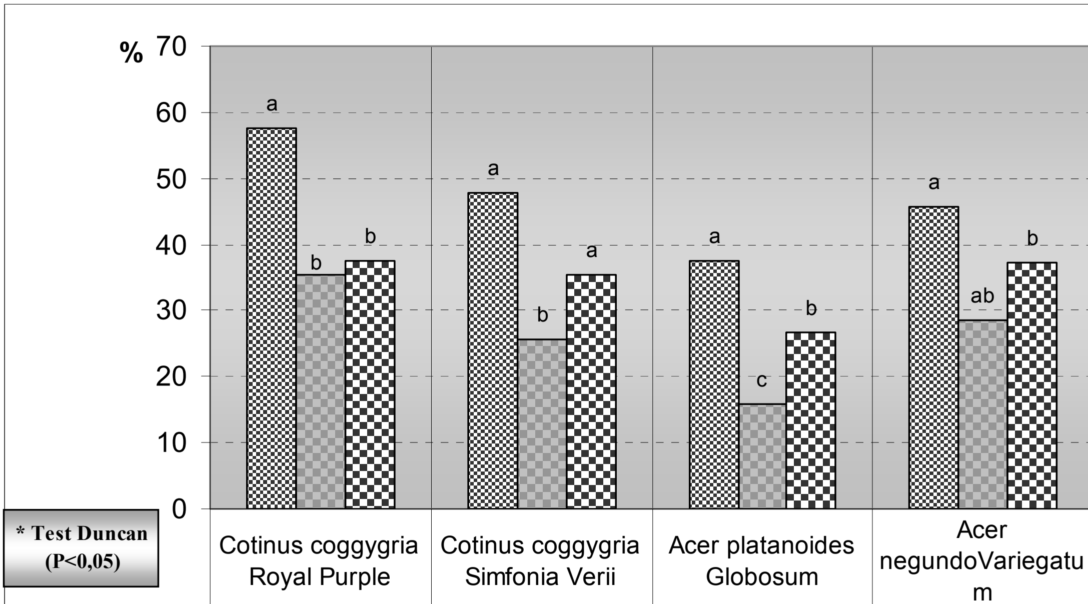
RESULTS AND DISCUSSION

The statistical analysis of the results showed a variation between the two ornamental varieties of *Cotinus* and two ornamental varieties of *Acer.*

Over the investigation period, *Cotinus coggygria "Royal Purple"* had a high rooting percentage, getting the first place in the two graduation of B factor (the values have ranged from 35.4 to 57.5%) and *Acer negundo Variegatum* had a rooting percentage between 28.8 – 45.7%.

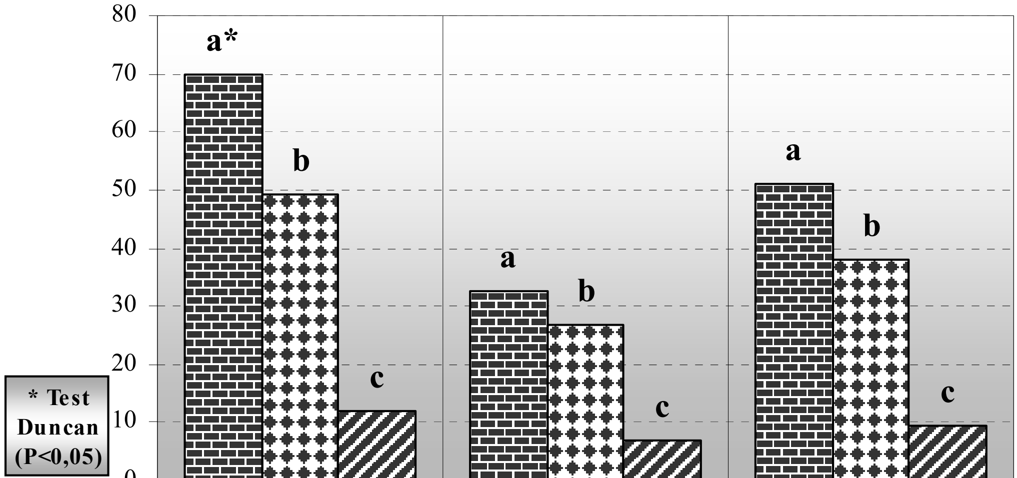
The average of rooting biostimulator (graph no. 2) proved Radistim 2 to be the best rooting biostimulator inducing the highest rooting yields in all ornamental varieties, with values between 32.5 – 69.7 %.

Fig. 1 indicated that the tip cutting induced the highest rooting in all varieties versus the bottom cutting (values between 15.8 – 57.5%).



	Cotinus coggygria Royal Purple	Cotinus coggygria Simfonia Verii	Acer platanoides Globosum	Acer negundoVariegatum
Top cutting	57,5	47,8	37,6	45,7
Bootom cutting	35,4	25,63	15,8	28,6
Media	37,6	35,4	26,7	37,2

Fig. 1 Variability of rooting percentage for the ornamental varieties of a tip and bottom cutting used



	Top cutting	Bottom cutting	Media
Radistim	69,7	32,5	51,1
Banoriz	49,1	26,7	37,9
Versue	11,9	6,7	9,3

Fig. 2 Variability of rooting percentage for ornamental varieties of a rooting biostimulator used

Fig. 3 Cuttings of Cotinus coggygria „Simfonia verii” and Cotinus coggygria „Royal purple”

Fig. 5 The cuttings of Cotinus coggygria „Simfonia verii” in the rooting space

CONCLUSIONS

1. The tip cuttings gave higher rooting yields versus the bottom cuttings in all ornamental varieties of *Cotinus* and ornamental varieties of *Acer*.
2. *Cotinus coggygria ”Royal Purple”* and *Acer negundo ”Variegatum”* varieties showed the highest rooting percentage in all treatments.
3. Application of the biostimulators (Radistim 2, Banoriz) has obviously improved the rooting yield versus the untreated control, treatment.

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BEHAVIOUR OF SOME ORNAMENTAL DECIDUOUS SPECIES IN THE VEGETATIVE PROPAGATION PROCESS

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Keywords: micropropagation, ornamental varieties, rooting, substrate

ABSTRACT

The ornamental species and varieties of Magnolia, Lagestroemia and Clematis genera are of great decorative interest being utilized in landscape arrangements as simple samples or together with others (1, 2). The propagation of these ornamental varieties is usually difficult due to their specific biological features. The studies carried out at the Research Institute for Fruit Growing have had in view the response of two Magnolia, one Lagestroemia and one Clematis ornamental varieties to propagation by softwood cuttings, employing Radistim 2, using two rooting substrates, under artificial mist.

INTRODUCTION

The importance of the ornamental deciduous species and varieties comes off their complex role in the landscape design and natural environment. The parks, family and organization gardens as well as the entertainment areas play a major role in the modern development of the towns. The propagation of these ornamental varieties is usually difficult due to their specific biological features. Having in view the importance of these species in the landscape field as well as their difficult propagation, studies focused on: behaviour of ornamental deciduous species in vegetative propagation process (Iliescu Ana Felicia, 2003).

MATERIAL AND METHOD

The experiments were performed in the plastic tunnels at the Research Institute for Fruit Growing Pitesti- Maracineni, during 2004-2006.

The studies carried out at Research Institute for Fruit Growing have had in view the response of two *Magnolia* ornamental varieties, one *Lagestroemia* ornamental variety and one *Clematis* ornamental variety to propagation by softwood cutting employing Radistim 2 biostimulator using two rooting substrates perlite and mixture perlite and peat.

The summer cottage was done between June 15–July 20 as recommended (4).

After propagation, the cuttings defoliated at the bottom were treated by the biostimulators: Radistim 2 and then planted in a two rooting substrates.

After planting, the artificial mist was used.

According to biometric measurements on the rooting system the data were statistically recorded using test t and test Duncan.

The experiments were bifactorial (4x2) with 8 treatments in 3 replications arranged as subdivided plots as reported by I. Botu (1997).

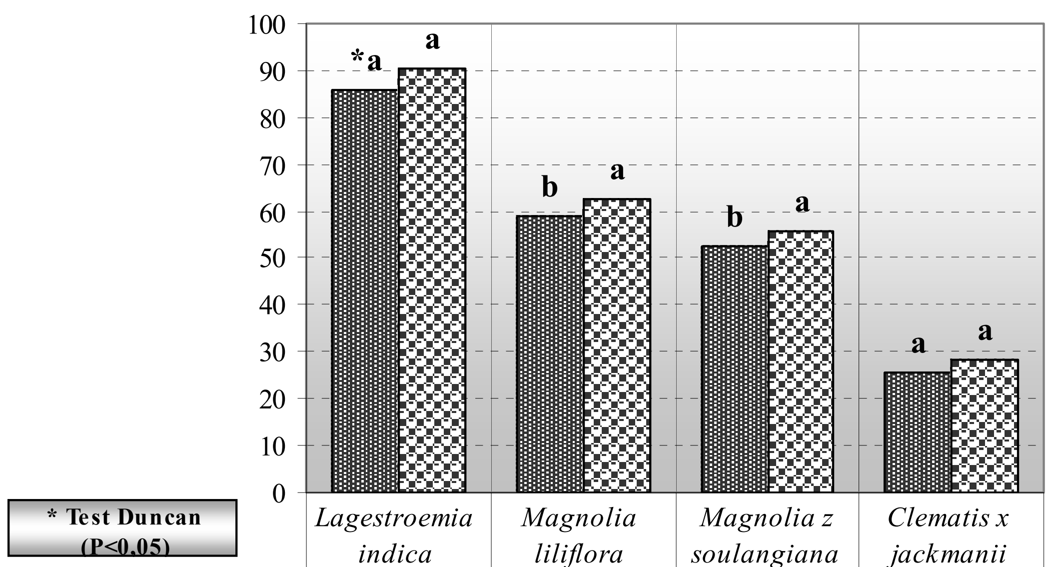
RESULTS AND DISCUSSION

The statistical analysis of the results has shown a variation between the two ornamental varieties of *Magnolia, Lagestroemia* and *Clematis*.

Over the investigation period, *Lagestroemia indica* had a high rooting percentage, getting the first place in the two graduations of B factor (the values have ranged from 85.8 to 90.2 %, fig. 1) and *Magnolia liliflora* with values between 58.8-62.4 %.

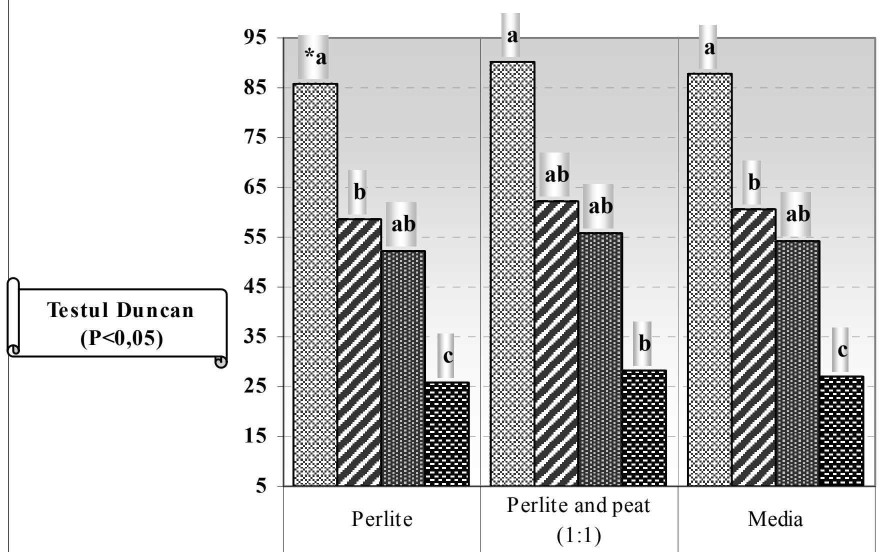
Clematis x jackmanii" had a little rooting percentage, (the values have ranged from 25.7-28.3 %, fig. 1).

The average of rooting substrates (fig. 2) proved that the mixture perlite and peat to be the best rooting substrates inducing the highest rooting yields in all ornamental varieties, with values between 32.5-69.7 %.



	Lagestroemia indica	Magnolia liliflora	Magnolia z soulangiana	Clematis x jackmanii
Perlite	*85,8*	*58,8*	*52,4*	*25,7*
Perlite and peat (1:1)	*90,2*	*62,4*	*55,7*	*28,3*

Fig. 1 Variability of rooting percentage for the ornamental varieties of the rooting substrates used



	Perlite	Perlite and peat (1:1)	Media
Lagestroemia indica	85,80	90,20	88,0
Magnolia liliflora	58,80	62,40	60,6
Magnolia x soulangiana	52,40	55,70	54,1
Clematis x jackmanii	25,70	28,30	27,0

Fig. 2 Variability of rooting percentage for the ornamental varieties, of the rooting substrates used

Fig. 3 Cuttings of *Lagestroemia indica* at rooting in the perlite substrate

Fig. 4 The cuttings of *Magnolia liliflora*

CONCLUSIONS

1. *Lagestroemia indica* and *Magnolia liliflora* showed the highest rooting percentage in all treatments.
2. *Clematis x jackmanii"* had a little rooting percentage, the values have ranged between 25.7-28.3 %.
3. The media of rooting substrates proved that between mixture perlite and peat to be the best rooting substrates inducing the highest rooting yields in all ornamental varieties, with values between 32.5-69.7 %.

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INFLUENCE OF VARIOUS CULTURE MEDIA ON *IN VITRO* DIFFERENTIATION FOR SOME ORNAMENTAL SPECIES/VARIETIES

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Keywords: micropropagation, macroelements, microelements, growth hormones, meristems.

ABSTRACT

This paper deals with partial results on the influence of culture media used for the investigated species/varieties: Acer negundo „Variegatum", Acer platanoides "Globosum", Cotinus coggygria "Royal Purple", Cotinus coggygria "Simfonia Verii" and Clematis „Contesse de Bouchand". From all media tested, the best differentiation results have been obtained in the case of the Lepoivre medium for Acer platanoides "Globosum" with 91.6% and for Acer negundo „Variegatum with 75%, in case of the Murashige & Skoog medium for Acer platanoides "Globosum" with 75% and for Cotinus coggygria "Royal Purple" with 66.6%. As opposed to the above species/varieties, Acer platanoides "Globosum" have also given good results on the Lee Fossard medium, showing 83.3% differentiation.

INTRODUCTION

The higher interest for private gardens and parks decoration generate a massive increase in demand for dendrological planting material. *In vitro* propagation has got the advantage of producing a high amount of healthy plants in a short period of time, juvenile material with great capacity of propagation material (Cachita - Cosma, 1987) and lead to *Clematis, Acer* and *Cotinus in vitro* propagation capacity assessment, in order to satisfy the market demand for these species/varieties. The efficiency of micropropagation is related to the *in vitro* cultural conditions. In every plant organism each nutrient proves a full efficiency, only together with the other elements participating to plant metabolism reactions (Trifu & Barbat, 1997). Taking in to account these references must be considered that in order to get success for such kind of microcultures, the key factors are: culture media, growth hormones, organic carbon source, light intensity, etc. According to other authors (Isac, 1983), the requirements are different depending on the explants used. Another important factor influencing the explants regeneration is the optimum moment for biological material prelevation from the mother plant (Popescu, 1986).

The objectives of this study were:

- testing of the differentiation ability of the studied species/varieties related to the cultural medium;
- finding of the optimum moment for meristems prelevation.

MATERIAL AND METHOD

The studies on the initiation and *in vitro* multiplication of the studied species were carried out at the Virology and Tissue Culture Lab (Research Institute for Fruit Growing Pitesti-Maracineni, Arges) between April-September, 2006.

Biological material: auxiliary buds on one year shoots. The shoots were sampled in April from the mother plants from the collection of the ornamental park of the Research Institute for Fruit Growing Pitesti-Maracineni, (step I) and July (step II).

For the initiation phase, the explants source was represented by the meristems with 2-3 foliar primordials (2-3 mm), collected from the axilary buds for *Acer negundo „Variegatum",* *Acer platanoides ”Globosum”, Cotinus coggygria ”Royal Purple”, Cotinus coggygria ”Simfonia Verii”* and microcuttings with one bud (one node segments) for *Clematis „Contesse de Bouchand”*.

Optimum period determination for the meristems and microcuttings prelevation was performed in two steps: first step in April and the second step in July.

To disinfect the plants, washing with distilled water, immersion in ethylic alcohol of 96^0 (2-10 minutes depending on the species), immersion in Ca hypochlorite (5-20 minutes related to the species), washing with distilled and sterile water (3 x 10 minutes) were done (table 1).

Table 1. Biological material disinfecting

Nr. crt.	**Species / variety**	**Time of the disinfecting substance (min)**	
		Ethylic alcohol 96^0	**Ca hypochlorite**
1	*Acer negundo „Variegatum”*	3	7
2	*Acer platanoides ”Globosum”,*	5	10
3	*Cotinus coggygria ”Royal Purple”*	10	20
4	*Cotinus coggygria ”Simfonia Verii”*	10	20
5	*Clematis „Contesse de Bouchand”*	2	5

As nutrient media, Murashige & Skoog (1962), Lee Fossard (1972) and Lepoivre (1977) were used (table 2), with the following - differentiation: IBA = 0.1 ml/l; GA_3 = 1 ml/l.

As source of organic carbon dextrose (30 g/l) and agar (8 g/l) for gelling agent was used. Three treatments of growing media were preparated (table 3).

The nutrient media were sterilized in a sterilizer at a temperature (T) of 115-120^0 C for 20 minutes. Inoculations were performed in glass vessels at the laminar air flow hood. The conditions from the growing chamber were set to 21-24 ^{0} C, with periods of 16 hours of light, 8 hours of dark and a light of 2.000-2.500 lux.

Table 2. Composition of the basic nutrient media for *in vitro* propagation of some ornamental species/varieties

Components	**Medium concentration (mg/l)**		
	Murashige & Skoog (1962)	**Lee Fossard (1977)**	**Lepoivre (1977)**
Macroelements			
NH_4NO_3	1650	800	400
$Ca(NO_3)2$	-	-	1200
KNO_3	1900	1011	1800
NaH_2PO_4	-	138	-
CaCl2	440	438	-
$MgSO_47H_2O$	370	370	360
K_2SO_4	-	-	-
KH_2PO_4	170	-	270
Microelements			
K 1	0,83	0,20	0,08
H_3BO_3	6,2	3,09	6,20
$MnSO_4$-H_2O	22,3	8,45	1,00
$ZnSO_4$-$7H_2O$	8,6	5,75	8,60
Na_2MoO_4-$2H_2O$	0,250	0,024	0,25
$CuSO_4$-$5H_2O$	0,025	0,024	0,025
CaCl2-6H2O	0,025	0,118	0,025
Na_2EDTA	-	18,61	-
$FeSO_4$-$7H_2O$	-	10,70	-
Na_2SO_4	-	144,99	-
Vitamins and Amino acids			
Inositol	100	54,05	50
Acid nicotinic	0,5	2,40	-
Pyridoxine HCl	0,5	0,6	-
Acid ascorbic	1,0	0,176	-
Thiamine	0,1	0,6	0,4
Glicina	2,0	0,37	-
Cisteina HCl	-	7,2	-

Table 3. Composition of the nutrient media tried in the differentiation phase

Composition	Treatment		
	T1	T2	T3
Macro elements	Murashige & Skoog	Lee Fossard	Lepoivre
Microelements	Murashige & Skoog	Lee Fossard	Lepoivre
Vitamins	Murashige & Skoog	Lee Fossard	Linsmeier
Dextrose (g/l)	40	40	40
Agar (g/l)	8	8	8
GA_3 (ml/l)	1	1	1
IBA (ml/l)	0,1	0,1	0,1
NaFeEDTA (ml/l)	3,2	3,2	3,2

RESULTS AND DISCUSSION

The studies on *in vitro* differentiation and multiplication emphasized the various responses of the ornamental species/varieties to the 3 nutrient media tried.

The best differentiation (over 75 %) showed *Acer platanoides „Globosum",* on all 3 nutrient media. Also, a good differentiation had *Cotinus coggygria „Royal Purple"* (50 % on Lee Fossard and 66.6 % on Murashige & Skoog).

The lowest differentiation was obtained with *Clematis „Contesse de Bouchaud"* (16.6-50 %).

One can notice that on the same nutrient medium, the values differ from one species to another. So, on Lepoivre medium, the values ranged from 16.6 % for *Clematis „Contesse de Bouchaud"* and *Cotinus coggygria „Simfonia Verii",* to *33.3 %* for *Cotinus coggygria „Royal Purple"*, 75 % *Acer negundo „Variegatum"*and to 91.6 % for *Acer platanoides „Globosum".*

With Murashige & Skoog medium, the following values were found: 16.6 % for *Cotinus coggygria „Simfonia Verii"*and *Acer negundo „Varigatum"*; 50 % for *Clematis „Contesse de Bouchaud";* 66.6 % for *Cotinus coggygria „Royal Purple"*and 75 % for *Acer platanoides "Glob sum".*

With Lee Fossard, the explants had values between: 16.6 % for *Clematis „Contesse de Bouchaud"*; 50 % for *Cotinus coggygria „Royal Purple"* and *Acer negundo „Varigatum"*, 66.6 % for *Cotinus coggygria „Simfonia Verii"* şi 83.3 % for *Acer platanoides „Globosum",* table 4.

Regarding the optimum period for meristems prelevation in the used treatments, it was noticed that the optimum period influenced the regenerative capacity of the explants. Analyzing table 4 we can observe that the best results were obtained in the first step of meristem prelevation:

- for *Acer negundo „Varigatum"* the differentiation rate varied between 16.6% - 50% in the first step versus 16.6% - 33.3% in the second step;
- for *Acer platanoides "Globosum"* the differentiation rate ranged between 16.6% - 50% in the first step versus 16.6% - 33.3% in the second step;
- for *Cotinus coggygria „Royal Purple"* the differentiation rate varied between 33.3% - 66.6% in the first step versus 16.6% - 50% in the second step;
- for *Cotinus coggygria „Simfonia Verii"* the differentiation rate ranged between 16.6% - 66.6% in the first step versus 16.6% - 50% in the second step;
- for *Clematis „Contesse de Bouchaud"* the differentiation rate varied between 16.6% - 50% in the first step versus 16.6% in the second step.

The shoots developed at the end of differentiation phase (about in 4-5 weeks) were transferred to the multiplication medium.

Table 4. Influence of the nutrient medium in the *in vitro* differentiation phase

No	Species/ Variety	Treatment 1				Treatment 2			Treatment 3		
		Meristems prelevation step	Grown inoculs	Different inoculs	%	Grown inoculs	Different inoculs	%	Grown inoculs	Different inoculs	%
1	*Acer negundo ”Variegatum”*	Step I	12	2	16,6	12	6	50	12	9	75
		Step II	12	2	16,6	12	4	33,3	12	3	25
2	*Acer platanoides ”Globosum”*	Step I	12	9	75	12	10	83,3	12	11	91,6
		Step II	12	6	50	12	8	66,6	12	6	50
3	*Cotinus coggygria ”Royal Purple”*	Step I	12	8	66,6	12	6	50	12	4	33,3
		Step II	12	6	50	12	4	33,3	12	2	16,6
4	*Cotinus coggygria ”Simfonia Verii”*	Step I	12	2	16,6	12	8	66,6	12	2	16,6
		Step II	12	2	16,6	12	6	50	12	2	16,6
5	*Clematis ”Contesse de Bouchaud”*	Step I	12	6	50	12	2	16,6	12	2	16,6
		Step II	12	2	16,6	12	2	16,6	12	2	16,6

CONCLUSIONS

1. In the differentiations phase, the varieties *Cotinus coggygria „Royal Purple”* and *Clematis „Contesse de Bouchaud”* need a higher level of salts; the Murashige & Skoog medium provides the best requirements for those species.
2. The species *Acer negundo „Variegatum”* and *Acer platanoides „Globosum”* gave the best results on Lepoivre medium which was known to have a lower content of aminoacids.
3. *Cotinus coggygria „Simfonia Verii”* showed the best differentiation on Lee Fossard medium supplemented with Na_2 EDTA, Fe SO_4- 7 H_2O and Na SO_4.
4. The best period for meristems prelevation on the studied species/varieties proved to be in April (step I), and the regenerative capacity of the explant was lower in July (step II).

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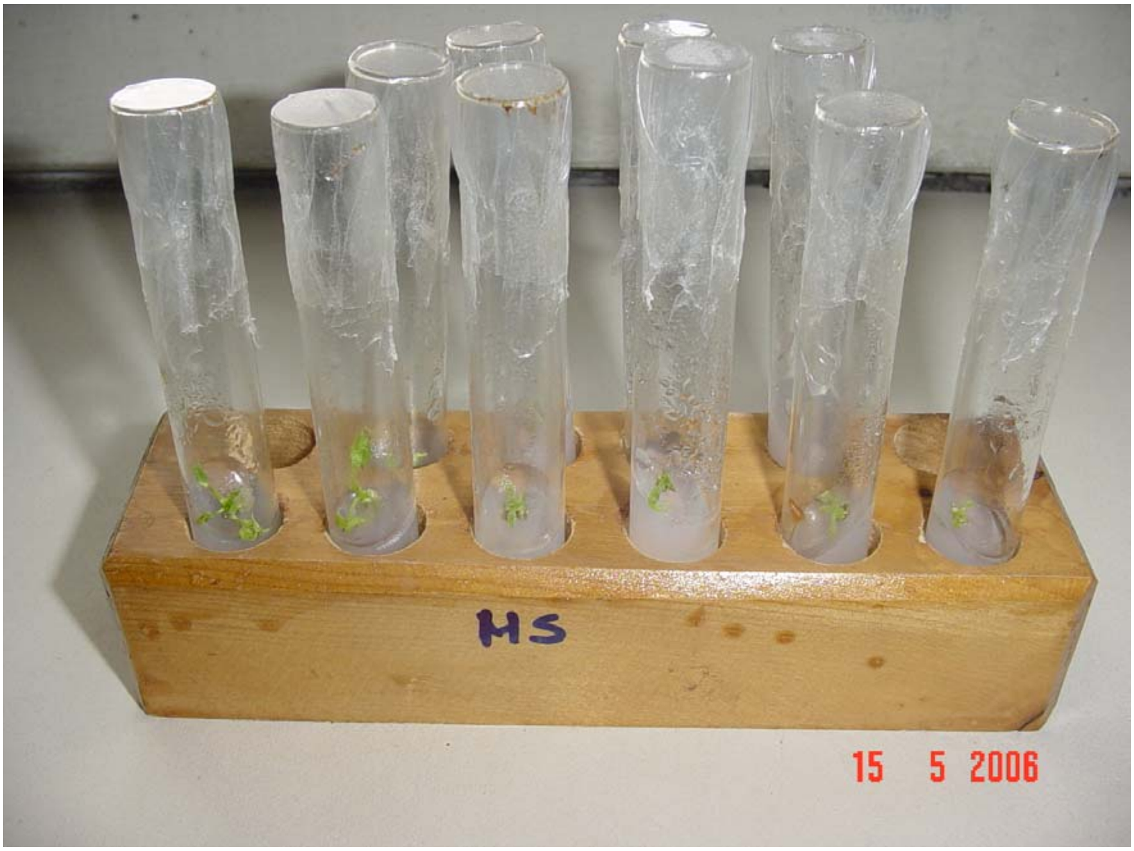

Fig. 1 *Cotinus coggygria „Simfonia Verii”* in differentiation phase.

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INFLUENCE OF BIOTIC AND ABIOTIC FACTORS ON EXPLANT GROWTH DURING THE INITIATION OF IN VITRO CULTURE OF *EUSTOMA GRANDIFLORUM*

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Key words: *Eustoma*, micropropagation, explant, photoperiod, acclimatization

ABSTRACT

The purpose was to identify the abiotic and biotic influence of factors in the initiation phase of *in vitro* culture at sp. *Eustoma grandiflorum*. It has been determinate the composition of the nutritive substrates, the rate of explants growing, times of disinfection.

INTRODUCTION

By liberalization of the import seeds, multiplied materials, plants and cutting flowers, the market of the Romanian flowers increased almost at the level of the European market of flowers. (Figure 1)

As a conclusion of the import of flowers, the sortiment of flowers from Romania is very rich with high value. One of these species of flowers which entered in the Romanian market of flowers is "*Eustoma grandiflorum*".

The Objectives of the Research

- To optimize the abiotic factors in the initiation phase of the in vitro culture
- To maximize the rate of growing and the stabilization of the culture

MATERIALS AND METHODS

To determinate the influence of genotypes regarding the growing of explants in the initiation phase of culture we worked with the following cultivars (figure 2):

- Asenka, with simple and blue flowers, from the Kyoto series;
- Magic Blue, with double and blue flowers, from Fuji series;
- Echo White, with double and white flowers, from Fuji series;

The biologic material was disinfected by keeping in the 94% ethylic alcohol and 6% hypochlorite of calcium, and then it washed with distillate water, sterilized by autoclave. For stabilization the times of disinfections was made variants, in according with table number one.

The explants are very young tissues prepared at binocular magnifying glass in aseptic conditions.

The nutritive substrates, solidified and tested for the initiation phase had a different composition in vitamins and phytohormones, in according with the tables number two and three.

The nutritive substrates was controlled and the value of the pH was 5.6 – 5.8.

The nutritive substrates were sterilization by autoclave at one atmosphere (121^{0}C) and 20 minutes.

The explants pasted at nutritive substrates were kept on the initiation period of culture at 22-24^{0}C temperature, 16 hours photoperiod and 3500 lux light intensity, in the growing room (Figure 3).

RESULTS AND DISCUSSIONS

The results obtained by disinfection of the biological material demonstrated that the culture degree of the contamination decreased meantime the time of keeping in the disinfection substances is until four minutes in ethylic alcohol and eight minutes in hypochlorite of calcium.

The growing of disinfections time at five minutes reduced the degree of the contamination of culture at zero, but the quality explants was affected.

The observations and the registered data led to different culture degree of contamination from the genotypes point of view. Thus, in the same variant of disinfection, the highest degree of contamination was at the Asenka (60-23%) genotype, and the lowest at the Echo White genotypes (40-8%), in according with the table number four.

At the same level of vitamins, the results concerning the growing of explants are different from cytokine concentration point of view.

In the case of using Murashige – Skoog vitamins, at the all cultivars, the percent of explants growing increased with growing BAP concentration. The lowest results were obtained in the V.1, at 0.5 mg/l BAP (27-41%) and the highest results concerning the percent of explants growing (54 -63%) were register in V.3 at 1.5 mg/l cytokine concentration (figure 4).

From point of view of the explants aspect, was observed in V.3, where the percent of growing was highest, and the phenomenon of vitrification.

In case of using White vitamins, the lowest percent of explants growing was registered in V.4 (54 68%) at 0.5 mg/l cytokine. BAP increasing at 1.0 mg/l lead to the highest result of explants growing in V.5 (82-96%) (figure 5).

CONCLUSIONS

In general, the cultivars of *Eustoma grandiflorum* (Echo White, Magic Blue, Asenka) researched was a good behaviour in the initiation phase of *in vitro* culture.

The observations and register data lead at the following conclusions:

1. For material disinfection is recommended the keeping in the 94% ethylic alcohol (4 minutes) and hypochlorite of calcium (8 minutes), then it will be wash with distillate water sterilized;
2. The growing of explants is influenced by nutritive substrates composition, the highest results could be obtain on the following substrate: Murashige – Skoog macro and microelement, White vitamins, 1.0 mg/l BAP, 32.0 mg/l NaFeEDTA, 40.0 g/l glucose, 7.0 g/l agar;
3. The best behaviour in the *in vitro* culture had Echo White, then Magic Blue, Asenka.

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Tables

Table 1. Time of disinfections for the biological material (minutes)

Variants	ethylic alcohol	hypochlorite of calcium
1.	2	4
2.	3	6
3.	4	8
4.	5	10

Table 2. The composition of nutritive substrate in the initiation phase

Components	V.1	V.2	V.3	V.4	V.5	V.6
Macroelements	MS	MS	MS	MS	MS	MS
Microelements	MS	MS	MS	MS	MS	MS
Vitamins	MS	MS	MS	W	W	W
Benzyl Aminopurine mg/l	0,5	1,0	1,5	0,5	1,0	1,5
NaFeEDTA	32,0	32,0	32,0	32,0	32,0	32,0
Glucose g/l	40,0	40,0	40,0	40,0	40,0	40,0
Agar g/l	7,0	7,0	7,0	7,0	7,0	7,0

Legend: MS = Murashige – Skoog (1962), W = White (1937)

Table 3. The composition of macro, microelements and vitamins used in the initiation phase of culture

Components (mg/l)	Macroelement MS	Microelement MS	Vitamins MS	Vitamins W
Potassium azotate	1650	-	-	-
Ammonium azotate	1900	-	-	-
Cobalt chloride	440	-	-	-
Magnesium sulphate	370	-	-	-
Mono Potassium Phosphate	170	-	-	-
Manganese sulphate	-	22,3	-	-
Zinc sulphate	-	8,6	-	-
Boric acid	-	6,2	-	-
Copper sulphate	-	0,025	-	-
Sodium molybdate	-	0,25	-	-
Cobalt chloride	-	0,025	-	-
Potassium iodide	-	0,83	-	-
Nicotinic acid	-	-	0,5	-
Pyridoxine	-	-	0,5	-
Thiamine	-	-	0,1	1,0
Glycine	-	-	2,0	-
Inositol	-	-	100,0	-

Table 4. The influence of the disinfections method and genotypes upon degree of the culture contamination

Variants	Contamination degree (%)		
	Asenka	Magic Blue	Echo White
1.	60	48	40
2.	34	26	21
3.	23	17	8
4.	N	N	N

N = burned

Figures

Figure 1. *Eustoma grandiflorum*

Asenka | Magic Blue | Echo White

Figure 2. *Eustoma grandiflorum* cultivars

Figure 3. Aspect from the growing room

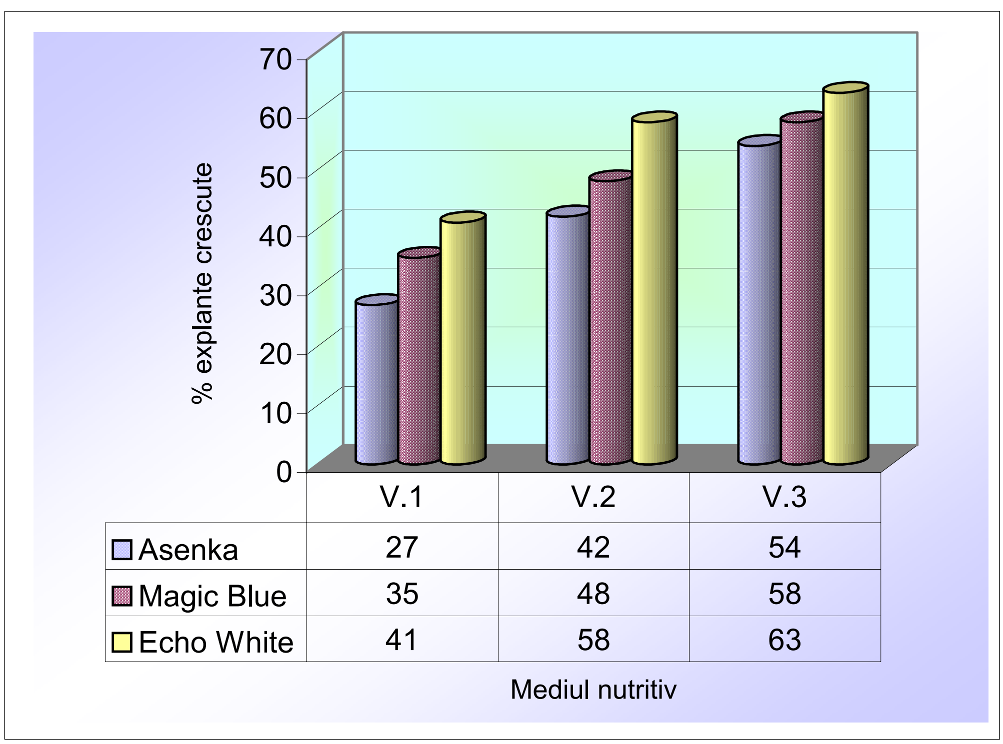

Figure 4. Murashuge – Skoog vitamins and cytokine influence upon explants growing

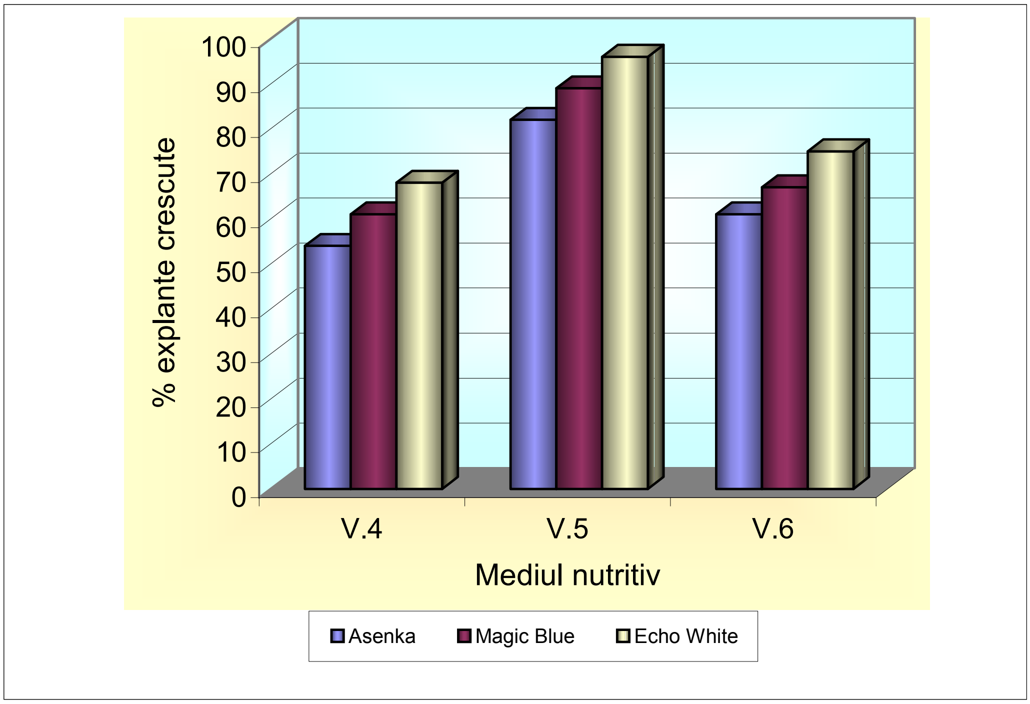

Figure 5. White vitamins influence upon explants growing

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GARDEN IN MOTION THEORY AND ITS APPLICATION IN THE HERĂSTRĂU PARK

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Keywords: garden in motion, ecology, Herăstrău Park

ABSTRACT

In this paper, I will briefly present the ecological theory developed by the French landscaper engineer Gilles Clément, called garden in motion (*jardin en movement*) and argue for the desirability of applying the above-mentioned theory to an almost derelict area of the Herăstrău Park, in Bucharest. The concept of garden in motion is inspired by waste grounds, places where plants growing spontaneously are allowed to develop freely. The garden and the landscape are always changing, they are not permanent. The plants, the seeds are always moving and thus are transforming the spaces where they end up being implanted. The landscape architect or the gardener has to choose between leaving the nature develop freely and interfering. His task is to interpret the plants' interactions and then to decide where and how much to interfere in order to maintain and to improve biodiversity (.e.g. he has to decide how to balance light and shadow, to decide on the arbitration between different species etc). The concept of garden in motion is well known and very well received all over the world. It is its ecological importance that makes me propose its application in Romania too, in Bucharest, in the northern area of the Herăstrău Park.

INTRODUCTION

The aim of this paper is twofold. I will start by briefly presenting the garden in motion theory (*jardin en movement*), also known as differentiate management. This theory was developed by a worldwide known professional and theorist, the French landscape engineer Gilles Clément, who is little-known in our country. In the second part of the paper I will go on to argue for the desirability of applying the above-mentioned theory to an almost derelict area in the northern part of the Herăstrău Park from Bucharest.

MATERIALS AND METHODS

The methods I used in studying/analysing the garden in motion theory are:
- study of documents: books, reviews, internet sites, images;
- visits and analyses of sites where the theory was applied
- systemisation of analyses.

The methods I used in finding and presenting the appropriate site for applying garden in motion theory in Bucharest:
- study of documents about Bucharest: plans, books, reviews

RESULTS AND DISCUSSION

Garden in motion (*jardin en movement*)

Gilles Clément, landscaper, horticulturist engineer, rare plant searcher and professor at Ecole Nationale Supérieure du Paysage de la Versailles, has imposed himself during the last 3 decades in France and worldwide as a first-rank artist and theorist. Experimenting since 1977 the management of a derelict terrain that he named *jardin en movement* on his Creuse domain, France, he extracted doctrine elements that he applies to many of his works ever since, every time differently, depending on the specific site and climate.

Inspired by waste grounds, places where plants growing spontaneously are allowed to develop freely. The garden and the landscape are always changing, they are not permanent. The plants, the seeds are always moving and thus are transforming the spaces where they end up being implanted. The landscape architect or the gardener has to choose between leaving the nature develop freely and interfering. His task is to interpret the plants' interactions and then to decide where and how much to interfere in order to maintain and to improve biodiversity (.e.g. he has to decide how to balance light and shadow, to decide on the arbitration between different species etc).

This theory changes the formal concept of garden, which, here, is totally in the gardener's hands. The design of the garden, changing through time, depends on the maintainer, i.e. it does not result from a previous conception worked out on the paper.

This type of management, thus of garden conception, was first applied, with a lot of success, as I already mentioned, in Clément's Creuse domain (authentic and continuous laboratory), then in French towns and worldwide, sometimes as the generic title of differentiate management. The most famous public park where Clément applied this concept is André Citröen Park in Paris (followed by Matisse Park in Lille). Here he created a garden in motion, with exactly this name (Fig.4, 5 and 6).

Applying garden in motion theory in Bucharest

The appropriate site for applying the garden in motion theory in Bucharest is a northern area of the Herăstrău Park, between Băneasa Bridge and Nordului Avenue (Fig.7 and 8). I have chosen this area because it is almost derelict, without utilities, and because people love it and use it the way it is, and applying there garden in motion concept would minimally change it (Fig.9, 10 and 11).

The Herăstrău Park, a historical park, was first conceived by the German architect Fritz Rebhun with the purpose of organising exhibitions, only in the southern part of the lake, then, after 1950, it was transformed in a big park for culture and relaxation. As a consequence of the program established by the communist government to develop the green areas of Bucharest, it was decided to extend Herastrau Park in the northern part of the lake. The project achievement brought new types of relaxation to the inhabitants of Bucharest as restaurants, playing fields, spaces for recreation and aquatic sports, playgrounds for children, mechanical equipments for entertainment. It became the largest park in Bucharest. In the '70 Herăstrău Park was submitted to new modifications, which increased its value and interest, especially in its central zone.

At present, the park is the subject of a study initiated by the town council with the view to evaluate the general state of the park and of the vegetation, in order to plan the rehabilitation.

The area I have chosen to apply garden in motion theory in Herăstrău Park was never design, and it is almost derelict (Fig.9, 10 and 11).

CONCLUSIONS

1. Garden in motion's main objective is to maintain and to improve biodiversity, and so it is very important, I would say even necessary, to apply it in Romania also, for ecological reasons.
2. The northern area of the Herăstrău Park is very appropriate for applying this theory in Bucharest, because of its state of dereliction, and because people use it and love it the way it is, and applying garden in motion concept here would live it almost the way it is.

3. The project, once realised, must be observed and managed very carefully and continuously.

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14. *** www.culture-routes.lu/php/fo_index.php?lng=fr&dest=bd_pa_det&id=00000146

Figures

Fig. 1. Image from the garden in motion at The Creuse domain – pulled down trees used by men or by plants (after Hucliez Marielle 1999)

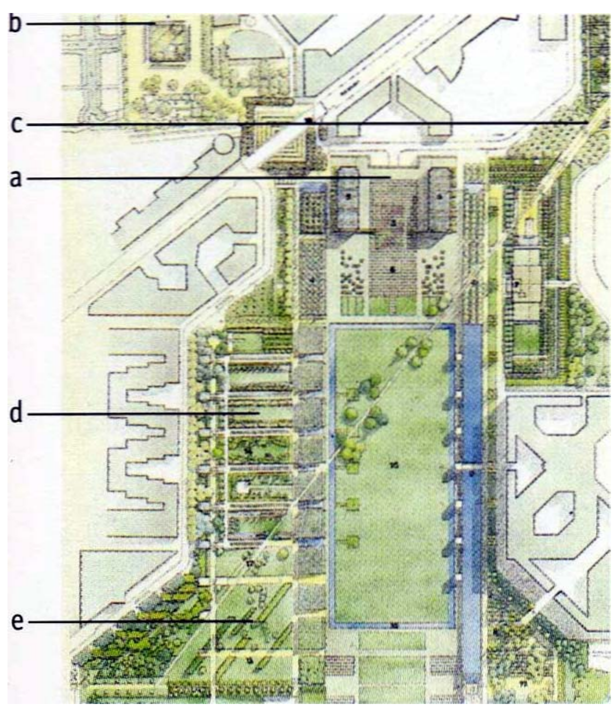

Fig. 2. Citröen Park plan: e - The Garden in Motion (after Hucliez Marielle 1999)

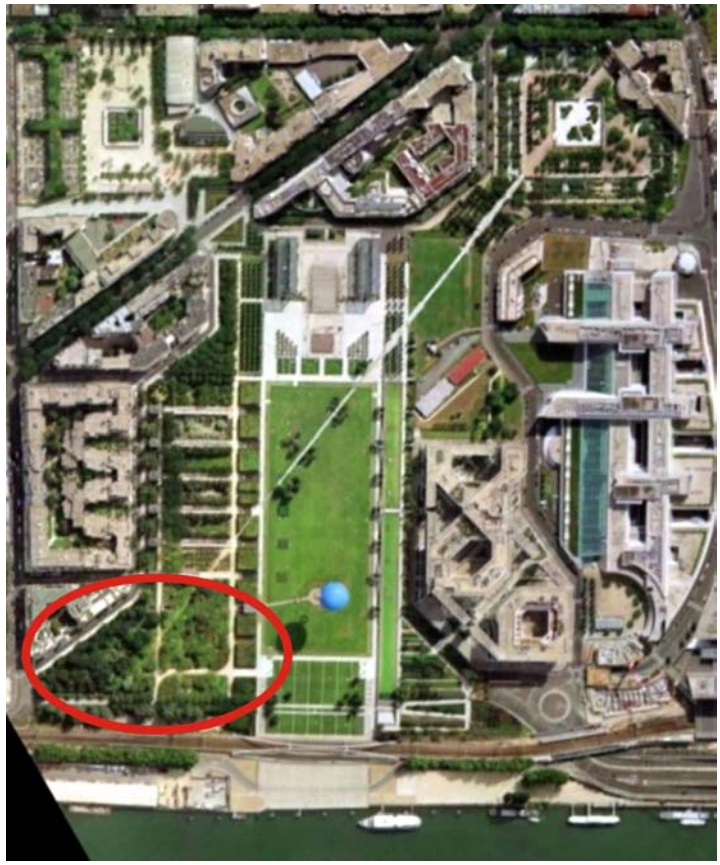

Fig. 3. Citröen Park plan: The Garden in Motion (after Google Earth)

Fig. 4. Image of The Garden in Motion, Citröen Park – Rosa sericeea
(after Hucliez Marielle 1999)

Fig. 5. Image of The Garden in Motion, Citröen Park (after Hucliez Marielle 1999)

Fig. 6. Image of The Garden in Motion, Citröen Park, 2000

Fig. 7. Herăstrău Park plan (after Iliescu Ana-Felicia 2003)

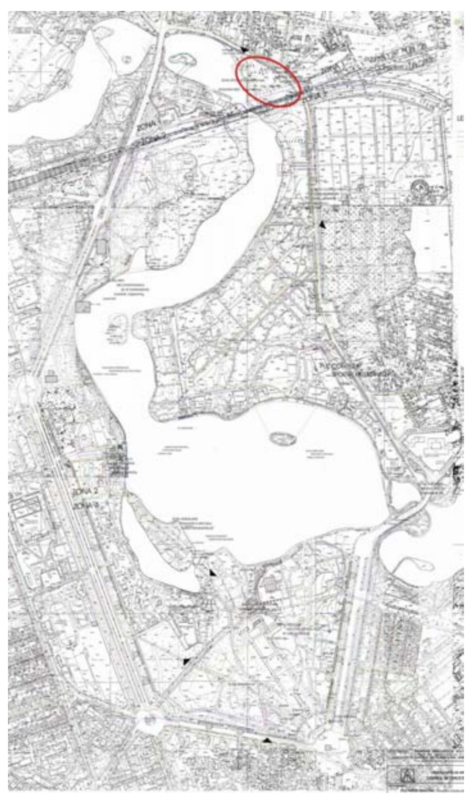

Fig. 8. Plan of Herăstrău Park (survey)

Fig. 9. Northern Herăstrău Park

Fig. 10. Northern Herăstrău Park

Fig. 11. Northern Herăstrău Park

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FRUIT GROWING & TECHNOLOGY

ANTIFUNGAL PROPERTIES OF ESSENTIAL OILS ON *MALUS* POSTHARVEST PATHOGENS

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Keywords: plant essential oils, fungitoxic properties, *Malus* fruits, postharvest pathogens

ABSTRACT

The fungal decay of fruits in postharvest storage greatly limits their economic value. Although fungicide treatments have been the main method for controlling postharvest diseases, public concern about fungicide residues in food and the development of fungicide resistance by pathogens has increased the search for alternative means of controlling diseases.
Certain plant essential oils have a broad spectrum of activity against pests and pathogens. As such, they have considerable potential as crop protectants, being safe to user and the environment. The antifungal and fungicidal effects of seven plant essential oils were studied in a series of *in vitro* experiments. Mycelial growth of *Monilinia fructigena*, *Penicillium expansum* and *Rhizopus stolonifer* was totally inhibited by basil, dill, lavender and peppermint essential oils. These finding suggest that these essential oils have strong fungicidal activity and need exploitation as an alternative source of natural antifungal agents.

INTRODUCTION

Fruits are highly perishable products, especially during the postharvest phase, when considerable losses can occur. Losses which are related to a ready-for-marketing commodity, with a high added value, are of economic importance. One of the research priority areas for enhanced fruit production was identified as reducing postharvest losses due to microbiological diseases.

Adequate storage methods (controlled atmosphere storage, refrigeration) capable of slowing down the development of pathogens can prevent or reduce losses. Chemical control remains the main measure to reduce the incidence of postharvest diseases in various fruits. Fungicides belonging to benzimidazoles, aromatic hydrocarbons and sterol biosynthesis inhibitors are often used as postharvest treatments. However, the risk of pathogen resistance to different active fungicidal ingredients is a serious problem (60-80% *Penicillium expansum* isolates are resistant to benzimidazoles). Pathogens resistance to fungicides has rendered curtains products ineffective, creating a need for new ones with alternative modes of action.

In addition, there is an widespread public concern for long-term health and environmental effects of synthetic pesticides, the demand for reduction in the use of pesticides in horticulture increasing the interest in alternative biological control methods.

Along with the use of antagonist microorganisms, emerging postharvest biocontrol technology employs other approaches, such as intensification of the natural defence mechanisms commonly present in the fruit after harvesting and use of natural compounds.

During the last years there has been growing interest in testing natural compounds of different origins as defence for cultivated plants against pathogenic fungi. The exploitation of natural substances such as essential oils, safer to consumers and the environment for the control of postharvest pathogens (wild type and resistant strains to fungicides) could be an alternative.

Essential oils are natural occurring terpenic mixtures, whose insecticidal and fungicidal action against some important specific pests and plant pathogens have been reviewed (Isman, 2000). Certain essential plant oils, widely used as fragrances and flavours in the perfume and food industries, have been long reputed to repel insects and recent investigations in several countries confirm their fungicidal action against some important plant pathogens.

Our interest is focused on the effectiveness of several essential oils against important postharvest *Malus* pathogens with a view to identify those essential oils which may have potential for development as alternative control products.

The objective of the present study was to screen the antifungal properties of essential oils from basil (*Ocimum basilicum*), dill (*Anethum graveolens*), thyme (*Thymus capitatus*), lavender (*Lavandula angustifolia*), pine (*Pinus sylvestris*), lemmon (*Citrus limonum*), peppermint (*Mentha piperita*) on the growth of *Monilinia fructigena*, *Penicillium expansum* and *Rhizopus stolonifer*. These pathogens causes serious postharvest losses due to their development during the storage and distribution of fruits. *Monilinia fructigena* causes considerable yield losses and is also an important postharvest pathogen, causing fruit rot in apple. *Penicillium expansum* is one of the main postharvest pathogen in apple. Is a widespread fungus that causes fruit decay and may lead to production of a toxic secondary metabolite, patulin. *Rhizopus stolonifer* causes severe losses in stored apples; the fungus develops during storage at temperature above 0^0C and during shelf-life.

MATERIALS AND METHODS

The fungal pathogens tested were *Monilinia fructigena*, *Penicillium expansum* and *Rhizopus stolonifer*, isolated from *Malus* harvested fruits. The three isolates were maintained on malt-agar medium.

The essential oils tested were: basil (*Ocimum basilicum*), dill (*Anethum graveolens*), thyme (*Thymus capitatus*), lavender (*Lavandula angustifolia*), pine (*Pinus sylvestris*), lemmon (*Citrus limonum*) and peppermint (*Mentha piperita*).

All the tested oil was purchased from the Romanian market (Dacia Plant). Their chemical composition is standardized, so the results from their application could be repeatable.

For inoculation, mycelium was taken from the periphery of 7-day-old stock cultures. Plugs of mycelium were removed with a 8 mm cork borer and placed in the centre of each Petri dish (80 mm). Three plugs of malt agar media per Petri dish were cut and filled with essential oils or mineral oil (50µl), for the control.

Inhibition of the mycelial growth of *Monilinia fructigena*, *Penicillium expansum* and *Rhizopus stolonifer* was determined by measuring the radial growth. Three replicates were used for each essential oils and pathogen and the incubation was at 20^0C, in the dark.

RESULTS AND DISCUSSIONS

The antifungal activity of the tested essential oils is shown in table 1 and figs. 1-3. In all three pathogens, basil (*Ocimum basilicum*) had strong fungicidal activities. Mycelial growth of *M. fructigena*, *P. expansum* and *R. stolonifer* was totally inhibited by basil essential oil.

Lavander (*Lavandula angustifolia*), peppermint (*Mentha piperita*) and dill (*Anethum graveolens*) essential oils were also fungitoxic on mycelial growth of all tested pathogens.

Lemmon oil (*Citrus limonum*) exibited a strong fungicidal action on *M. fructigena* and only a moderate fungistatic activity on *Rhizopus stolonifer*. In this later case, the mycelial growth of *R. stolonifer* was recorded. However, lemon essential oil had an antisporulant effect on *R. stolonifer*, no sporangium being observed. Lemmon oil has no effect on mycelial growth of *P. expansum*.

Pine essential oil (*Pinus sylvestris*) showed a strong fungicidal activity against *M. fructigena* and *R. stolonifer* and only a moderate inhibitory effect on mycelial growth of *P. expansum*.

In this study we have demonstrated that essential oils from several plants are able to inhibit the growth and sporulation of three important postharvest *Malus* pathogens: *M. fructigena*, *P. expansum* and *R. stolonifer*.

Other previous studies have shown that the volatile components of the essential oil of basil possesses *in vitro* activity against a number of plant pathogenic fungi (Oxenham, Svoboda and Walters, 2005; Oxenham, 2003).

Lavender oil has been found also to be active against many species of bacteria and fungi. Both the oil and oil vapour have been demonstrated to posse's antifungal activity (Cavanagh and Wilkinson, 2002).

Also, a study of the fungicidal activity of oils obtained from genera as *Ocimum*, *Thymus*, *Anethum*, *Eucalyptus*, *Foeniculum* and *Citrus* against several postharvest pathogens reveals the marked fungicidal activity of carvacrol (in thyme, origanum oil) and p-anisaldehyde – oxidation product of anethole, found in anise oil (Mari and Guizzardi, 1998).

CONCLUSIONS

1. Plants produce a wide range of secondary metabolites; the essential oils are, in many cases, biologically active. The biological activity of the essential oils is due to the action of their components.
2. Our results highlight the potential for using essential oils for postharvest disease control of malus fruits. Natural occurring biologically active compounds from plants, as essential oils, are condidered GRAS compounds (generally regarded as safe). These compounds are generally assumed to be more acceptable than synthetic compounds, due to their natural origin, which means more safety to the people and environment (low mammalian toxicity, biodegradable, multifunctional, non-persistent in the environment).
3. Essential oils which have been registered as Food Additives are much easier to register for postharvest use than new synthetic pesticides. In addition, the essential oils are considered at low risk for resistance development by pathogens. It is believed that is difficult for the pathogens to develop resistance to such a mixture of oil components with, apparently, different mechanisms of antimicrobial activity (Daferera et al., 2003)
4. Vapour treatment has an advantage over solution treatment in that the microbial growth could be inhibited by a smaller amount of essential oil while also acting as a potent inhibitor of sporulation.
5. Further research is needed to obtain information regarding the practical effectiveness of essential oils to protect fruits against the postharvest pathogens.

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Table 1. The fungitoxic activity of essential oils against postharvest pathogens

Essential oil	*Monilinia fructigena*	*Penicillium expansum*	*Rhizopus stolonifer*
Basil	-	-	-
Dill	-	-	-
Lavender	-	-	-
Lemmon	-/+	+++	++
Peppermint	-	-	-
Pine	-	++	-
Thyme	+++	+++	+++
Mineral oil (Control)	+++	+++	+++

+++ mycelial growth; ++ moderate mycelial growth; -/+ fungisatic effect; - mycelial growth totally inhibited

Figures

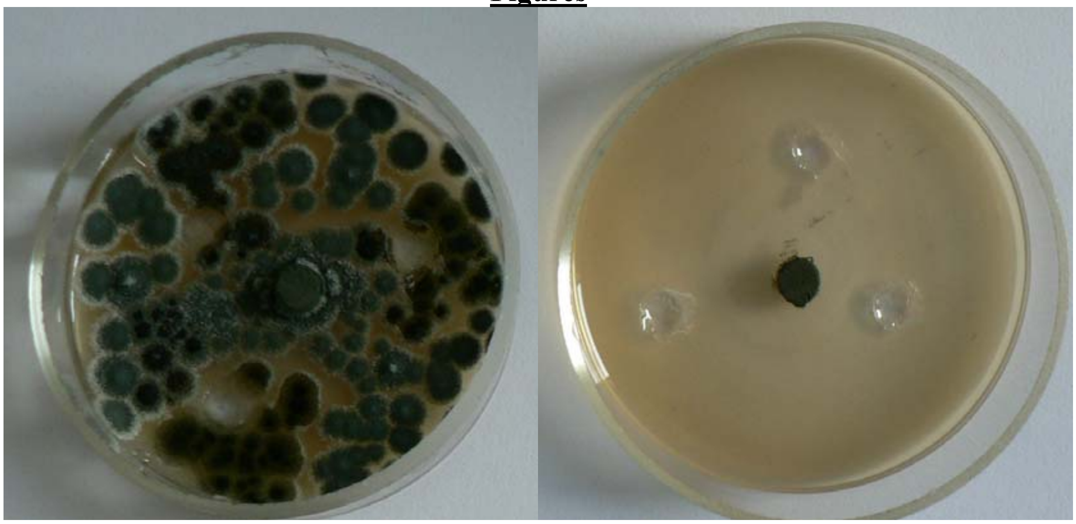

Fig. 1. The fungicidal effect of *Ocimum basilicum* essential oil on *Penicillium expansum*

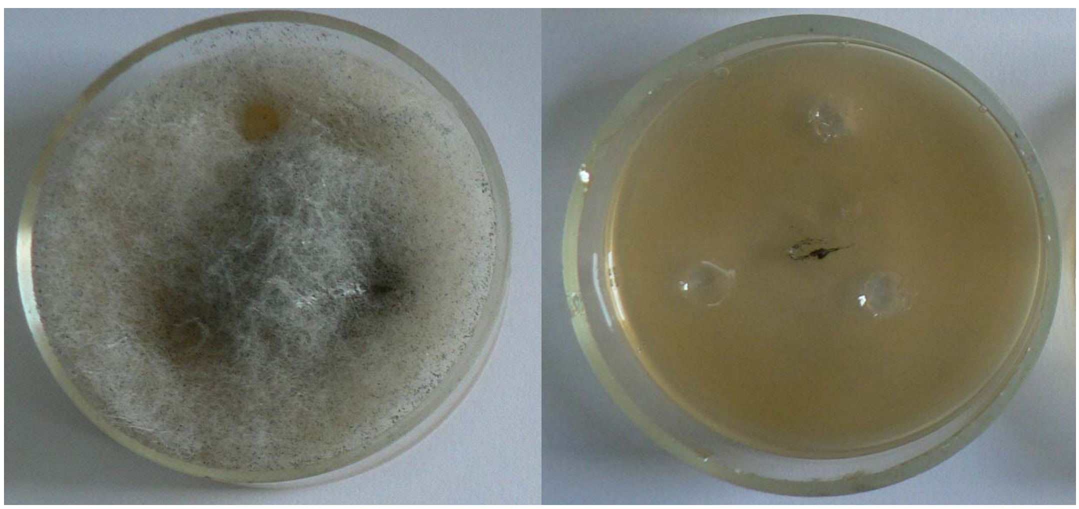

Fig. 2. The fungicidal effect of *Ocimum basilicum* essential oil on *Rhizopus stolonifer*

Fig. 3. The fungicidal effect of *Ocimum basilicum* essential oil on *Monilinia fructigena*

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RESEARCHES REGARDING THE MICROPROPAGATION RESULTS OF THE POMEGRANATE (*PUNICA GRANATUM)*

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Key words: Pomegranate, nutrient medium, plant disinfecting.

OBJECTIVES

- Finding out the young virus free plants to initialize the culture.
- Finding out the protocol for the pomegranate plants micro propagation.
- Finding out the best nutrient medium type to decrease the necessary time to obtain ready plants for planting in the field.
- Studying the effect of different solution concentrations in the disinfection treatment.

INTRODUCTION

Punica granatum is a species whose origin is in Asia. It was cultivated in Mediterranean regions, in Africa and Europe, were it was signalized in the same crop area around 2000 years ago. The most important yield and area production are in Egypt, China, Iraq, Iran, Afghanistan, Pakistan, India, Saudi Arabia, and Turkey. This beautiful plant has the old name of Tunis, Puny, and it is the symbol of luck in Greece. It was brought in the Californian region by the Spanish colonists.

The plant grows like a bush which gets around 2-3 meters, in wild reaching even 7 meters. The raciness are strong, leafs are small, elliptic and dark green coloured at the superior surface. The flowers are growing in the top of the branches, solitaires or in groups. They are hermaphrodites, red, pink and orange coloured. There are also varieties that have flowers with more petals then usual ones. Those ones are used more like ornamental plants. The fruit is a berry weighting around 200-800 grams, being yellow brown coloured at the maturity. The most interesting varieties the ones having sweet pulp and soft seeds. The most important group is named *Mollar* and another interesting one is *Valencianas*.

MATERIALS AND METHODS

In this experimental study there were used 2 artificial mediums for the *in vitro* culture: Murashige and Skoog (MS) and Querin Lepoivre (QL).

The varieties used in this experience were:

Punica granatum var. nana is a dwarf variety, cultivated for his ornamental character like an indoor plant, in pots. The flowers are incandescent red coloured.

Kandhari – is a pomegranate variety with big red fruit, pink pulp and soft seeds. It is often cultivated in India.

Robab – is a pomegranate variety with elliptic and big red fruit, red pulp, and sweet taste and is the usually cultivated in Iran.

Hicaz **–** is a pomegranate variety with medium size fruit, succulent pulp, and soft seeds. It is usually cultivated in Turkey.

The culture mediums used were MS, QL and DKW.

The meristems were preloaded from young branches and stimulated in climatic room.

To sterilize the vegetal material there was used sodium hypochlorite with the commercial name *Domestos*. The study variants excelled regarding the sodium hypochlorite concentration and the different times for disinfections.

The main method was the one using different concentrations starting with 1% and ending with 4% sodium hypochlorite for all of them for 10 minutes. We also tried another method by introducing the material into the disinfectant solution for 15 minutes but the percentage of necroses was high.

RESULTS AND DISCUSSIONS

Following the results we observed that the last variant (sodium hypochlorite 20%, 15 min) gave only necroses explants.

The best possibility/way to disinfect the explants, before inoculation, was the one using 3% sodium hypochlorite for 10 minutes, 91.6 % being viable explants.

As the explants grew and built-up, QL medium for initialisation offered better conditions than the MS medium for initialisation, but the ones growing on the MS medium registered a bigger number of leafs.

QL medium gave the best results also regarding the multiplication culture, where after 35 days of observation the growth average was bigger than that of the explants growing on MS medium.

Kandhary variety gave the highest number of leafs and young branches on the MS medium and also on the DKW medium (Table 1).

The Nana variety gave the highest number of leafs on the DKW medium and young branches on the QL medium (Table 2).

For the multiplication part, the Kandhary variety gave the best results on the MS medium: 59.8 % of the explants measured more then 2 cm length (Table 3).

For the multiplication part, the Nana variety gave the best results on the QL medium with 1.8 cm length in 30 days after the inoculation (Table 4).

Table 1

Culture medium	10 zile			20 zile			30 zile		
	No. of leafs	No. of branch	Branch length (cm)	No. of leafs	No. of branch	Branch length (cm)	No. of leafs	No. of branch	Branch length (cm))
MS	3.3	1.4	1.2	7.4	2.3	2.1	9.2	2.7	2.6
QL	4.2	1.1	0.7	6.1	1.6	1.4	6.7	1.8	1.2
DKW	3.8	1	0.4	6.3	1.3	0.7	7.4	1.4	0.9

Table 2

Culture medium / Observation date	MS		QL		DKW	
	No. of leafs	Branch length (cm)	No. of leafs	Branch length (cm)	No. of leafs	Branch length (cm)
20 days	6.5	0.7	3.7	1.2	8.3	1.1
30 days	7.3	0.9	4	1.7	9.2	1.3

Table 3

Culture medium	2 weeks			4 weeks		
	20-40 mm	40-60 mm	60-100 mm	50-100 mm	100-150 mm	More then 200 mm
MS / %	34.4	21.9	43.8	13.3	26.9	59.8
QL / %	13.2	62.5	24.3	68.4	26.3	5.2

Table 4

Culture medium / Observation date	QL	
	No. of leafs	Branch length (cm)
20 days	4.4	1.3
30 days	6.5	1.8

CONCLUSIONS

1. A good disinfection of the vegetal material provided from the Nana variety can be realised using 4 % sodium hypochlorite for 10 minutes mad 3% for 10 minutes for the other varieties.
2. The explants growth can be obtained in good conditions using both for initialisation and multiplication QL medium for the Nana variety and MS for the Kadhary variety.

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STUDY REFERRING THE LEVEL OF CHERRY WORMS POPULATION IN SWEET CHERRY PLANTATION FROM UNIVERSITY OF AGRONOMIC SCIENCES AND VETERINARY MEDICINE – BUCHAREST

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Keywords: *Rhagoletis cerasi*, dynamic, quality fruits, yellow sticky traps type Pherocone AM

ABSTRACT

In conditions of our country, cherry fly (*Rhagolethis cerasi* L.) is the most important pest of sweet cherry orchards. Due to hidden attack of larvae, evolution of attack is possible to be sub evaluated, registering in this way, and failure in phytosanitary protection against the pest.
In favourable years for the pest, attacks are considerable, especially at varieties with late or very late ripening (*Draganele de Piteşti, Bigarreau, Germersdorf*), being registered values of 60-70% vermiculite fruits.
In the present paper there are presented the moment of flies appearing in crowns of the trees, on basis of number of trapped adults in Pherocon AM traps.

INTRODUCTION

Obtaining good crops and good quality fruits is correlated with a good health of trees neglecting cherry illnesses and insects we can loose a most 45-100% of the crop variety with middle and late ripe (Victoria Suta, 1976). Among cherry insects we can find the cherry worm (*Rhagoletis cerasi* L.) which depreciates the quality of fruits and decreases their commercial value.

In over country the cherry worm (*Rhagoletis cerasi* L.) is the most important insect of the cherry orchard. Due to the hidden mode of the larva, the evolution of this attack can have sub-evaluation of the risk, registering failures in *phytosanitary* protection for this insect.

In the best years of his reproduction there have been big attacks, especially at cherry varieties with late and very late ripe (Draganele de Pitesti, Bigarreau, Germersdorf), obtaining values of 60-70% of worm fruits. In this study we proposed to present the moment of the adult apparition and their evolution in cherry trees, by yellow sticky traps type Pherocone AM.

MATERIALS AND METHODS

The studies have been achieved in the Didactic Experimentally field of the University of Agricultural Sciences and Veterinary Medicine – Bucharest, between 2004 and 2006, in a cherry orchard of 12 year old and 4-4,5 m high and plantated un spaces of 2 x 3 m. The cherry orchard us formed from varieties: Boambe de Cotnari, Germesdorf it is always submitted to the cherry worm attack (*Rhagoletis cerasi* L.), for its control there are annually applied chemical treatments with selective and unselective pesticides.

The observations and the harvest of the biologically material have been done in the vegetation period of the trees, between May and July. Up to the apparition of the first adult's have been issued daily observations, them weekly, taking down the examples at very reading. For the harvest of the samples there has been used a method of collection, yellow sticky traps type Pherocon AM, installed at 1,5 m high and 50 m distance between them.

In accordingly with dates of the insect's traffic, has been issued the chart of paste evolution (the beginning of the adult's apparition, maximum of fly and the apparition).

RESULTS AND DISCUSSIONS

Unfortunately, in the last years, it doesn't give adequate attention to health of the plantation and we found that the population of these insects was grown up, and the crop has registered significant lost due of the quality fruits depreciation.

The obtained dates with the of yellow sticky traps type Pherocone AM, helped us to obtain value information's about the adults fly of cherry's worm sp. (*Rhagoletis cerasi* L.) from Bucharest, bringing us read dates about the biologically reserve and to establish the best moments to apply the chemical treatments.

In 2004, by the registered captures, we found out that the first adults have appeared in the observation period 06.05 – 15.05, when then have registered 3 adults/traps, followed by a progressing grow, up to a maximum level of 35.5 adults/trap between 13.05 – 14.06 (fig. 1).

After 04.06.2004 the number of the adults started to decrease in the cherry orchard, because the fruits have been totally harvested, and the *Rhagoletis cerasi* L. adults migrated in the cherry tree orchards.

In 2006 the first apparitions in the tree wealth have been registered between 09.05 – 18.05 there where captured have 3.5 adults/trap.

The highest population have been registered between 18.05 – 02.06 catching up to a maximum level of 66.5 adults/trap.

After that the numbers of worms have seriously decreased a 10.5 adults/trap (fig. 2).

To establish the best moments to apply the treatments based by the number of the captured individuals in the yellow sticky traps type Pherocone AM, it have been mode the flying curse of the insect, which emphasizes the generation evolution and the maximum fly period.

CONCLUSIONS

1. The yellow sticky traps type Pherocone AM presents a big attraction power, proving to by useful to establish the population level of *Rhagoletis cerasi* L. species and dynamic, heading to the apply of warning treatments in the best moments;
2. By the obtained information's we can notice that in 2004 the population of *Rhagoletis cerasi* L. species has presented a big density un May and June, depreciating the quality of fruits variety with early and middle ripe;
3. In 2006, the population of the cherry worm presented a maximum of fly from the second decade of May until the first decade of June (66.5 adults/trap), depreciating the quality of fruits variety with early ripe.

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Figures

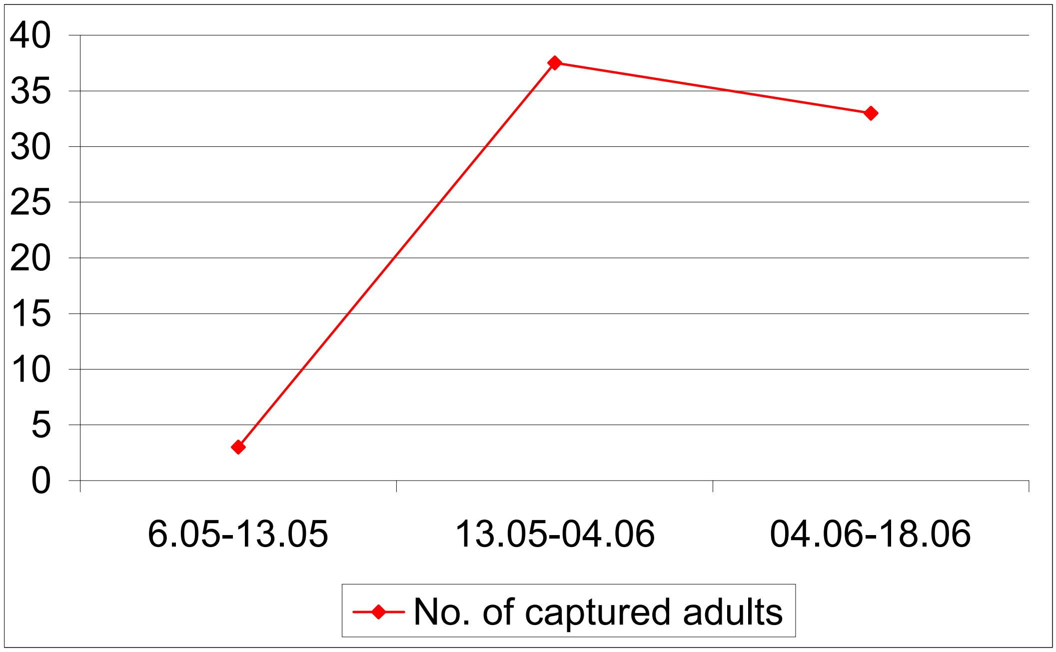

Fig. 1. Dynamics species *Rhagoletis cerasi* L., on years 2004

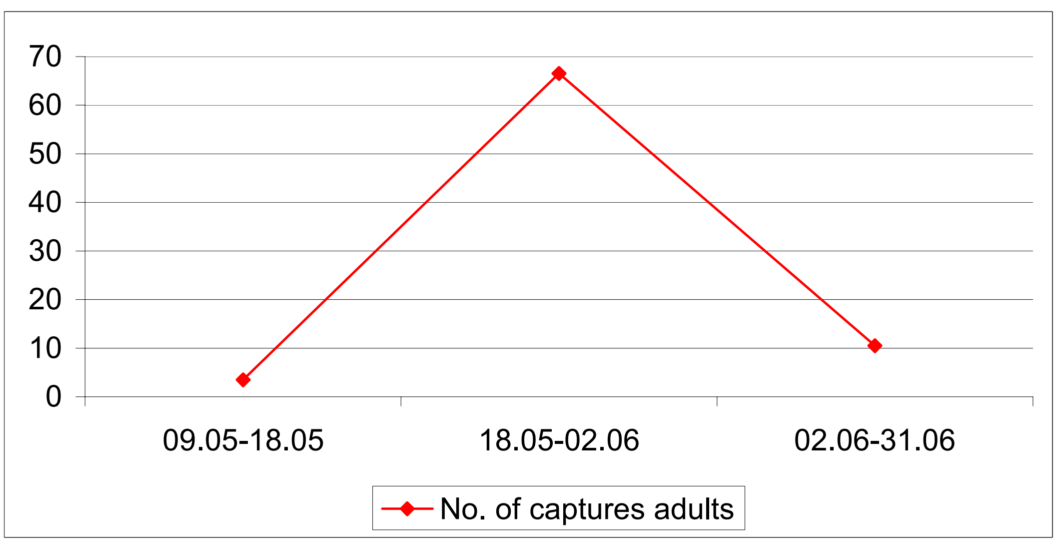

Fig. 2. Dynamics species *Rhagoletis cerasi* L., on years 2006

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STUDIES UPON THE WAY OF MIGRATION OF VIRAL PARTICLE OF PPV (PLUM POX VIRUS) IN RESISTANT CULTIVARS OF APRICOTS

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Key words: plum pox virus, systemic, genotype, apricot, resistance

Regarding the way of migration of the viral particle in the host plant the results of the researches are not yet so known. What is known until now is the viral particle is migrating once through the system called “cell to cell” and through systemic way using phloem and xylem. This paper has the role to underline the fact that every cultivar however how resistant it is lets the viral particle to get to the sensitive zones and offers also a spatial view at tissues level using the technique of in-situ hybridization.

INTRODUCTION

Sharka (PPV), is the disease that affects the trees from stone fruits, genus *Prunus*. The ill is the result of a quarantine agent called Plum pox virus (PPV). Until now there were started many programmes of selection of resistant genotypes, but these are taking long times and cost a lot of money.

The classic programmes of genotypes selection which have important characters, for example the resistance to diseases and pest, are very expensive and take long times (especially for species as those from genus *Prunus*). After the inoculation, for the final evaluation of the resistance or of the sensitivity of one plant is necessary almost 4 years, for peaches are necessary 3 years and for plums are necessary 8 years. The varieties of apricots, from the point of view of the response to infection with PPV, were split in 3 groups: sensitive genotypes, partial resistant genotypes and resistant genotypes. It is known that exist 5 barriers of protection of plant facing the viral infection, some of the most important are at the entrance and at the exit from conducting vessels. With all of these the mechanism of migration of viral particles in the host plant is not yet known.

MATERIALS AND METHODS

The material used is rootstocks infected with PPV of GF305 which were after grafted with different apricots genotypes from sensitive, the variety Moniqui, to partial resistant varieties, Goldrich, and resistant varieties as Stark Early Orange, Stella, Henderson, Harlaine. The biggest interest in our experience were resistant genotypes and those partial resistant genotypes which were after topgrafting at 3 weeks after inoculation (cipp budding) with branches from peach tree GF305 very sensitive to PPV.

The idea that we want to underline is based on the question viral particles of PPV which have infected first rootstock GF305 are capable of migration through resistant varieties grafted on these and after to find them again in topgraft GF305. This would demonstrate that the virus is capable to use resistant varieties as passing zones to other sensitive zones where the virus is finding conditions for replication and infection, this, even if resistant varieties are after capable to isolate the viral particles in such a way in which on the plant are not appearing symptoms.

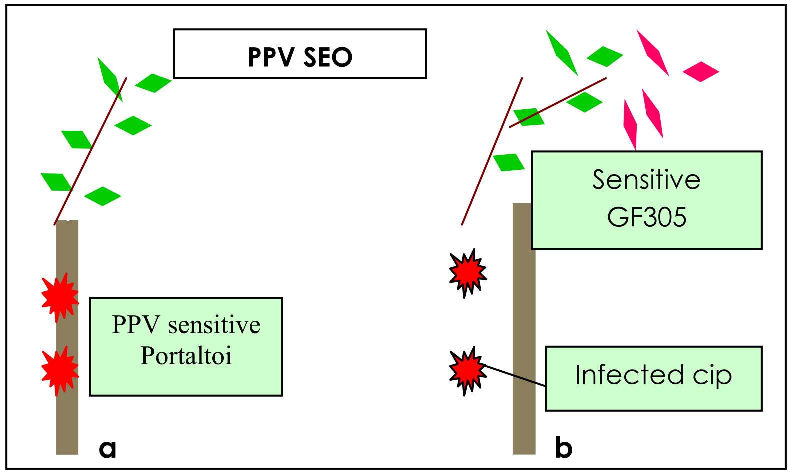

Fig. 1. The experience: **a** – grafting with resistant variety Stark Early Orange, **b –** topgrafting on resistant SEO variety with sensitive peach tree GF305

When topgrafted shoot has almost 5-6 real leaves there have been made symptomatic, serological and molecular determination.

Serological diagnostic was made through DAS-ELISA technique (Double Antibody Sandwich – Enzyme Linked Immunoadsorbent Assay) – CLARK and ADAMS, 1977 – using polyclonal antiserums and the recommended protocol by Bioreba Firm.

The molecular diagnostic was realized through RT-PCR (Reverse Transcription-Polymerase Chain Reaction) using *Qiagen One-Step RT-PCR* kit and the polyvalent leaders pair P1/P2 which amplifies one fragment of 243 bp corresponding to C terminus region of capsid protein (WETZEL and co., 1991).

Also, to have a spatial view of the virus presence in plant, there was used *in-situ* hybridization technique. Based on this technique, antisense sonds are marked at digoxygenine and sense sonds will not reveal any mark while antisense sonds reveals one blue-violet mark which shows the presence of the viral particle.

RESULTS AND DISCUSSIONS

There were made transversal sections in leaves after those were fixed and put on paraffin, cut at microton**,** put on lamellas and after hybridized.

In the case of *in-situ* hybridization of topgrafted GF 305 on sensitive variety Moniqui it is observed that antisense sond (As) marks the virus presence in cellular membrane and in parenchim. Sense sond doesn’t mark the viral particle presence.

In the case of resistant varieties we observe that antisense sond underlines viral particles, for example Stark Early Orange variety considered resistant let the viral particles to topgrafted GF305. In one case and in the other one it is observed that the virus is present in the cellular membrane and in parenchim but not in conducting tissues, these zones remain unmarked.

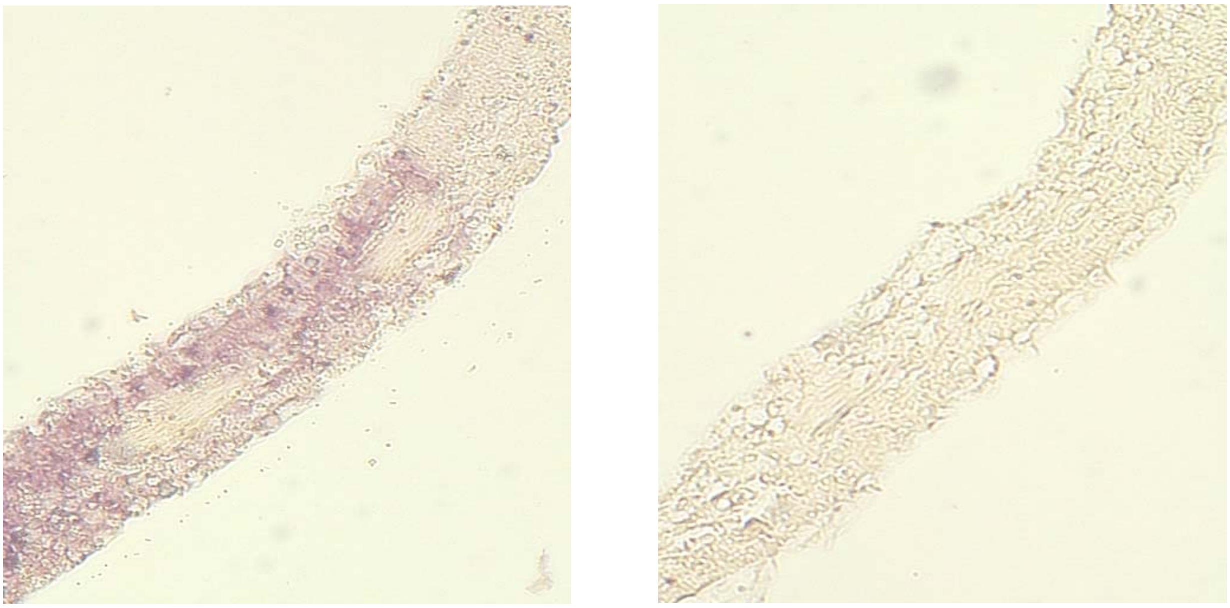

Fig. 2 – Transversal section through GF305 leaves **supraltoit** on PPV sensitive apricot variety Moniqui

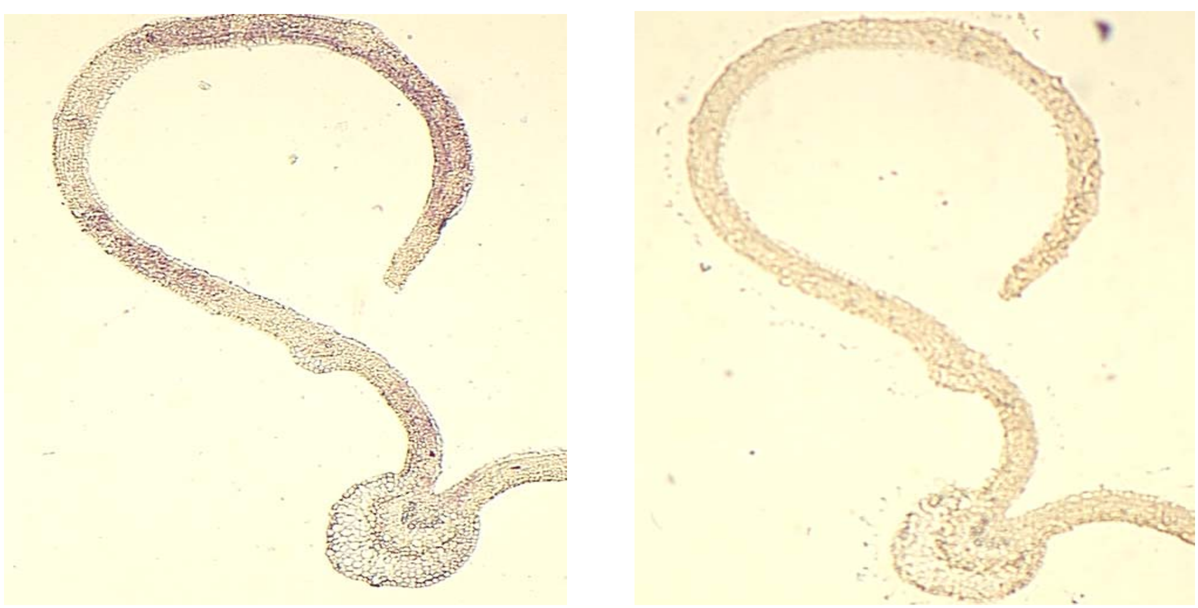

Fig. 3 – Transversal section through GF305 leaves grafted on Stark Early Orange variety

The results from table 1 show that Stark Early Orange variety is the only one which is negative as symptoms on the tree and as serological (Elisa test) and as molecular (RT-PCR test). But for topgrafted GF305 grafted on SEO appeared as positive during all methods. Goldrich variety, which is considered partial resistant, doesn't have symptoms on the plant and is not positive from serological point of view (Elisa test) but is positive from molecular point of view (RT-PCR). For topgraft GF305 grafted on Goldrich doesn't have symptoms on the plant but it is positive from serological and molecular point of view.

Stella variety has the same response as Goldrich variety, also the same topgrafted GF305 grafted on Stella.

Particularly, but expected, the sensitive variety Moniqui is positive the same as the variety and the topgrafted GF 305 at symptomatic level, serological and molecular**.**

Table 1 – Serological and molecular results of the way of response of some apricot genotypes

Variety	On variety			On topgrated GF305		
	Symptoms	ELISA	RT-PCR	Symptoms	ELISA	RT-PCR
SEO	-	-	-	+	+	+
Goldrich	-	-	+	-	+	+
Stella	-	-	+	+	-	+
Henderson	-	-	n.d.	-	-	n.d
Harlayne	-	-	n.d.	-	-	n.d.
Harcot	-	-	n.d.	-	-	n.d.
Moniqui	+	+	+	+	-	+
Screara	+	-	n.d.	+	-	n.d.

n.d. - undetermined

Fig. 4 – The migration in agarose gel of DNA fragments from PPV infected plant
1 – SEO, 2 – topgrafted GF305 grafted on SEO, 3 – Goldrich, 4 – topgrafted GF305 grafted on Goldrich, 5 – Stella, 6 – topgrafted GF305 grafted on Stella, 7 – Moniqui, 8 – topgrafted GF305 grafted on Moniqui, 9 –positive control

CONCLUSIONS

Regarding the way of migration of viral particles of PPV in host plant depends of course on the studied genotype but it is observed that partial resistant varieties and resistant varieties, even if they don't have symptoms on plant, they are used as passing zones by the viral particle to get to sensitive topgraft where they can replicate and multiplicate.

Form sensitive varieties point of view, these demonstrate that in spatial way through *in-situ* hybridization technique, viral particles are localized in cellular membrane, cellular parenchim, but haven't been present in conducting vessels. For sure the way of migration is "cell to cell", further the question is if the propagation is also through systemic way. The answer to this question is the subject of another paper of the same team work.

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RESEARCHES REFERRING MICROLEPIDOPTEROUS DYNAMICS FROM APPLE AGROECOSYSTEM FROM UNIVERSITY OF AGRICULTURAL SCIENCES AND VETERINARY MEDICINE BUCHAREST

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Keywords: microlepidopterous, apple orchard, pheromone adhesive traps,

INTRODUCTION

Sexual pheromones, included in the last time in systems of biological control of insect pests, are useful for warning of chemical treatments, establishing of real pest spreading area and at determining the level of microlepidopterous pest from orchards.

Even that at the Research Institute of Chemical Researches Raluca Ripan – Cluj Napoca were registered 35 types of synthetic sexual pheromones for warning, determining the level and control of pest population from orchards, grape vine plantations, field crops, forestry and storage place, the implementation of using these products in practice is very slow. Importance of using pheromones was demonstrated in numerous scientific papers elaborated by authors from research institutes from Romania: Iacob M. (1976, 1977, 1981), Susea S. (1985), Ghizdavu I. (1983), Drosu S. (1993, 2001), Rosca I. and colab. (2001), Istrate R. (2005), but we consider that we have to maintain in actuality the interest of using pheromones in integrated control programs, especially in orchards.

In this paper we present the results of researches which were been done during year 2006 in orchard of experimental field of orchard department from USAMV-Bucharest, and in which we try to prove the importance of sexual synthesis pheromones in supervising of microlepidopterous pest from apple orchard, and recommendation for applying treatments at the proper time regarding to pest population level.

MATERIALS AND METHODS

Supervising of microlepidopterous pest from apple was done with pheromone adhesive traps (AtraPom, AtraRet, AtraVir, AtraPod, AtraNub, and AtraBlanc). These traps and sexual synthesis pheromones were bought from Research Institute of Chemical Researches Raluca Ripan – Cluj Napoca.

Researches were been done during year 2006 in experimental field of orchard department from USAMV-Bucharest, in an apple orchard of 10 years old, with high of de 3-3,5 m and distance between trees of de 2 x 3 m, having the following cultivars: Florina, Ionagored, Prima and other impurities.

Pheromone traps were installed between trees branches at the beginning of May and captures were registered till the October. Traps were installed in diagonal with 50 m between traps at the 1,5 – 2 m high (fig.1). Captures registering were done weekly, moths adults were put out in each observation time (fig.2). Replacing of lures was done monthly (4 weeks).

Data obtained in each trap were registered in tables, and based on the number of captured moths at each observation time was done flight curve, for establishing easier evolution of pest population.

RESULTS AND DISCUSSIONS

Codling moth (*Cydia pomonella* L.) is considered the most dangerous pest in apple orchards, determining yearly important quantitative and qualitative losses in production.

It is observed that this species, during 2006, has a low population comparing with previous years, arriving at a maximum of 23 moth/trap in the firs generation and of 29 moth/trap in the second generation. Biological reserve has come down in the last years, perhaps due to the efficacy of chemical treatments done in the proper time.

In figure 3 is presented flight dynamics of codling moth during 2006 experimental field of orchard department from USAMV-Bucharest.

Apple peel tortricid (*Adoxophyes reticulana* Hb.) has only one registration on 31.May, 1 moth/trap (fig. 4).

Absence of captures means that there is no attack risk and that is without sense to apply any kind of treatment against this pest.

European oak leaf roller or green oak moth (*Tortrix viridana* L.) has also only one generation, but AtraVir lure has trapped others species from microlepidopterous, family *Tortricidae* (fig. 5).

Green Budworm (*Hedya nubiferana* Haw.) was missing in apple trees but AtraNub lure attracted many other *Tortricidae* species as: *Cydia funebrata* Tr., *Cydia molesta* L., *Cydia pomonella* L.. (fig. 6.).

Fruit tree tortrix (*Archips podanus* Scop.) is considered like a secondary important pest in apple orchard, which was also demonstrated in pheromone traps with lure AtraPod, by low number of captures registered only in May (11 moth/trap). We have to underline that in this trap was attracted more specimens of apple ermine moth (*Ypomomeuta malinellus* Zell.), in May, June and July (fig. 7).

Spotted tentiform leafminer (*Phyllonorycter blancardella* F.) is considered in the last 6-7 years as a "increasing species", damaging 80-90 % from leafs starting with the end of July. High number of captures all over the observation time, underline that this species is no negligible. The highest population level was registered in the second July's decade with a maximum flight of 1756 moth/trap, on 27.VII (fig. 8).

CONCLUSIONS

1. Monitories of microlepidopterous pest from apple orchard is possible to be done by using of pheromone traps with a specific species lure;
2. Synthetic sexual pheromone lures **AtraPom, AtraBlanc** have presented a high level of at activity, proving to be useful in knowing the level of codling moth (*Cydia funebrana* Tr.), spotted tentiform leafminer (*Phyllonorycter blancardella* F.) populations, of population dynamics and applying of chemical treatments in proper times;
3. Other microlepidopterous species (*Adoxophyes reticulana* Hb., *Tortrix viridana* L., *Hedya nubiferana* Haw., *Archips podanus* Scop.,) had a low level of populations in orchard, this fact is possible to be corroborate with efficacy of chemical treatments against codling moth.

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<u>**Figures**</u>

Fig. 1. Pheromone traps in tree

Fig. 2. Adults capture on pheromone traps

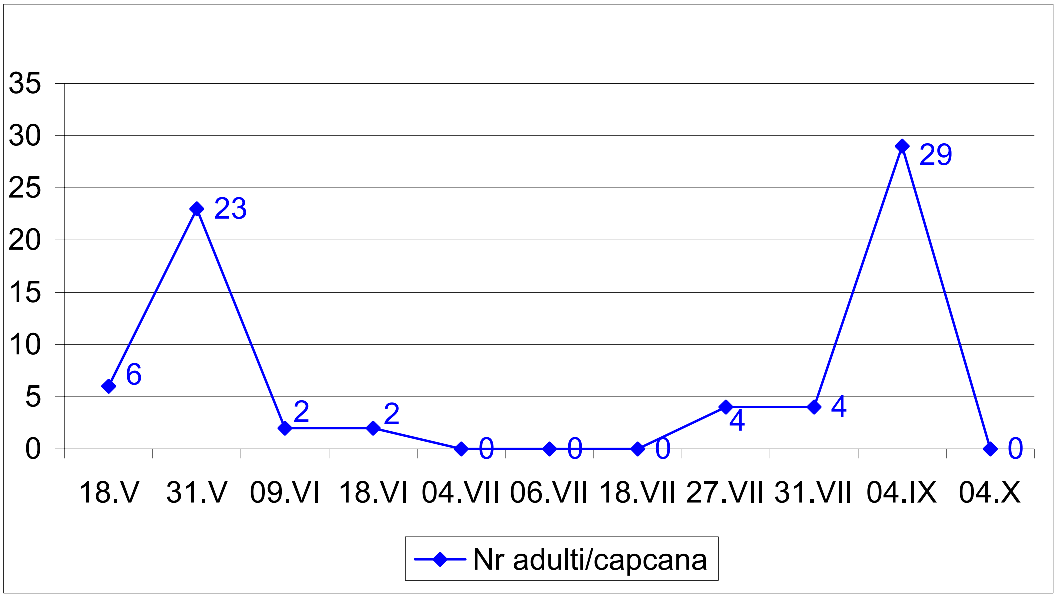

Fig. 3. Flight dynamics of species *Cydia pomonella* L., at USAMV-Bucharest

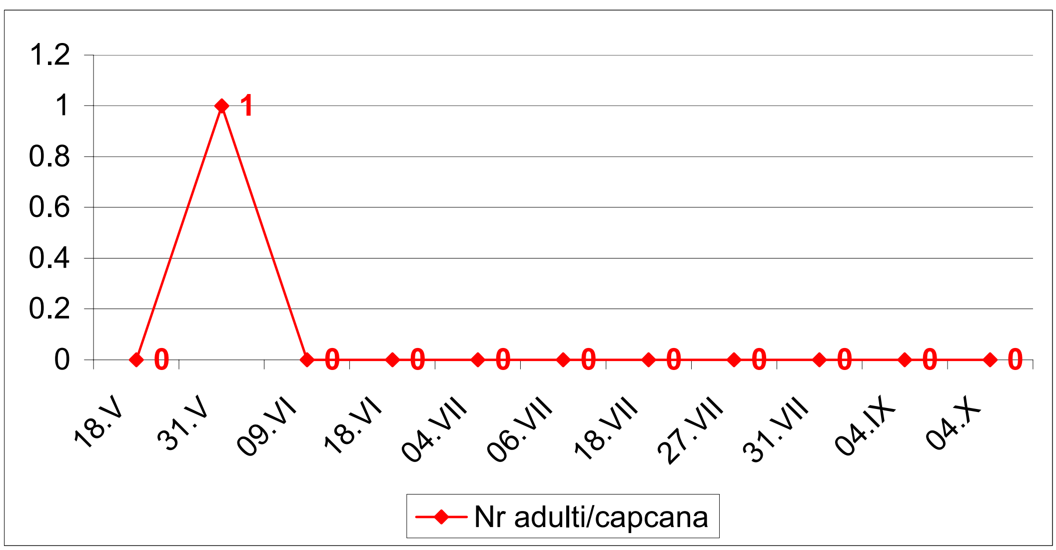

Fig. 4. Flight dynamics of species *Adoxophyes reticulana* Hb., at USAMV-Bucharest

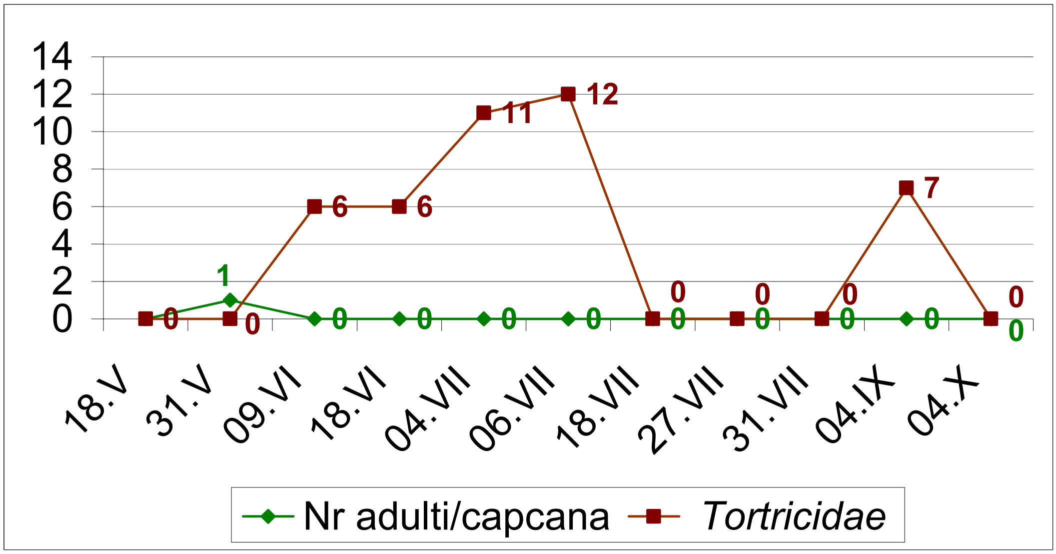

Fig. 5. Flight dynamics of species *Tortrix viridana* L., at USAMV-Bucharest

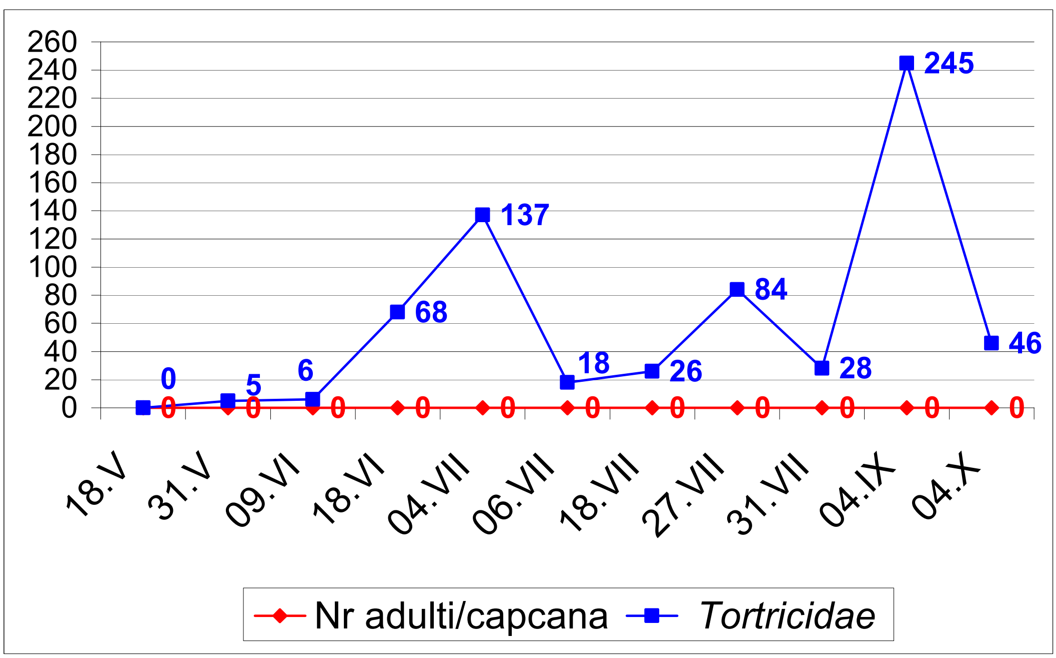

Fig. 6. Flight dynamics of species *Hedya nubiferana* Haw., at USAMV-Bucharest

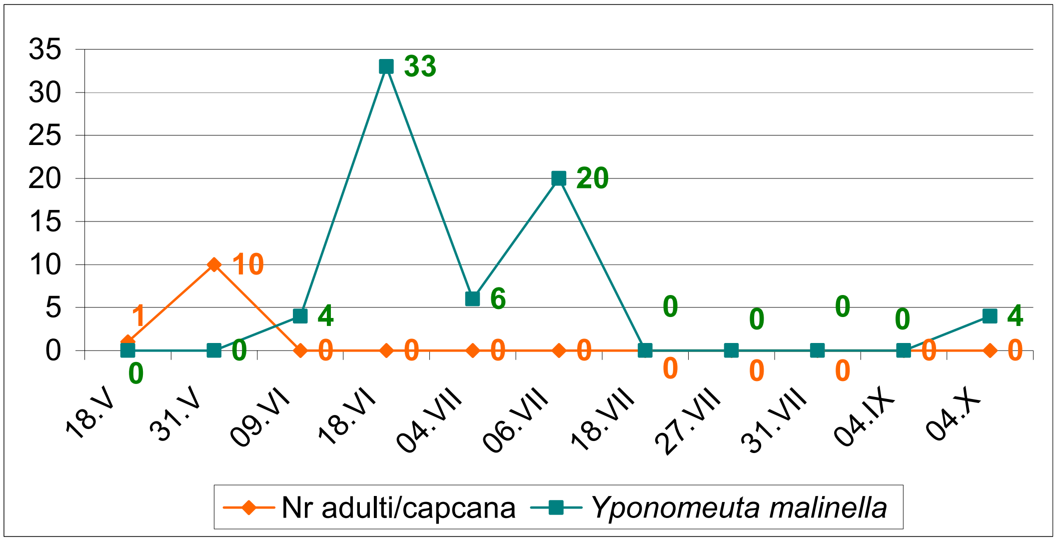

Fig. 7. Flight dynamics of species *Archips podanus* Scop., at USAMV-Bucharest

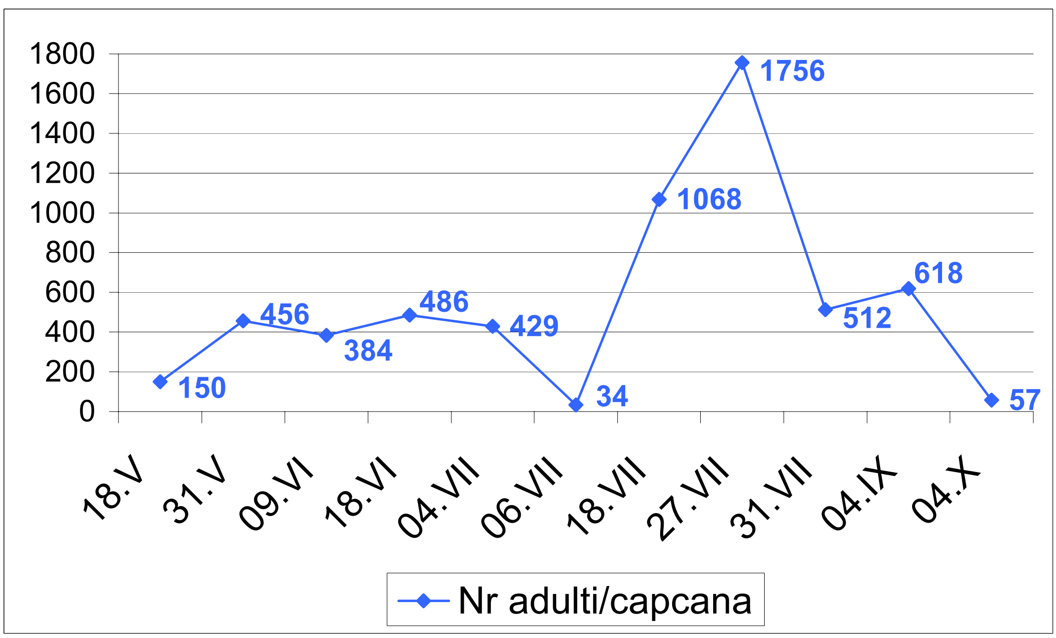

Fig. 8. Flight dynamics of species *Phyllonorycter blancardella* F., at USAMV-Bucharest

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STUDY ON RELATIONAL RESPONSE PLANT/POTYVIRUS USING *IN-SITU* HYBRIDIZATION TECHNIQUE

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Keywords: plum pox virus, *in-situ* hybridization, sense, antisense

SUMMARY

The *in-situ* hybridization technique shows a spatial view of the viral PPV particles made at 5 days after the inoculation with PPV strains D and M, and after at 20 days after inoculation in a way that we can observe the way of viral particle migration at tissues level. The inoculations were made by cipp budding technique. Before having been made the *in-situ* hybridizations the vegetative material was serological and molecular tested through Elisa and RT-PCR.

INTRODUCTION

Plum pox virus (PPV) is the most destructive viral pathogen agent of fruit stones varieties causing important yield losses (almost 100% for sensitive varieties) especially for orchards from Central and East of Europe, where this disease is very large spread (NEMETH, 1986). European and Mediterranean Organization for Plant Protection (OEPP) – 1975 – proposed 2 lists containing quarantine viruses for fruit trees. The most important virus, which is a quarantine subject for fruit trees, is Plum pox.

The elaboration and application, in west countries, for some eradication strategies (production of virus free material, supplementary treatments for virus vectors elimination, eradication of infected trees) for Plum pox have driven to improvement in this situation, but the problem still remain unsolved. Also, even if have been done important efforts for getting natural resistant genes, respectively pyramiding through conventional breeding methods, the results consisted often on obtaining of some tolerant varieties which doesn't stop the spread of the virus but only limit its impact (KEGLER and Colab., 1998). The continuation of such researches remain very important if it is taken in consideration the fact that, nowadays, is almost accepted in unanimity that the only way of efficient work against this dangerous pathogen remain the identification of the resistance resources and the use of them for improvement to create and introduce in culture some resistant varieties.

MATERIALS AND METHODS

For genotypes identification and selection that have interest from resistance to PPV point of view, they have chose as subject for these research sensitive apricot genotypes, partial resistant and resistant apricot genotypes.

The technique that was used was *in-situ* hybridization.

The steps of this technique contain to collect and fix the probes, to fix them in fixing solution (ethanol, acetic acid, formaldehyde, water) in different alcohol concentrations. Vegetative material is fixed in monoblock paraffin, is cut at microton on film of 8 μ, is put on lamellas, is pre-hybridized, is hybridized and after is detection.

Before, the vegetative material was serological and molecular diagnosticated.

The serological diagnostic was made using DAS-ELISA technique (Double Antibody Sandwich – Enzyme Linked Immunoadsorbent Assay) – CLARK and ADAMS, 1977 – using polyclonal antiserums and the recommended protocol by Bioreba firm.

The molecular diagnostic was done through RT-PCR (Reverse Transcription – Polymerase Chain Reaction) using *Qiagen One-Step RT-PCR* kit and the polyvalent leaders pair P1/P2 which amplify a 243 bp fragment corresponding to C-termini of capsid protein (WETZEL and Colab., 1991). For amplification was used total RNA from apricot leaves, extracted with the help of extraction kit *Rneasy Plant Mini Kit* (Qiagen) with all the steps from firm recommended protocol. The thermic cycle used for RT-PCR was as follows: reverse transcription 30 min at 50^{o}C, denaturation / reverse-transcriptase inactivation 2 min at 94^{o}C, hybridization with leaders 45 s at 61^{o}C, elongation of cDNA 60s at 72^{o}C. After the last cycle, followed the final elongation at 72^{o}C 10 min.

The amplification products were separated through electrophoresis, in agarose gel (Sigma) 1,5%. For not being contaminated the electrophoresis recipient with ethidium bromide, gels were colored after the migration. So, after the migration of amplified cDNA fragments, the gel was put in distilled water, and was added ethidium bromide solution, with final concentration of 0,5 μg/ml. In this solution, the gel was kept 15 min on vortex. Visualization of amplified products was done under UV light, and the image was captured by a video-camera (DocPrint).

Serological differentiation of PPV isolates was done through immune-enzymatic TAS-ELISA technique (Triple Antibody Sandwich – Enzyme Linked Immunoadsorbent Assay) using monoclonal antiserum for those two major serogroups – PPV-D (chlorotic strain). The protocol used was that one recommended by Veronique Decroocq (INRSA Bordeaux).

RESULTS AND DISCUSSIONS

Through *in-situ* hybridization technique with sense and antisense sonds viral particles, mRNA respectively, will be marked with digoxygenine and revealed with antidigoxygenine antibody, and tissues will be colored in violet there were the virus is present. The sections were made in young herbaceous branches in transversal way.

The sections were executed in young apricot branches for sensitive apricot varieties (Moniqui) and resistant varieties (Stark Early Orange). After 5 days from inoculation it is observed a strong response for viral presence in the case of sensitive varieties and also for resistant varieties, both in medula. In fig. 1, 2, 3 and 4 it can be observed that for the same varieties viral particle is migrating in the system of “cell to cell”, the violet signal which indicate the virus presence in parenchim and cellular membrane.

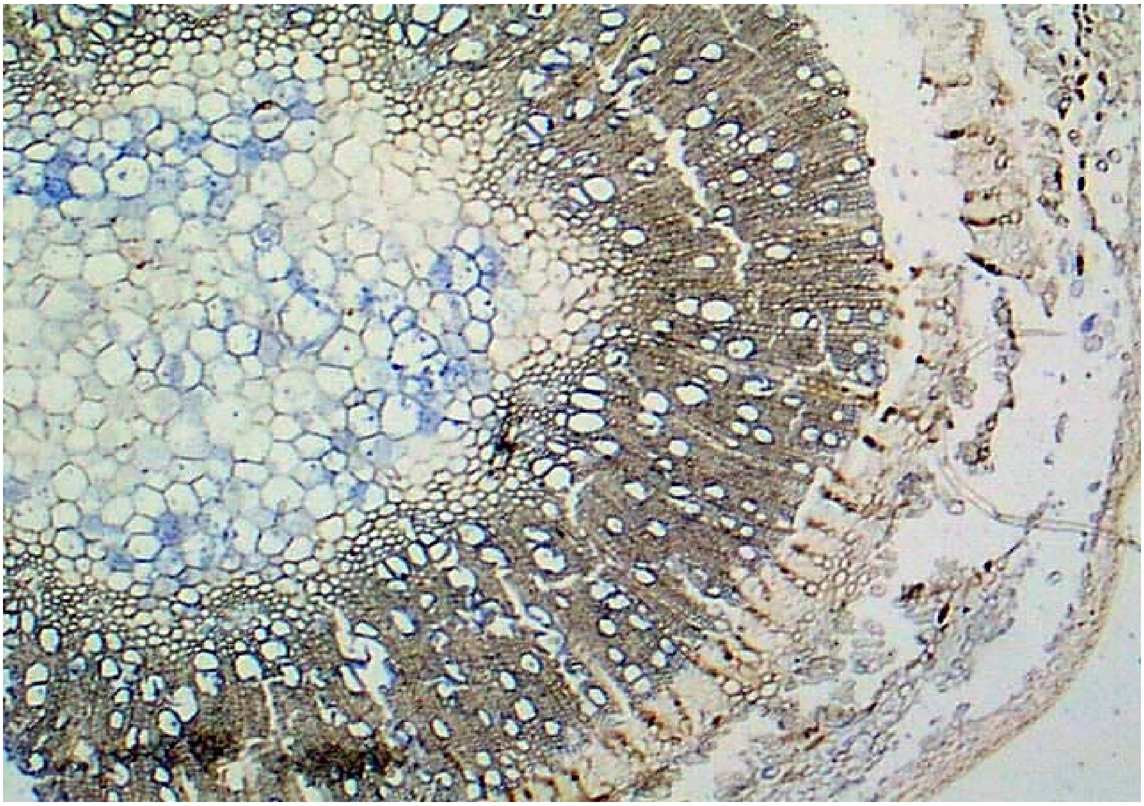

Fig. 1 – SEO variety – PPV resistant

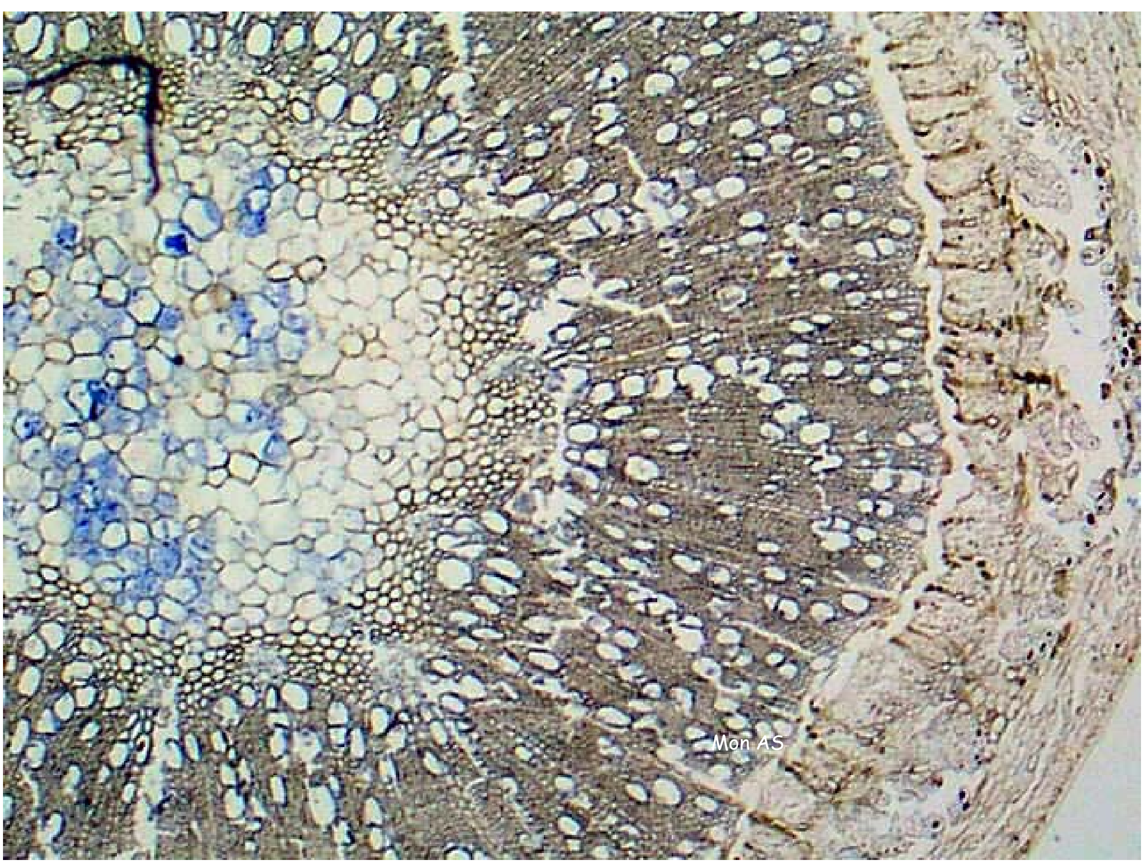

Fig. 2 – Moniqui variety – PPV sensitive

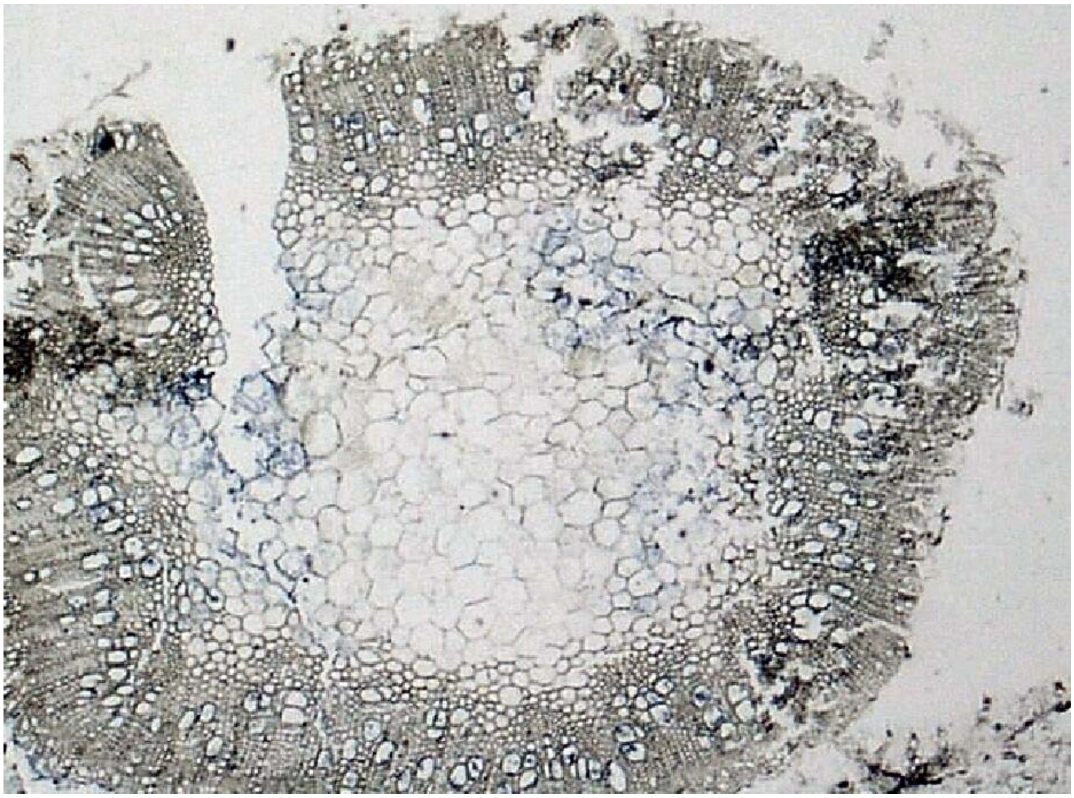

Fig. 3 – SEO variety – PPV resistant

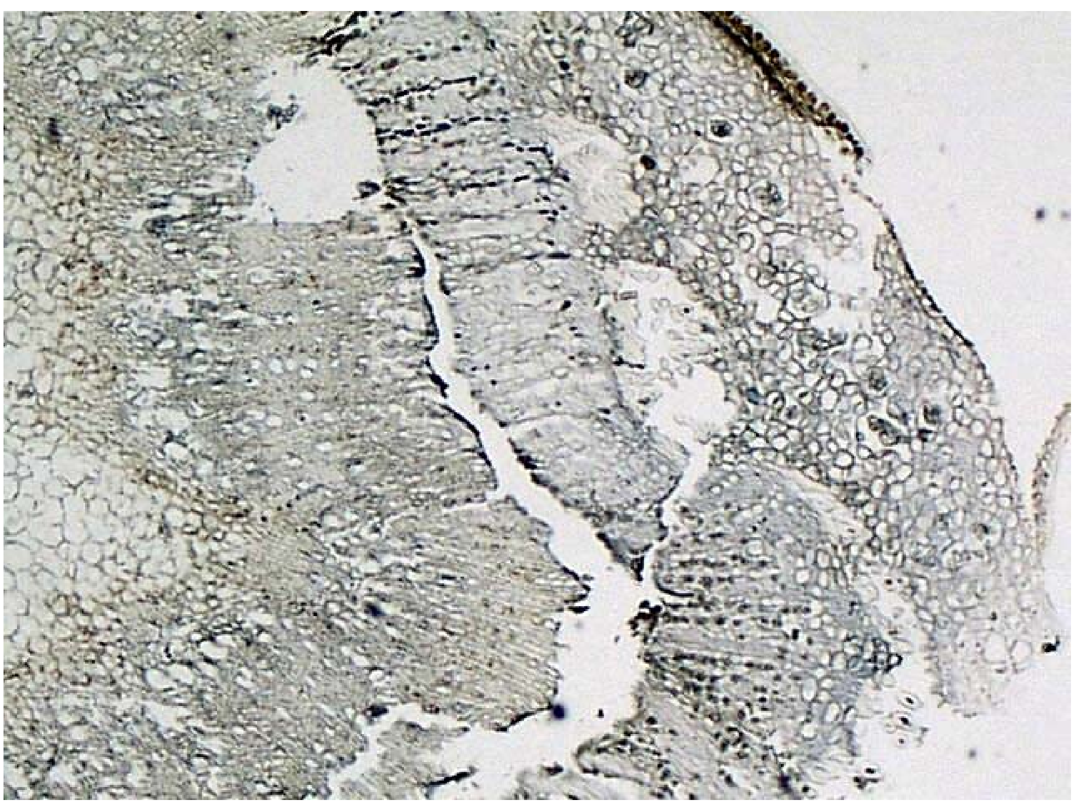

Fig. 4 – Moniqui variety – PPV sensitive

CONCLUSIONS

Regarding the way of viral particles migration in host plant we can conclude two ways of migration, respectively "cell to cell" and through "systemic way" using conducting vessels, the xylem. After 5 days from inoculation with PPV it can be observed that there are no differences between sensitive varieties and resistant ones, but after 20 days from inoculation it can be observed a migration of the signal from medulla to parenchim**.**

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PRESENT ASSORTMENT OF PEACH VARIETIES FROM SOUTH-EASTERN OF ROMANIA

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Keywords: *Prunus persica*, breeding, genitors, cultivar, fruit quality

ABSTRACT

The Peach National Collection is located at Valu lui Traian, Constanta, near the Black Sea Coast. It contents 855 genotypes, from all over the world. Year by year Collection was enriched and preserved. The researchers selected the best genitors and many hybrids have been obtained. Some of them became new cultivars and now, enriched the Romanian peach assortment: Raluca, Florin, Filip, etc. (standard tree); Cecilia, Craita, Liviu, etc. (dwarf tree).

INTRODUCTION

There are still many old cultivars in Romanian orchards as follow: Springold, Springcrest, Cardinal, Jerseyland, Redhaven, Southland, etc. but the new Romanian cultivars captivate interest and penetrate more and more this diversity the fruits assortment.

MATERIALS AND METHODS

The biological material was observed from the phenological point of view; there were made biometric measurements on fruits and trees; physic-chemical analyses, appreciations on productivity and fruit-bearing precocity; behaviour to the attack of main diseases and parasites were also investigated.

Annually, the researchers selected the best genitors and made many hibridations, self pollinations and clonal selections in the experimental fields.

The valuable genetic material obtained was used to organize competitions crop in different Romanian regions: in 1994 and in 1995 at Fruit Research Station Constanta and at UASVM Bucharest.

For standard trees the planting distances are: 4/3 m and the planting density is 833 trees/ha.

For dwarf tees the planting distances are 3/1.5 m and the planting density is 2222 trees/ha.

RESULTS AND DISCUSSION

The selected genotypes have spherical, oval or flat fruit (Table 1) The flowering is medium or late and the flowering intensity is between 3 and 5.

The ripening time is in July and August.

Yield is between: 27 kg/tree (Florin) and 45 kg/tree (Catherine Sel.1) at the standard cultivars and between: 10.5 kg/tree (Naica) and 20.5 kg/tree (Valerica) – at the dwarf one.

The selected genotypes have, white, yellow or orange flesh (Table 2).

The dry matter is between 10.3 (Puiu) and 14 ^{o}Brix (Catherine Sel.1).

Acidity (g malic acid/100 g) is between 0.40 (Filip) and 0.83 (Craita)

The fruits are very attractive, nice coloured and very good for fresh consumption and for processing too.

CONCLUSIONS

1. Fruit Research Station Constanta registered in the last years (2000-2003) new peach clingstone, nectarine and brugnone cultivars with high quality fruit, good fruit size, interested fruit form (sandwich-peach), high yield; different tree size (standard dwarf and semidwarf).
2. All these new cultivars enriched the Romanian peach assortment.

ACKNOWLEDGEMENTS

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<u>**Tables**</u>

Table 1. Phenological stages and average yield of some genotypes of peach, nectarine, brugnone and clingstone – multiannual data – Fruit Research Station Constanta, UASVM Bucharest, 2006

Genotype	Group	Beginning of flowering	End of flowering	Flowering intensity	Ripening time	Yield	
						kg/tree	t/ha
Florin	Peach with flat fruit	03.04-25.04	12.04-06.05	4	08.07-25.07	27.0	23.5
Raluca	Peach	30.03-13.04	27.04-03.05	3-4	10.07-19.07	30.5	25.4
Filip	Peach with flat fruit	23.03-22.04	05.04-03.05	5	15.07-03.08	33.0	27.5
Catherine Sel.1	Clingstone (pavie)	28.03-12.04	19.04-26.04	5	22.07-19.08	45.0	37.4
Redhaven - Control	Peach	23.03-17.04	10.04-08.05	5	13.07-29.07	30.0	25.0
Cecilia	Dwarf Peach	22.03-24.04	03.04-08.05	5	04.08-13.08	13.0	29.0
Puiu	Dwarf Peach	24.03-26.04	04.04-10.05	5	08.08-19.08	15.7	35.0
Craita	Dwarf Peach	22.03-24.04	03.04-08.05	5	04.08-12.08	18.0	40.0
Liviu	Dwarf Nectarine	22.03-25.04	06.04-09.05	5	13.08-20.08	12.0	26.7
Naica	Dwarf Nectarine	21.03-24.04	03.04-08.05	5	04.08-13.08	10.5	23.3
Valerica	Semidwarf brugnone	21.03-24.04	06.04-08.05	5	14.08-23.08	20.5	45.5

Table 2. Quality test some peach, clingstone, nectarine and brugnone cultivars Fruit Research Station Constanta, UASVM Bucharest, 2006

Genotype	Fruit mean weight (g)	Dry matter (%)	Acidity (mg%)	Fruit appearance	Quality and destination of fruits
Florin	120.0	11.5	0.52	Flat, yellow-orange with 30% red	Orange flesh, juicy, for dessert and industrial (compote, jam).
Raluca	170.0	12.3	0.58	Spherical, yellow with 80% covering colour	Yellow flesh, juicy, for flesh consumption
Filip	68.0	12.7	0.40	Flat fruit, red-carmine, very nice	White, flesh, juicy, flavoured for flesh consumption and industrial processing (compote, nectar, jam)
Catherine Sel.1	220.0	14.0	0.63	Spherical, yellow-orange, nice	Orange flesh, very form, with a strong flavour, for processing and dessert (jam, comfiture, compote)
Redhaven -Control	185.0	10.4	0.70	Spherical, yellow-more that 70% red-dark, nice	Yellow flesh, juicy, for dessert and processing
Cecilia	215.0	10.8	0.75	Spherical, 90% red covering colour, nice	Yellow flesh, juicy, for dessert and industrial processing (jam, nectar)
Puiu	170.0	10.3	0.68	Oval, yellow-orange with 30% red covering colour	White flesh, juicy, for fresh consumption and processing (nectar)
Craita	135.0	11.0	0.83	Spherical, orange	Yellow-orange, flesh, for dessert and processing
Liviu	95.0	11.6	0.81	Spherical, 100% red-covering colour	Yellow flesh, juicy, flavoured for dessert and processing (nectar).
Naica	105.2	10.5	0.36	Spherical, 100% red-dark covering colour	Yellow flesh, juicy, for desert and processing
Valerica	105.0	10.8	0.65	Oval, yellow-orange with 70% red	Yellow-orange flesh, flavoured for processing (jam, stewed and dessert)

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RESEARCHES REGARDING THE STORAGE CAPACITY AND THE QUALITY OF SOME APPLE VARIETIES FROM VOINESTI REGION IN NORMAL ATMOSPHERE STORAGE CONDITIONS

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Keywords: Weight looses, firmness, biochemical composition, organoleptic features

ABSTRACT

This study regards the storage capacity of some apple varieties from Voinesti region, in ordinary conditions. Also, the fruits are organoleptical and biochemical studied. The differences between the apple varieties, emphasize some own characteristics which recommend them for different types of storage and the possibilities of maintaining the quality during the storage period.

INTRODUCTION

In actual condition, when more and more storage spaces are closing and the fruit growers are building themselves small storage spaces, adapted to individual necessity, it is important to analyze the actual fruit assortment of different traditional areas, from the storage capacity (in normal atmosphere conditions) point of view.

MATERIALS AND METHODS

The experiment was carried out from October to December 2005 in the frame of the Horticulture Faculty, Bucharest. The biological material was represented by 18 apple varieties provided by SCDP Voinesti. The 2005 year was a raining one, with favourable conditions for apple scab infection. The apples were poked up and temporary stored in the Voinesti storage place then transferred to Bucharest in the P boxes. Here, there were stored in a subsoiled space, in normal atmosphere storage conditions.

First determinations were made at the storage entering of the fruits (Oct 11, 2005), the experience has ended at the get out in the 2nd of December, 2005. During the experience, the fruits were weighted at 7 days interval and the dry soluble substance and flesh fermity were determined at 10 days interval. The total dry substance was determined at the start of the experiment and the acidity and C vitamin at the entering and get out of the fruits from storage space.

The determinations were made on a 10 sample fruits for each variety, the average sample being set up from representative apples (from the size, maturity, and coloration etc point of view). The average weight of the fruits was determined by analytical balance (two decimal fraction) and the flesh firmness with Turoni handly digital penetrometer. It was used the 11 mm piston dedicated for apple fruits, the penetration being executed in the ecuatorial zone, in 4 points after a previous elimination of the local epiderma. The results were noted in kgf/cm^2. In order to determinate the main chemical components, it were applied standardized labour methods; soluble dry substance determined by refractometer method (Abbe industrial refractometer); acidity by titrimetric method (% malic acid); vitamin C by iodometric method (mg/100g fresh material).

At the same time, the apple varieties were visual and organoleptical appreciated by the students who completed degusting sheets, the obtained score being colected and interpreted after. For appreciation of the apple sensorial quality it was considerate necessary 3 appreciation criterions: the aspect, the texture and the taste. The notification used a 100 points scale, each of the criteria having a different share in the final note. Thus, the aspect represents 15%, the texture 35%, the taste 50%. Depending on the registered score, each variety has been allocated to one of the 5 quality classes.

RESULTS AND DISCUSSIONS

During the storage period (Oct 11 – Dec 2), each variety had a different manifestation regarding the storage capacity and the biochemical composition. So, it was registered weight losses, the biggest being observed at the Frumos de Boskoop, Golden delicious, Frumos de Voineşti and Creţesc (table 1).

Also, the firmness of the fruits decreased a lot during the storage period, being mainly affected the autumn varieties and the ones which are predisposed to dehydration (table 2). At the entering in the storehouse, the best firmness were recorded by the fruits of Florina, next by Golden delicious, Generos, Redix and Idared. Low values were found out at the Pionier, Freedom and Frumos de Voineşti.

At the last determination, it was noted a better firmness at the varieties Florina, Generos, Jonathan, Idared, Redix, Liberty and a poor one at the Pionier, Freedom, Frumos de Voineşti and Sir Prize.

Concerning the biochemical composition of the fruits, the dates indicate a great content in mineral substances at the Ciprian (3,57 %), Idared (3,07 %), Jonathan (3,03 %) and Florina (3,03 %).

The soluble dry substance varied from the start of storage period between 16,87 % at Frumos de Boskoop and 11,87 % at Pionier variety. Generally, for the autumn varieties, the soluble dry substance gradually decreased and for the winter varieties, in the first 10-20 days were registered an incensement of the soluble dry substance values, and later a decrease of those till the end of the storage period.

The last determination of the soluble dry substance situated the Jonathan variety in the top with 15,17% next closely by Redix and in the opposite positions Pionier and Freedom with 10,2 respectively 10,88% (table 4).

The apple acidity varied from 0,824 % at the Frumos de Boskoop to 0,494 % at Golden delicious, along the storage period recording decreasing of the acidity values for each variety. Frumos de Voineşti and Freedom varieties recorded the lowest decrease of the acidity.

Regarding the vitamin C content, Liberty accumulated the highest amount (11,13 mg/100g), also Florina and Frumos de Boskoop, and at the end of the storage period Generos, Jonathan and Frumos de Boskoop.

The Soluble Dry Substance/Acidity report has recorded an increase from the start to the end of the storage period (between 17.32 and 37.68). The biggest differences were remarked at the Florina, Pionier, Creţesc and Sir Prize, and the lowest at Priam and Freedom.

Centralizing the dates from the degustation sheets it could be done a classification of the varieties, in the top being situate the Jonathan variety next by Generos, Iris and Frumos de Voinesti.

At the end of the list are situated with the “good” qualificative the varieties Ciprian, Priscilla and Creţesc (table 5).

The qualificative classes are: very good (80-100), good (60-79), acceptable (40-59), mediocre (20-39), and inadequate (0-19)

CONCLUSIONS

1. At the end of the storage period, the greatest weigh losses were recorded by the Frumos de Boskoop, Golden delicious, Frumos de Voineşti and Crețesc.
2. A good firmness of the flesh presented the varieties: Florina, Golden delicious, Generos, Redix, Idared and Liberty, poor consistency Pionier, Freedom and Frumos de Voinesti.
3. Ciprian, Idared, Jonathan and Florina registered a high mineral content. The soluble dry substance varied during the storge period, at the autumn varieties the soluble dry substance gradually decreased and for the winter varieties, in the first 10-20 days were registered an increasement of the soluble dry substance values and after that a decreasment of those till the end of the storage period.
4. As varieties with high acidity remarked Frumosul de Boskoop, Priam, Liberty and Jonathan. Great vitamin C content registered the varieties Liberty, Florina, Frumos de Boskoop, Priam, Generos and Idared.
5. From the organoleptical point of view, the best variety was Jonathan next by Generos, Iris and Frumos de Voineşti. At the end of the list were situated Ciprian, Priscilla and Crețesc.

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Table 1

The dynamic weight losses at some apple varieties

No.	Variety	Average weight (g)					
		Oct 11 2005	**Oct 21 2005**	**Oct 31 2005**	**Nov. 11 2005**	**Nov. 21 2005**	**Dec. 2 2005**
1	CIPRIAN*	135	133	132	131	130	128
2	FLORINA*	159	158	156	155	154	153
3	GENEROS*	199	198	196	195	192	192
4	PIONIER*	121	120	118	116	116	114
5	PRISCILLA*	170	168	165	164	162	159
6	SIR PRIZE*	208	206	205	204	201	201
7	VOINEA*	169	167	166	164	162	162
8	LIBERTY*	128	126	125	124	123	121
9	PRIAM*	130	129	127	125	122	122
10	FREEDOM*	218	217	215	214	213	211
11	IRIS*	169	167	165	164	162	161
12	REDIX*	178	176	174	172	169	167
13	BOSKOOP	205	201	197	194	191	188
14	CRETESC	110	106	101	98	97	96
15	JONATHAN	176	174	173	172	170	169
16	GOLDEN DEL.	167	165	161	159	156	154
17	IDARED	203	201	199	198	195	195
18	FR DE VOINESTI	185	182	179	177	173	169

Table 2

The firmness decrease of some apple varieties during the storage period

No.	Variety	Firmness (kgf/cm^2)					
		Oct 11 2005	**Oct 21 2005**	**Oct 31 2005**	**Nov. 11 2005**	**Nov. 21 2005**	**Dec. 2 2005**
1	CIPRIAN*	4,51	4,41	4,36	3,89	3,74	3,57
2	FLORINA*	7,93	5,22	4,94	4,97	4,43	4,02
3	GENEROS*	6,44	6,17	6,07	5,91	4,93	4,89
4	PIONIER*	3,41	3,04	3,02	2,75	2,75	2,74
5	PRISCILLA*	4,92	4,70	4,20	4,13	3,85	3,84
6	SIR PRIZE*	4,36	3,84	3,66	3,61	3,53	3,18
7	VOINEA*	5,02	4,98	4,67	4,27	4,13	3,93
8	LIBERTY*	5,94	5,55	5,35	5,30	4,96	4,21
9	PRIAM*	4,47	4,46	4,36	4,22	3,80	3,76
10	FREEDOM*	3,46	3,30	3,18	3,06	2,80	2,59
11	IRIS*	5,49	4,81	4,49	4,07	3,81	3,23
12	REDIX*	6,29	5,20	4,78	4,55	4,38	4,10
13	BOSKOOP	5,98	5,54	5,10	4,75	4,19	3,93
14	CRETESC	5,90	5,10	4,74	4,64	4,11	3,51
15	JONATHAN	5,66	5,61	5,44	4,72	4,40	4,47
16	GOLDEN DEL.	6,70	5,18	4,24	3,79	3,63	3,54
17	IDARED	6,03	5,95	5,27	4,82	4,24	4,17
18	FR DE VOINESTI	3,86	3,54	3,14	3,13	2,97	2,85

Table 3

The variation of the soluble dry substance during the storage period

No.	Variety	Soluble dry substance (%)					
		Oct 11 2005	**Oct 21 2005**	**Oct 31 2005**	**Nov. 11 2005**	**Nov. 21 2005**	**Dec. 2 2005**
1	CIPRIAN*	12,50	13,83	13,72	13,56	13,50	12,83
2	FLORINA*	13,50	15,66	15,54	14,0	14,5	13,83
3	GENEROS*	12,70	14,10	16,5	15,0	13,91	13,17
4	PIONIER*	11,87	11,13	10,87	10,65	10,42	10,20
5	PRISCILLA*	16,80	15,83	15,74	15,66	15,50	14,17
6	SIR PRIZE*	12,95	12,83	12,21	11,57	11,54	11,33
7	VOINEA*	14,66	14,14	13,05	12,89	12,83	12,37
8	LIBERTY*	14,07	17,16	15,40	15,00	14,91	14,50
9	PRIAM*	16,00	15,16	14,68	13,51	13,23	13,17
10	FREEDOM*	13,90	12,66	12,41	12,34	11,47	10,88
11	IRIS*	14,67	14,43	14,25	13,94	13,78	13,50
12	REDIX*	14,07	16,50	16,00	15,67	15,24	15,10
13	BOSKOOP	16,87	17,33	16,33	16,14	15,54	14,40
14	CRETESC	15,5	14,78	14,44	13,58	13,21	12,27
15	JONATHAN	13,53	15,66	17,10	16,95	16,40	15,17
16	GOLDEN	12,47	13,00	14,84	14,59	13,53	12,67
17	IDARED	12,66	13,55	16,57	15,13	13,5	12,83
18	FR VOINESTI	15,00	14,33	13,43	13,20	12,85	12,51

Table 5

The organoleptic appreciation of some apple varieties from Voinesti region

Variety	Organoleptic appreciation (points)					
	Aspect	**Firmness**	**taste**	**Total**	**Qualificative**	**Position**
CIPRIAN*	11,85	32,12	35,2	79,17	Good	16
FLORINA*	14,56	34,88	42,87	92,31	Very good	8
GENEROS*	15,34	35,74	46,82	97,9	Very good	2
PIONIER*	13,98	31,65	37,94	83,57	Very good	13
PRISCILLA*	12,54	29,64	32,35	74,53	Good	17
SIR PRIZE*	13	30,05	38,24	81,29	Very good	14
VOINEA*	14,85	32,44	44,97	92,26	Very good	9
LIBERTY*	11,6	33,57	43,85	89,02	Very good	11
PRIAM*	12,86	31,68	40,37	84,91	Very good	12
FREEDOM*	10,75	28,94	40,78	80,47	Very good	15
IRIS*	15,94	33,4	45,89	95,23	Very good	3
REDIX*	15,43	35,21	43,52	94,16	Very good	6
BOSKOOP	12,68	33	44,12	89,8	Very good	10
CRETESC	11,15	21,84	33,57	66,56	Good	18
JONATHAN	14,62	35,49	48,36	98,47	Very good	1
GOLDEN	13,85	33,24	47,55	94,64	Very good	5
IDARED	15,84	34,2	43,59	93,63	Very good	7
FR VOINESTI	14,61	32,64	47,68	94,93	Very good	4

Table 4

The changes registered in the compositions of some apple varieties at the start and the end of the storage period

No.	Variety	Mineral substance (%)	Acidity (% acid malic)		Vitamin C (mg/100g)		Soluble Dry Substance (%)		Soluble Dry Substance / Acidity	
		Oct 11	Oct 11	Dec 2	Oct 11	Dec 2	Oct 11	Dec 2	Oct 11	Dec 2
		At the start	At the start	At the end	At the start	At the end	At the start	At the end	At the start	At the end
1	CIPRIAN*	3,57	0,625	0,416	7,13	3,48	12,50	12,83	20,00	30,84
2	FLORINA*	3,03	0,624	0,367	10,66	4,53	13,50	13,83	21,63	37,68
3	GENEROS*	2,32	0,658	0,421	9,21	4,88	12,70	13,17	19,30	31,28
4	PIONIER*	2,63	0,641	0,309	8,33	3,20	11,87	10,20	18,52	33,01
5	PRISCILLA*	1,78	0,691	0,386	7,04	2,59	16,80	14,17	24,31	36,71
6	SIR PRIZE*	1,81	0,583	0,313	6,40	2,81	12,95	11,33	22,21	36,20
7	VOINEA*	1,29	0,655	0,428	5,28	2,98	14,66	12,37	22,38	28,90
8	LIBERTY*	1,21	0,745	0,497	11,13	4,62	14,07	14,50	18,89	29,18
9	PRIAM*	1,25	0,824	0,568	9,56	3,07	16,00	13,17	19,42	23,19
10	FREEDOM*	2,43	0,561	0,368	6,60	2,47	13,90	10,88	24,78	29,57
11	IRIS*	1,96	0,646	0,426	8,42	3,56	14,67	13,50	22,71	31,69
12	REDIX*	1,31	0,654	0,431	7,44	3,26	14,07	15,10	21,51	35,03
13	BOSKOOP	2,32	0,838	0,501	10,24	4,14	16,87	14,40	20,13	28,74
14	CRETESC	1,78	0,693	0,329	5,58	2,41	15,5	12,27	22,37	37,29
15	JONATHAN	3,03	0,781	0,553	8,85	4,30	13,53	15,17	17,32	27,43
16	GOLDEN	2,22	0,494	0,35	7,28	3,20	12,47	12,67	25,24	36,20
17	IDARED	3,07	0,672	0,455	9,36	2,28	12,66	12,83	18,84	28,20
18	FRUMOS DE VOINESTI	2,43	0,538	0,352	8,80	3,12	15,00	12,51	27,88	35,54

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ASPECTS AS REGARD AS THE BIOLOGICAL PRODUCTS CERTIFICATION METHODOLOGY

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Keywords: certification, biological agriculture, documents, conformity, certification body

ABSTRACT

The biological agriculture, according to the accepted definition by the European Union represents those systems, which tend to exploit and to preserve the productive ecological systems, without to use the synthesis chemical substance. The biological production system respects standards, reference books and nationally specification conditions and is certify by a supervision and Certification Body that is set up with this purpose. The biological certification scheme of the agricultural units is composed by two phases, as followings: 1) access application in the control system and obtaining the Certificate of accepted agricultural (farm) unit; 2) the application for registration in licensed list of the Certification Body and obtaining the Conformity Certificate with the biological production method (License Certificate).

INTRODUCTION

The biological agriculture, according to the accepted definition by the European Union represents those systems, which tend to exploit and to preserve the productive ecological systems, without to use the synthesis chemical substance (1).

The purpose of the biological production is to realize durable, various and balanced agricultural systems, that assure protection of natural resources and people soundness.

The biological production method contributes to reduce dissipation, by rotation of crops, by using nitrogen biological fixation plants and by recycling organic residues, especially of animal manure.

MATERIAL AND METHOD

The biological production system respects standards, reference books and nationally specification conditions and is certify by a supervision and Certification Body (CB) that is set up with this purpose.

The biological certification scheme of the agricultural units is composed by two phases, as followings:

1. Access application in the control system and obtaining the Certificate of accepted agricultural (farm) unit.
2. The application for registration in licensed list of the Certification Body (CB) and obtaining the Conformity Certificate with the biological production method (License Certificate).

For the industrial processing units, the two phases can be in unison, while the production units can request to obtain the Conformity Certification and to be register in the Licensed List only after the end of the minimum period of conversion to biological agriculture.

During such a period, the production unit is supposed to checking.

CERTIFICATION PROCESS PROGRESSING

The access application is composed by the following documents:

1. *Notification* with the production activity by biological method [1] that must contains:
   - unit description, the agricultural used area in the unit and the unit structure;
   - liability declaration of the legal representative in conformity with Authority and with Certification Body.

To obtain listing in the Biological Units Register, notification must be presented at the territorial Authority, too.

Note: (1): To work out the Notification and for its actualize it must be carried out referring to the working out instructions, statutory in the normative requirements.

Notification must have the signature of the legal representing or of a corresponding authority.

2. *Technical report* [2] with a complete description of the biological producing units and containing the concrete measures to observe a rule of the applicable requirements.

Technical report can be presented on Certification Body documents or on unit documents and must describes:

- the general activity carried out in that unit and those specifically for the biological production;
- production parcels (productive units), preventing applied measures and specify the date of the last application of the inadequate products for the biological production;
- rotation crops plan, established to maintain soil fertility and soil biological activity, mentioning the number of years and the cultivated species;
- technological paper sheet indicating the cultural technique for fertilization, phyto sanitary protection and pests control;
- harvesting and storing products methods, specifying the adopted measures to guarantee the biological products identification and to avoid in this phase the lots interfering and separation those contacted with the conventionally products.

Note (2): to make out the Technical report it must be made referring to the legislation Compendium of Reg. 2092/91 CEE.

3. *Annexed documents* to the application:
   - the unit survey plan at a scale 1:10 000, emphasizing the respective unit;
   - the structural plan with the destined location for storing, storage spaces, transformer spaces , animals growing spaces;
   - a copy of the property title;
   - a copy of the documents which attest if the unit practiced the biological production, before;
   - The Annual Production Program, where it will be defined the annual program of the unit cultures. This document must be send to the Certification Body in the moment of the first notification on January 31 every year, or during the year, every time when there are some changes.

APPLICATION EVALUATION

After the application being received, the sector responsible (or the regional coordinator) marks a technical valuator for the application valuation and a technical inspector to unit survey. The mark persons must have the specifically competence and it is necessary do not exist concerns conflicts. The unit visit will be carried out in no more than 90 days from the application receiving date. The mark technical valuator, with the aid of the check list, evaluates the applicant requirement and pursues the followings aspects:

- if the applicable requirements are complete and conform;
- identified non -conforming;

- culture technology, producers and certificates of origin ;
- labels and publicity materials;
- technical schemes.

The technical valuator will communicate to the unit and to the technical inspector, possible non-conforming and correction proposals. At the unit requirement, the technical valuator, noticing the technology, producers and labels project conformity, will communicate in the preliminary phases the license code, which will be mention on the labels, thus to be sufficient time to inscribe the packages.

INITIAL INSPECTION

The marked technical inspector visits the entire unit (bio and non bio) and must draw up:

- checking the production unit description (bio and non bio), storage and production areas, the culture system, the technical means and if it is imposed sites where are performed some transformation and/or conditioning operations;
- checking the concrete measures that the producer must performed in the proper unit, to guarantee respecting of the specifically requirements;
- evaluate the unit and its organization and production system;
- announcing the norms discrepancies and presenting in the unit the possible non-conforming;
- informing the farmer upon the certification process progressing.

At the visit end, the inspector puts to the farmer disposition the followings documents (if the farmer has not these documents yet):

- Farm register and others registers in the case when these exist and others connected activity to the vegetal production;
- Certification regulation;
- The Certification Body Reference Book for production and processing of products obtained by biological agriculture;
- The actualized Compendium of the Regulation 2092/91 CEE.

THE FINAL EVALUATION AND DECISION FOR CERTIFICATION

To be enclosed in the List of the certified units and production certification, the production unit must to practice before, as the Regulation 2092/91 CEE prescribed, for a defined period "the conversion to biological agriculture". The initial date to calculate such a period is that of notification.

The obtained vegetal production during the years of farm conversion period can be certified as "production obtained during conversion to biological production".

After the conversion period, production can be certified with the title "produced in biological agriculture".

ACCEPT THE UNIT IN THE CHECKING SYSTEM

In the case of a positive evaluation, the technical valuator advances the proposal to product certification to the responsible from the Certification Body, to inscribe the unit in the Certified Units List and give out the conformity certification.

In the case of non-conformity, that negatively affects the certification proposal; the evaluation will be in attention of the responsible of the Certification Body, which will be supposed to a debate in the following Certification Council meeting.

To give out the certification - the certification proposal advanced by the technical valuator is send to the responsible from the Certification Body, that if give the accept deliberate for inscribe the unit in the List of Certified Units and confers The Conformity

Certification. In the case of non-conformity, that compromise the certification, the responsible send the problem description to the Certification Council, that require to the unit to perform corrective actions and integrate them in documentation, establishing the adequate period to resolve them.

If during the established period, the unit demonstrates that had been carried out the necessary correction actions', removing the choused inconvenient, the Certification Body will inspects only the necessary phases from the initial inspection and after these, the Certification Council deliberates for the unit certification. So, the Certification Council refuses the application. With the aid of the Certification Body and Conformity Certification responsible it can be obtained:

- realizing of the Conformity Certification with the biological agricultural method;
- realizing of the possible checking certificates for the EU imports of the biological products (only for imports);
- inscribe the unit in List of units with certified products;
- accept the package labels and authorize the recognized conformity identification mark.

Conformity certificate- is the document that registers only products for which the farmer is authorized by the Certification Body to deliver the conformity declaration. The packages labels for the products destined to be consumed and by the transaction documents n the case of products destined to other checked units represent the conformity declarations.

Conformity certificate contains:

- the identification, revision number and the valuable period;
- society type and the unit identification code, the legal office and operative address;
- spreading list;
- certified products list and the classification for every products according with art. 5 from Regulation 2092/CEE;
- authorization code for the labels products destined for consumers;
- means to deliver the transaction documents for products destined to other checking units;
- paper sheets number and the responsible signature from the underwriter Certification Body.

Survey activity - survey activity is programmed as followings: during January, Certification Body responsible elaborates The Annual Inspection Plan and to take samples for the checking units. For every unit, based on the non-conformity risk level as comparing with Regulation 2092/91, there are defined: the number, period of the checking (every trimester), inspection type and analytical samples that must be carried out during the year.

Monitoring – Certification Body responsible and regionally coordinators every trimester will performed the inspections monitoring and of the analyzed samples and compared them with those planning. The monitoring activities are documented and send to the Certification Body.

Inspections - there are planning the followings inspection types:

- announced visits, referring to the production process (bio and non bio) with a farmer warning;
- non-announced visits, partially, without the farmer warning that in the case of the production units are referring to observe the cultures stage in the field and samples collecting;
- auxiliary visits statutory in the followings cases: extension of the unit certification, which during the survey demonstrates a conformity inconstancy to the continuum certification requirements; new products or some products and/ or process changes, susceptible to influence the certified products conformity.

CONCLUSIONS

1. The biological products certification is realized following a specifically certification scheme of the Certification Body, according to the EU 2092/91 Regulation requirements.
2. The agricultural units, in function of their proper characteristics, must to follow a conversion period to the biological agriculture, before to request to be certified.

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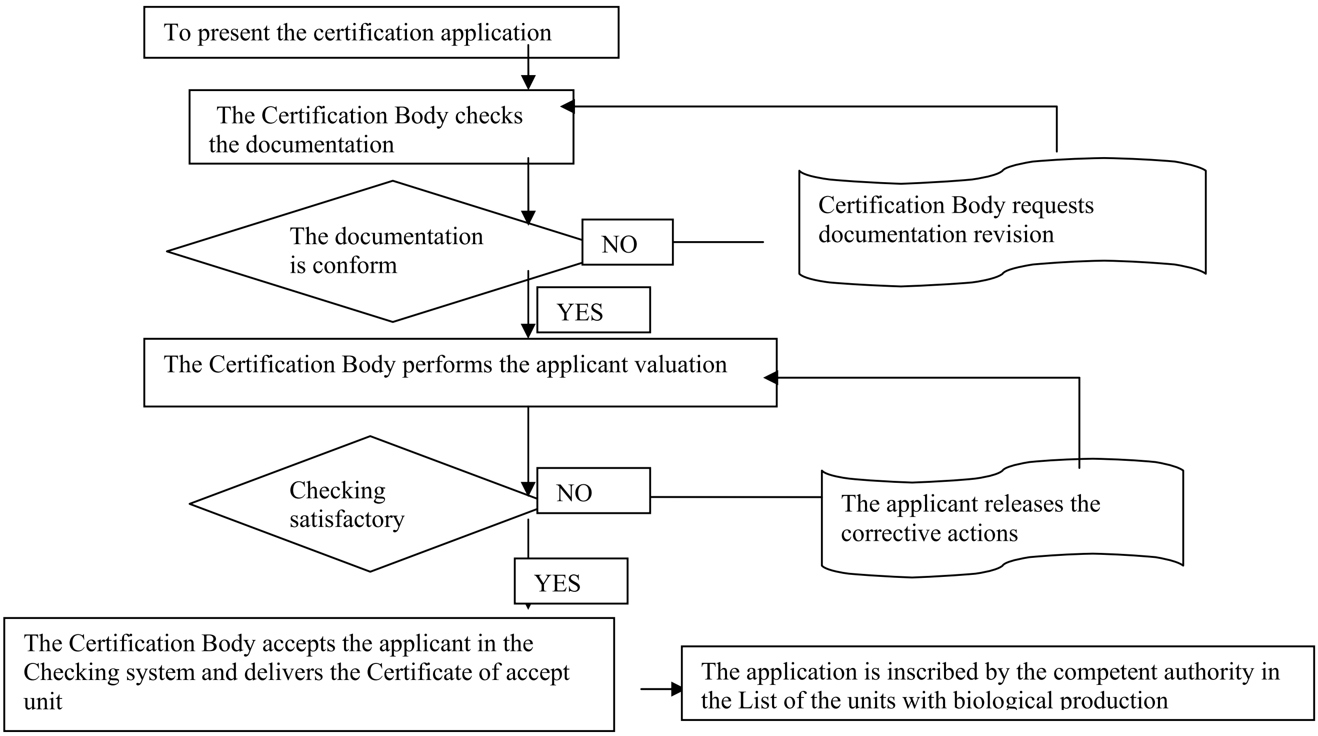
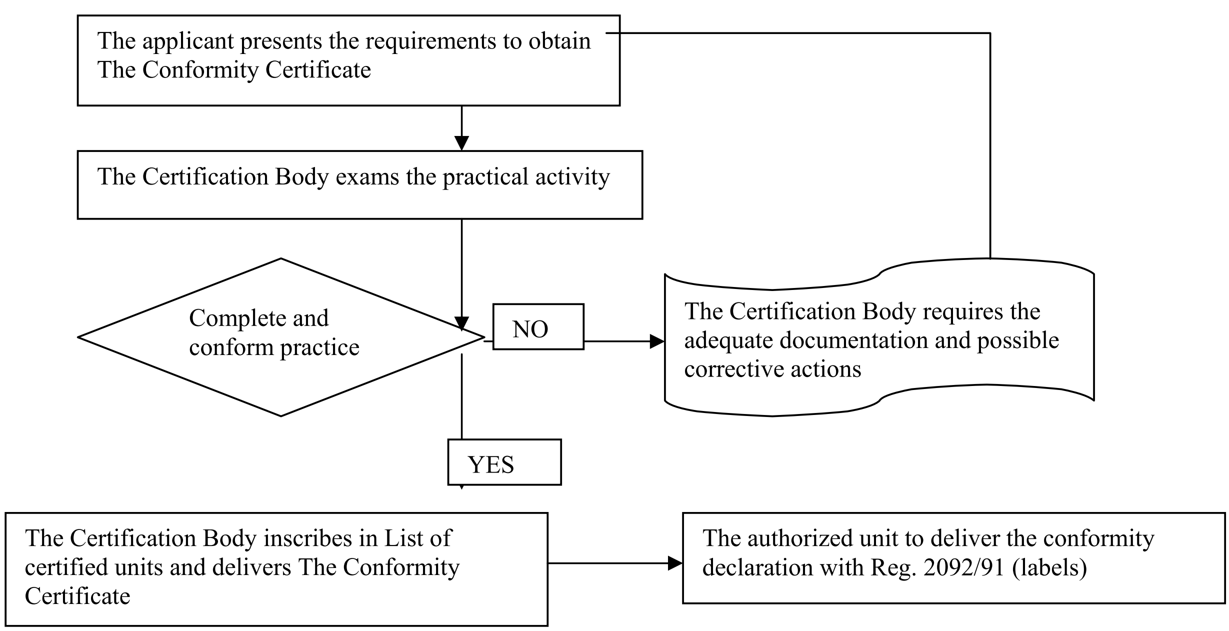
3. *** *Regulamentul Consiliului (CEE) nr. 2092/91 privind modul de producţie biologică*.

CERTIFICATION SCHEME

PHASE I



PHASE II



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THE EFFECT OF SHOOT TIPPING AND FRUIT THINING ON THE PEACH GROWING AND FRUCTIFICATION

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Keywords: shoot cutting, peach, production

SUMMARY

Cutting off the peach shoots in August determined the formation of secondary shoots in different percentages, depending on the varieties, registering values between 0-94%. The rared fruits determined a low production in comparison with not rared fruits, but their quality was higher. At the Alexia and Antonia varieties is not necessary to rare the fruits because this varieties form an optimal number of fruits.

INTRODUCTION

The peach culture although recently produced in our country in comparison on with other species (apple tree, plum tree, cherry tree etc.), finds in some fields very good conditions to obtain high quality productions. The main purpose of harvesters is to find proper solutions to take advantage of the best conditions of a field, desire based on studying the varieties and the culture technology. The present paper presents the result of 5 peach and clingstone peach varieties study in Campia Romana conditions, regarding the reactions to some green works.

MATERIAL AND METHOD

The present study was conducted in 2004-2005, in 5 years old plantation with the following varieties: Alexia, Antonia, Springcrest, Crimsongold and Independence. The planting distance was of 4/4 m, including the possibility of working the soil from 2 different ways in the first years. The maintaining works were the regular ones for a peach plantation; in addition there were done manual fruit raring works at tree varieties and cutting in green of shoots after harvesting at 3 intensifications: 1/3 from length, ½ from length and 2/3 from length. The searching method was the stationary one, registering biological and biometrical parameters of varieties during the study period; in laboratory were done specific analyses to determine the biochemical composition of fruits.

RESULTS AND DISCUSSIONS

After data interpretation different results were obtained between varieties and the variants for study which were port of the variety. In what regards the effect of raring on fruit size, it was proved that at clingstone the fruit weight was of 85-87%, bigger after raring and at Springcrest variety of 42% (table 1). Alexia and Antonia varieties did not need raring because the form the proper number of fruits.

The raring effect on production was negative; the production was lower at rared variants, even though the fruits had bigger size. The obtained production was different among variants as it follows in table 2

The quality of fruit was good at all varieties; the values for the biochemical components were appropriate for the specie. Though there were registered big differences between varieties in what regards the content in total dry substance, glucose, protein substances, C vitamin etc., (table 3).

In what regards the effect of cutting in green of shoots on the capacity of producing secondary shoots it were observed huge differences between varieties. At Independence variety there were no secondary shoots no matter the level of cutting and at other varieties the secondary shoots formed after 5-6 weeks (table 4).

CONCLUSIONS

This study proves once again that the variety potential of growing and fructification is influenced by the resources of a field.

Raring the fruits manually showed a different behavior between varieties; Alexia and Antonia do not need such works as the give quality in production and a proper number of fruits.

The clingstone tendency to have au excessive number of fruits is maintained; without raring the fruits we unassailable because of then improper size.

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Table 1

The raring effect on fruit size

Variety	Rared/non-rared	Dimension H/D1/D2 (mm)	Number of fruit/ kg	Average weight of fruit (g)	Difference rared/non-rared %
Independence	Rared	58/60/58	9	116	187
	Nonrared	48/43/45	16	62	
Crimsongold	Rared	56/55/53	14	72	185
	Nnonrared	43/40/39	26	39	
Springcrest	Rared	45/51/51	13	75,5	142
	Nonrared	44/47/46	19	53	
Alexia	Nonrared	56/53/64	9	108	-
Antonia	Nonrared	64/69/60	8	126	-

Table 2

The raring effect on peach production

Variety	Rared/non-rared	Fallen fruits (%)	Manually rared fruits (%)	Production Kg/pom	Production Kg/ha
Independence	Rared	4	30,9	17,8	11125
	Nonrared	58	-	23,6	14750
Crimsongold	Rared	2	46,34	21,3	13312
	Nonrared	71	-	27,2	17000
Springcrest	Rared	-	47,99	8,6	5375
	Nonrared	8	-	9,7	6062

Table 3

Biochemical parameters of fruits at some peach varieties

Parameter	UM	Independence	Crimsongold	Springcrest	Alexia	Antonia
Total dry substance	g%	13,11	11,58	15,06	10,41	14,98
Water	g%	86,89	88,42	84,94	89,59	85,02
Glucoses	g%	8,73	10,03	8,59	9,84	11,60
Total titrable acidity	g%	0,59	0,53	0,71	0,51	0,48
Protein substances	g%	0,80	0,73	1,03	0,67	0,97
Tanoide substances	g%	0,18	0,10	0,22	0,09	0,04
Pectin substances	g%	0,79	0,71	0,60	0,43	0,53
Mineral substances	g%	0,61	0,57	0,62	0,38	0,47
Cellulose	g%	0,69	0,54	0,68	0,50	0,57
C vitamin	mg%	10,73	9,21	12,02	6,09	5,19

Table 4

The effect of shoots cutting on secondary shoots formed

Variety	Cutting date	Cutting level	The period after secondary shoots appeared	The number of secondary shoots on shoot	The percent of shoots while formed secondary shoots
Independence	3 august	1/3	-	-	0%
		½	-	-	
		2/3	-	-	
Crimsongold	3 august	1/3	39	1	48%
		½	39	1	
		2/3	43	2	
Spingcrest	3 august	1/3	43	7	94%
		½	43	3	
		2/3	49	2	
Alexia	3 august	1/3	-	-	14%
		½	-	-	
		2/3	50	3	
Antonia	3 august	1/3	42	4	87%
		½	42	6	
		2/3	42	5	

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STUDIES ON THE AGROPRODUCTIVE POTENTIAL OF SOME APPLE SELECTIONS AND COLUMNARY CULTIVARS WITH DISEASE GENETIC RESISTANCE

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Keywords: columnar, resistance, agroproductive

ABSTRACT

Taking into account the technical and biological advantages of the columnary trees, one can ascertain that the columnary varieties are of great interest in establishing the new orchards. The paper describes the yield potential of Nicol and Colmar cvs., the first autochthonous, columnary cvs. and of other 6 selections under trial at the Research Institute for Fruit growing Pitesti, all showing scab genetic resistance.

INTRODUCTION

As a result of the science advances in all fields, for fruit culture as well in the 3rd millennium there are all chances for a significant improvement of raise the fruit yield. So the commercial growing of the columnary varieties is one of these opportunities producing at the world level over 56 million tons of apples (Branişte and Militaru, 2002, 2006). Having in view the technical and biological advantages of the columnary trees (a higher planting density of 5,000 – 25,000 trees/ha, a less sophisticated culture technology by reducing small volume canopies) we can assert that for the modern apple orchards, the columnary trees are of great interest (Cepoiu, 2000). In Romania, the breeding program for the columnary apple trees was initiated in 1994 at Research Institute for Fruit Growing Pitesti Maracineni, Arges and introduced Vf resistance gene from Florina, Priam, Liberty, Prima, Pionier cvs. to the columnery apple McIntosh Wijcik (natural mutation of Mc Intosh cv., discovered in Canada). The paper describes the productive potential of autochtonous, columnary apples Nicol and Colmar and of 6 columnary selections (Col 92, Col 95, Col 97, Col 109, Col 113, Col 114), all with scab genetic resistance versus Pionier control (Vf) and good quality fruit.

MATERIAL AND METHOD

The studies were carried out between 2002-2005 at Research Institute for Fruit Growing Pitesti Maracineni, within the Genetics and Breeding Laboratory.

The trees were grafted on M9 rootstock planted at 3.5/1 m spacing for the columnary genotypes and 4/2.5 m for the control. Yearly, 6 – 8 insecticide applications were done lacking the fungicide sprays. The soil management system was sod stripe 50 cm between rows and clean cultivation along the row (hoeing or herbicide).

To record the genotypes yield, the fruit (kg/tree) were weighed at each 10 trees/cv. having 6 planting treatment (V1 = 1,900 trees/ha, V2 = 2,850 trees/ha, V3 = 3,800 trees/ha, V4 = 3,333 trees/ha, V5 = 4,444 trees/ha, V6 = 6,666 trees/ha).

To emphasize the bear alternance, the index was calculated according to UPOV formula:

$$I.A. = [(A – B)/(A+ B)] \times 100\ \%,$$

where A and B represent the fruit yield for two consecutive years.

According to the values found we had: 1. full alternance (100 %); 3. high alternance (30 – 90 %); 5. mid alternance (20 - 30 %); 7. low alternance (1-20 %); 9. no alternance.

RESULTS AND DISCUSSIONS

The mean fruit during four consecutive bear years (3rd – 6th years after planting) was variable ranging from 2.7 kg/tree (Col 95) to 20.9 kg/tree (Col 114), table 1. Colmar columnary cv. gave a mean yield of 15.8 kg/tree, more than Pionier control (14.7 kg/tree).

Related to 2004 (normal weather conditions) and 2005, the genotypes studied were -- - grouped in 3 classes according to the alternance index:
genotypes with high fruiting alternance: Col 92, Col 95, Col 97, Col 109, Col 114;
genotypes with mid fruiting alternance: Col 113;
genotypes with small fruiting alternance: Nicol, Colmar.
Pionier cv. control belongs to the second class, mid alternance.

Table 1

Fruit yield of the studied genotypes

Genotype	Parents	Fruit yield (kg/tree)				I.A. %	Average Kg/tree	± Diference vs. control
		2002	2003	2004	2005			
Nicol	Wijcik x Pionier	0,4	5,2	3,1	4,3	16,2	3,2	- 11,5
Colmar	Wijcik x Florina	8,9	21,0	17,5	15,8	5,1	15,8	+ 1,1
Col 92	Pionier x Wijcik	0,7	8,1	5,1	2,2	39,7	4,0	- 10,7
Col 95	Pionier x Wijcik	0,3	5,7	1,1	3,6	53,2	2,7	- 4,0
Col 97	Pionier x Wijcik	2,8	1,5	15,4	1,7	80,1	5,3	+ 6,7
Col 109	Wijcik x Florina	6,2	0,9	24,8	2,2	83,7	8,5	- 6,2
Col 113	Florina x Wijcik	3,5	4,6	22,3	12,5	28,2	10,7	- 4,0
Col 114	Florina x Wijcik	2,6	41,1	10,0	29,9	49,9	20,9	+ 6,2
Pionier (Mt)		20,1	2,6	21,9	14,4	20,7	14,7	-

DL 5% = 15,2; DL 1% = 20,6; DL 0,1% = 27,6 (kg/tree)

To highlight the advantages of columnary varieties growing on small areas and show their yield potential at various planting densities, the yield for six planting replicates (Colmar cv. and Col 114 selection) was calculated: 1,900 trees/ha, 3.5 x 1m; 2,850 trees/ha, 3.5 x 1 m; 3,800 trees/ha, 3.5 x 0.75 m; 3,333 trees/ha, 3 x 1 m; 4,444 trees/ha, 3 x 0.75 m; 6,666 trees/ha, 3 x 0.5 m. The results were compared to Pionier cv. control (1,000 trees/ha, 4 x 2.5 m) and are listed in table 2. One can see that in the control plot (1,000 trees/ha) 20.1 t/ha (3rd year after planting) and in variant 6 (6,666 trees/ha), 59.3 t/ha were obtained.

The mean fruit yield over 4 consecutive years (III – VI), inerbases simultaneously with the planting density from 14.7 t/ha (1,000 trees/ha, 4 x 2.5 m) to 105.3 t/ha (6,666 trees/ha, 3 x 0.5m). The difference versus control raised from V1 to V6, being significant positive for V3 and V4, distinctly significant for V5 and highly significant for V6. The yield was rather high since the first years after planting, a major objective of growers when establishing a new orchard.

Table 2

The yield potential of Colmar cv. at various planting densities

Variant (trees no./ha)	Space planting (m)	Fruit yield (t/ha)					± Difference vs. control
		Year				Average	
		III	IV	V	VI	III - VI	
V1 – 1900	3,5 x 1,5	16,9	39,9	33,2	30,2	30,1	+ 15,4
V2 – 2850	3,5 x 1	25,6	59,8	49,8	45,0	45,1	+ 30,3
V3 – 3800	3,5 x 0,75	33,8	79,8	66,5	60,0	60,0	+ 43,3*
V4 – 3333	3 x 1	39,7	69,9	59,3	52,6	52,6	+ 38,1*
V5 - 4444	3 x 0,75	39,5	93,3	77,7	70,2	70,2	+ 55,2 **
V6 - 6666	3 x 0,5	59,3	139,9	116,6	105,3	105,3	+ 90,6***
Vm - 1000	4 x 2,5	20,1	2,6	21,9	14,4	14,7	-

DL 5% = 33.01; DL 1% = 45.7; DL 0.1% = 63 (t/ha)

The results obtained with Col 114 and listed in table 3 showed the same efficiency except that the trees showed an obvious bear alternance (3rd, 5th years with lower yields compared to 4 – 6th years with very high yields).

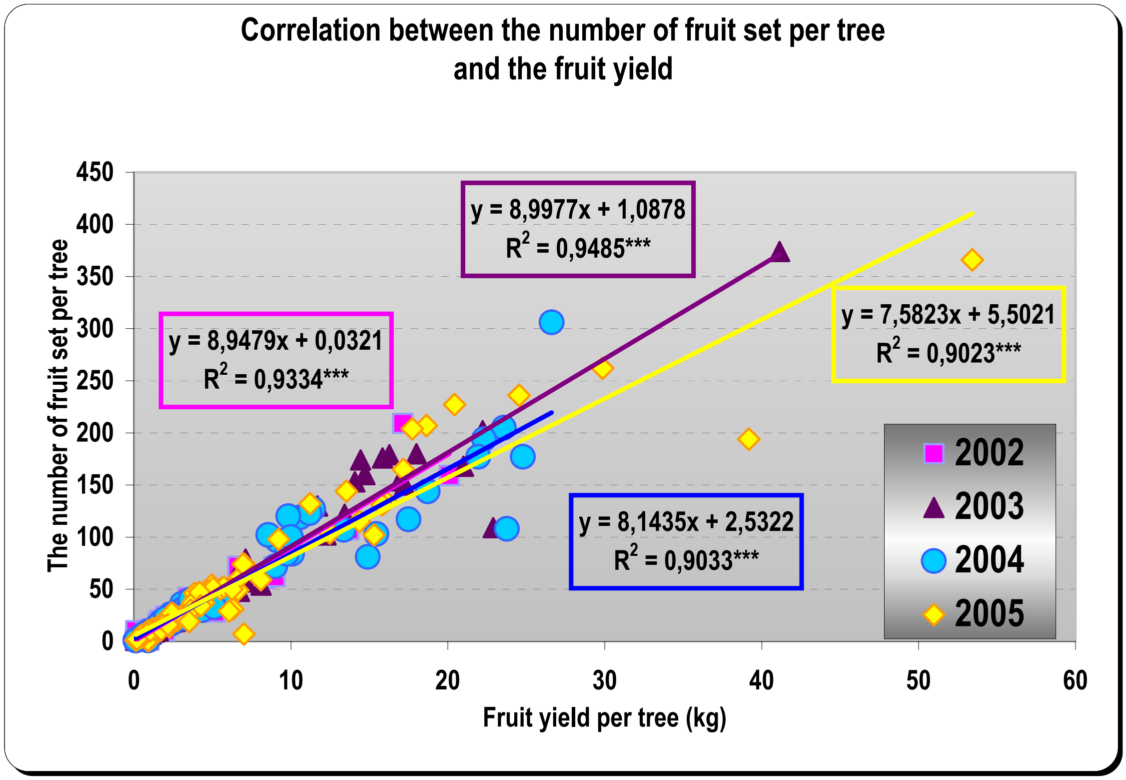
Table 3

The yield potential of Col 114 at various planting densities

Variant (trees no./ha)	Space planting (m)	Fruit yield (t/ha)					± Diference vs. martor
		Year				Average	
		III	IV	V	VI	III - VI	
V1 – 1900	3,5 x 1,5	4,9	78,1	19,0	56,8	39,7	+ 25,0
V2 – 2850	3,5 x 1	7,4	117,1	28,5	85,2	59,6	+ 44,9*
V3 – 3800	3,5 x 0,75	9,8	156,2	38,0	113,6	79,4	+ 64,7 **
V4 – 3333	3 x 1	8,7	136,9	33,3	99,7	69,7	+55,0*
V5 - 4444	3 x 0,75	11,6	182,6	44,4	132,8	92,8	+ 78,1**
V6 - 6666	3 x 0,5	17,3	273,9	66,0	199,3	139,3	+ 124,6 ***
Vm - 1000	4 x 2,5	20,1	2,6	21,9	14,4	14,7	-

DL 5% = 33,01; DL 1% = 45,7; DL 0,1% = 63 (t/ha)

Fig. 1 shows the correlation between the number of fruit set per tree and the fruit yield per tree, being a straight, linear and very significant correlation between all columnary genotypes studied, having a high and close value for all years of study: R^2 = 0,9334*** in 2002, R^2 = 0,9485*** in 2003, R^2 = 0,9033*** in 2004 and R^2 = 0,9023*** in 2005. The figure confirms the positive relation ship between the number of set fruit per tree and the fruit yield per tree.



CONCLUSIONS

1. Introduction of some columnnary apple varieties with scab genetic resistance (Vf) and good quality fruit is a progress in the high and very high density apple orchards.
2. The alternance index calculated has proved that Nicol and Colmar cvs are genotypes with low bear alternance (I.A. < 20%).
3. The mean fruit yield over four bear year period (III – VI) demonstrates the need of a high density planting in case of the columnary cultivars to maximize the production still in the first years.

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MONITORING OF ADULT WIRE WORMS POPULATIONS FROM *AGRIOTES* ESCH. WITH SYNTHETIC SEXUAL PHEROMONES IN BUCHAREST AREA 2005-2006

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Keywords: *Agriotes* Esch., wire worms, monitoring**,** pheromone, traps

ABSTRACT

Monitoring of adult wire worm population in Bucharest area, during 2005-2006, it was done with traps with sexual synthetic pheromone lure for *Agriotes* Esch., in two different biotopes, orchard and alfalfa, in order to identify of pests present in those biotopes and study their biology especially appearance and flight. It were used sexual synthetic pheromones lure for 8 species belonging to genus *Agriotes* Esch.; *A. lineatus* L., *A. obscurus* L, *A. sputator* L., *A. ustulatus* Schäll., *A. sordidus* Illiger, *A. brevis* Candeze, *A. litigiosus* Rossi and *A. rufipalpis* Brullé. Trap type used was VARb3 for species *A. ustulatus* Schäll. and *A. rufipalpis* and YATLORfunnel for species *A. lineatus* L., *A. litigiosus* Rossi, *A. obscurus* L., *A. sputator* L., *A. sordidus* Illiger and *A. brevis* Candeze. On the basis of biological material collected in traps, 1613 specimens, it was established adults dynamic, flight curves, level of population and existing of species and it was also possible to determine the selectivity of used pheromone lure. The high level of population was determined by species *A. sputator* (374 in 2005, 390 in 2006 specimens) and *A. ustulatus* Schall (201 in 2005, 214 in 2006 specimens), both species being dominant in these two biotopes. There also less present species *A. litigiosus* Rossi and *A. lineatus* L. with a small number of captured adults.

INTRODUCTION

Using of pheromone traps represent a new strategy in monitoring and control of damages wire worms, pest for different cultures, having the main purpose identifying of pest species and obtaining the information regarding their seasonal appearance (Tóth M. et al., 2002, 2003). Pheromone represents chemical way of communication between individuals. Wire worms are part of the pest species which are present in different crops, especially in those in which there are no many activities disturbing soil, and orchards and alfalfa are some of them. For monitoring of wire worm adult populations are in use, till now sexual synthetic pheromone for 43 species. In present there are in use different pheromone traps with specific lures, especially for species belonging to *Agriotes* Esch. genus, in monitoring adult's appearance, flight, population level and influence of crop and climatic factors on these aspects.

MATERIALS AND METHODS

Monitoring of adult wire worm population in Bucharest area, during 2005-2006, it was done with s-a traps with sexual synthetic pheromone lure for *Agriotes* Esch., in two different biotopes, orchard and alfalfa, in order to identify of pests present in those biotopes and study their biology especially appearance and flight. Sexual synthetic pheromone lure, in plastic cups with diameter of 8 mm and 32 mm length, were produced by Plant Protection Institute of Science Hungarian Academy, from Dr. Miklos Tóth. There were used sexual synthetic pheromone lure for 8 species from *Agriotes* Esch. genus; *A. lineatus* L., *A. obscurus* L, *A. sputator* L., *A. ustulatus* Schäll., *A. sordidus* Illiger, *A. brevis* Candeze, *A. litigiosus* Rossi. and *A. rufipalpis* Brullé.

Trap type used was VARb3 (fig.1) for species *A. ustulatus* Schäll. and *A. rufipalpis* and YATLORfunnel (fig. 2) for the other 6 species. Traps were installed in field, in groups, in straight line, with 20 m distance between traps. Pheromone lures were replaced in each 4 weeks, but control of specimens captured in traps were made weekly, from traps installing (end of March) till the moment in which there are no captures in traps during two weeks. Captured specimens were counted, preserved in 70^0 ethylic alcohols material, carried in the laboratory and identified. It was observed the dynamic of appearance of adults from soil, their flight, level of population for different species existing in studied area and specificity of pheromones.

RESULTS AND DISCUSSIONS

After monitoring of adult wire worm populations, it was registered the dynamic of appearance of adults from soil, their flight, level of population for different species existing in studied area and specificity of pheromones. Level of wire worms' populations, during 2005-2006 is presented in tables 1 and 2.

Taking into consideration data from table 1 and 2 it is observed that during last two years (2005-2006) from studied area was collected a significant biological material, 1613 adult specimens, belonging to 8 wire worms' species of *Agriotes* Esch. genus. From all 8 monitories species, *Agriotes sputator* L. was represented by 374 respectively 390 specimens, followed by *A. ustulatus* Schäll. with 210 respectively 214 specimens, both species being dominant. Average capture value were registered by *A. rufipalpis* Brullé, with 80 specimens in 2005 and 103 specimens in 2006. Species *A. brevis* Candèze *and A. sordidus* Illiger have registered 35 and 46 specimens respectively 18 and 25 specimens. Less presented were species *A. litigiosus* Rossi. and *A. lineatus* L. which were registered a low number of individuals captured, 9 and 16 specimens and respectively 11 and 15 specimens for *A. lineatus* L. Also species *A. obscurus* L., registered few specimens comparing with larvae number existing in soil. Dynamic of adult wire worms flight for each monitories species, presented in figures 3, 4, 5, 6, 7, 8, 9 and 10.

Variation of effective from each species, represented by flight curves of wire worm adults, indicates evolution in time of adult presence in field and moment of maximum flight level. In this respect it is possible to differentiate species with a long period of flight, 130 – 150 days (*A. sputator* L.), medium period of flight 60 – 80 days (*A. lineatus* L. *A. brevis* Candeze, *A. litigiosus* Rossi, *A. rufipalpis* Brulle) and species with short period of flight 35–50 days (*A. ustulatus* Schäll, *A. obscurus* L.). Appearance from soil and flight end, like number of adults emerging from soil and level of population is annually changed in relation with climatic conditions and population level in previous years. From the presented data it is observed that *A. sputator* L. appear first from soil followed after 10 days by *A. brevis* Candeze. During June and July all 8 monitorised species are present on plants for feeding and after that in field for laying eggs in soil.

Data obtained referring to appearing of insects from soil, dynamic of appearance, their flight, level of population for different species existing in studied area and specificity of pheromones, give us useful information for improving forecast and warning methods, for control of wire worms in adult stage but also pheromone trap proved their efficiency for biological and ecological studies of these pests of major importance, in critical period of laying eggs in agroecosystems (Mărgărit Gr. et al., 1985).

CONCLUSIONS

1. Sexual synthetic pheromone lures are specific and using pheromone traps represent a new way in adult monitorising of wire worms (*Elateridae*);
2. Pheromone traps for wire worms permit improving of forecast and warning methods in order to control of adults before laying eggs in soil;
3. Method of pheromone traps give new information which complete those obtained through the level of larvae from soil samples.

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Tables

Table 1. Level of adult wire worm monitories with traps with sexual synthetic pheromone lure in Bucharest area, in 2005

Observation period (month/decade)		Species of *Agriotes*							
		A. lineatus	*A. obscurus*	*A. sputator*	*A. ustulatus*	*A. sordidus*	*A. brevis*	*A. litigiosus*	*A. rufipalpis*
April	**I**	-	-	19	-	-	-	-	-
	II	-	-	13	-	-	2	-	-
	III	-	-	67	-	1	5	-	-
May	**I**	-	-	48	-	-	2	2	-
	II	1	-	16	-	1	2	1	12
	III	1	-	12	-	1	3	1	15
June	**I**	-	5	32	-	3	7	-	9
	II	4	5	73	-	11	8	3	22
	III	2	2	22	-	1	3	1	9
July	**I**	2	1	11	30	-	1	1	4
	II	-	-	16	52	-	1	-	2
	III	1	-	32	57	-	1	-	2
August	**I**	-	-	13	41	-	-	-	3
	II	-	-	-	30	-	-	-	2
	III	-	-	-	-	-	-	-	-
Total		**11**	**13**	**374**	**210**	**18**	**35**	**9**	**80**
Total specimens		**750**							

Table 2. Level of adult wire worm monitories with traps with sexual synthetic pheromone lure in Bucharest area, in 2006

Observation period (month/decade)		Species of *Agriotes*							
		A. lineatus	*A. obscurus*	*A. sputator*	*A. ustulatus*	*A. sordidus*	*A. brevis*	*A. litigiosus*	*A. rufipalpis*
April	**I**	-	-	21	-	-	-	-	-
	II	-	-	18	-	-	2	-	-
	III	-	-	58	-	-	2	-	-
May	**I**	2	-	36	-	-	7	1	-
	II	1	-	23	-	1	3	2	18
	III	2	4	19	-	3	5	3	14
June	**I**	2	6	29	-	3	6	2	10
	II	6	16	94	-	16	11	4	35
	III	1	8	41	-	2	5	2	10
July	**I**	1	8	21	44	-	2	2	5
	II	1	2	18	31	-	2	-	4
	III	1	-	9	65	-	1	-	4
August	**I**	-	-	3	49	-	-	-	2
	II	-	-	-	25	-	-	-	1
	III	-	-	-	-	-	-	-	-
TOTAL		**15**	**54**	**390**	**214**	**25**	**46**	**16**	**103**
TOTAL SPECIMENS		**863**							

Figures

Fig. 1- Trap type Varb3

Fig. 2 – Trap type YATLORfunnel

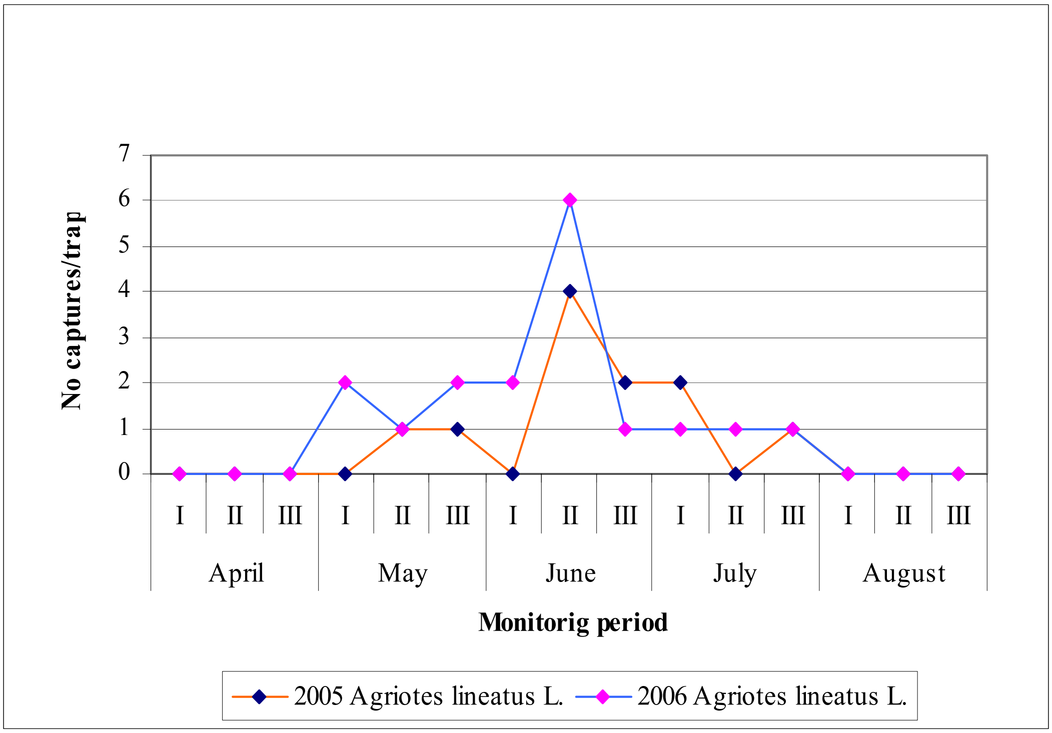

Fig. 3. Flight dynamic of *A. lineatus*

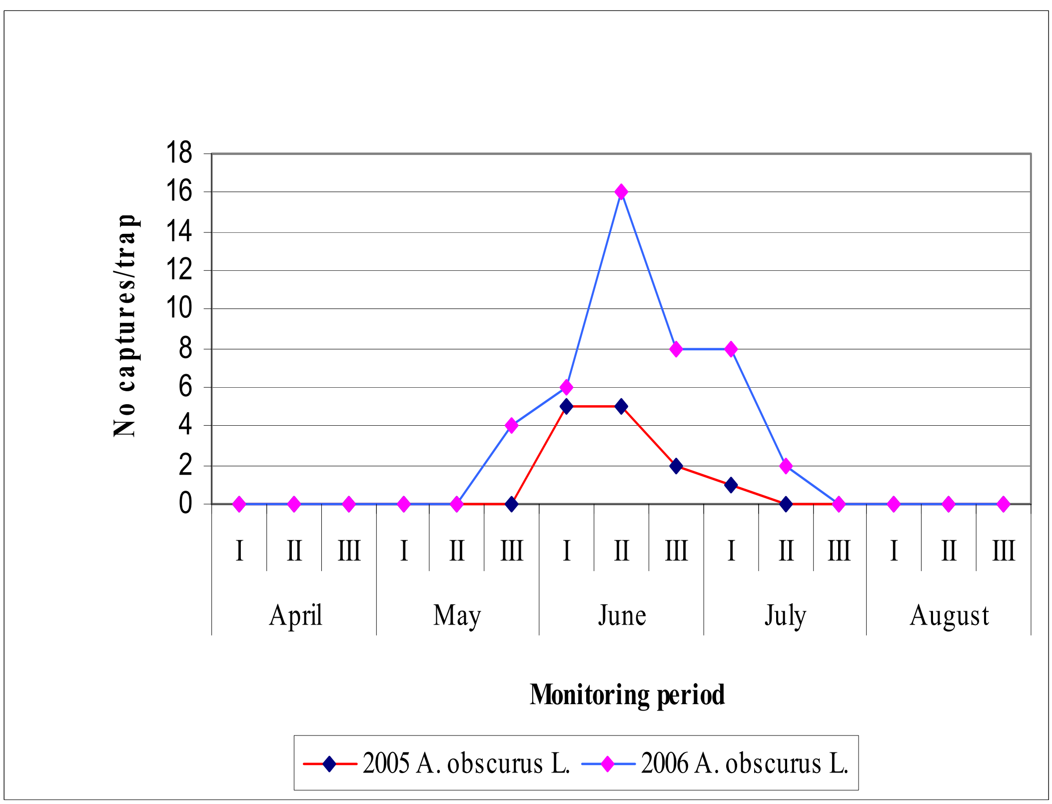

Fig. 4. Flight dynamic of *A. obscurus*

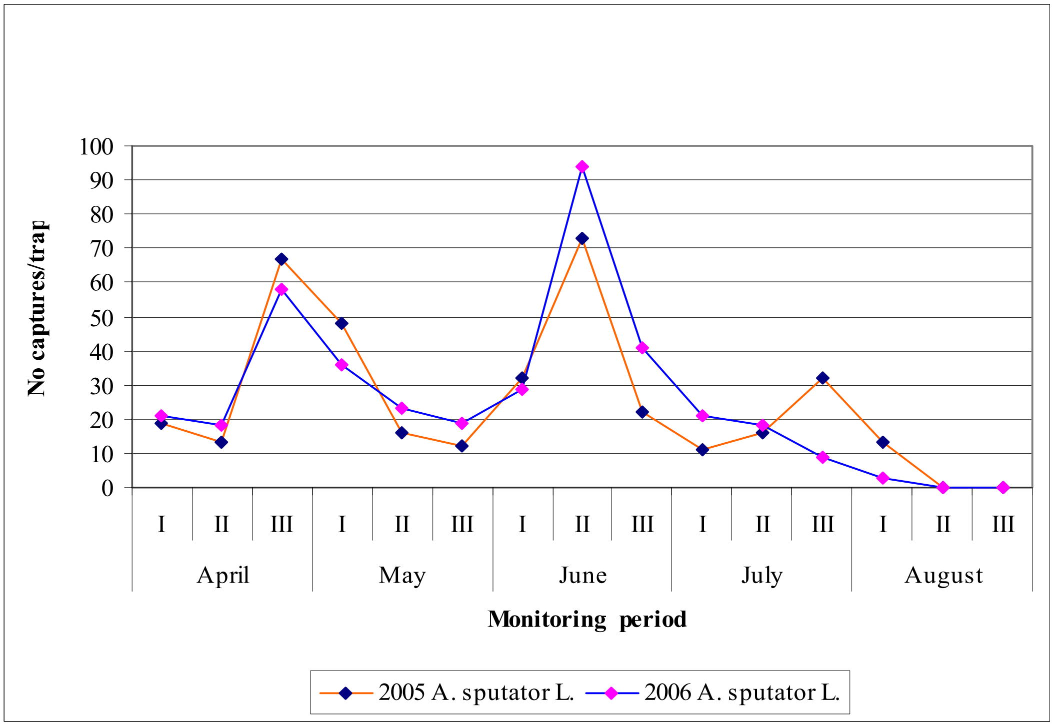

Fig. 5. Flight dynamic of *A. sputator*

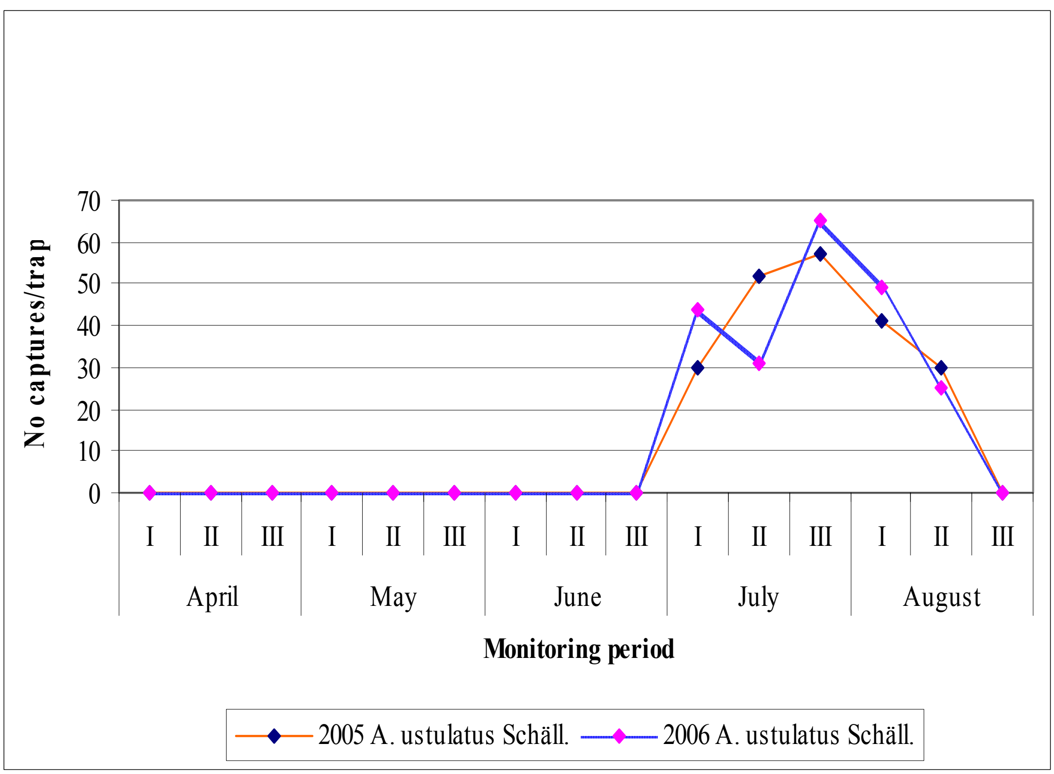

Fig. 6. Flight dynamic of *A. ustulatus*

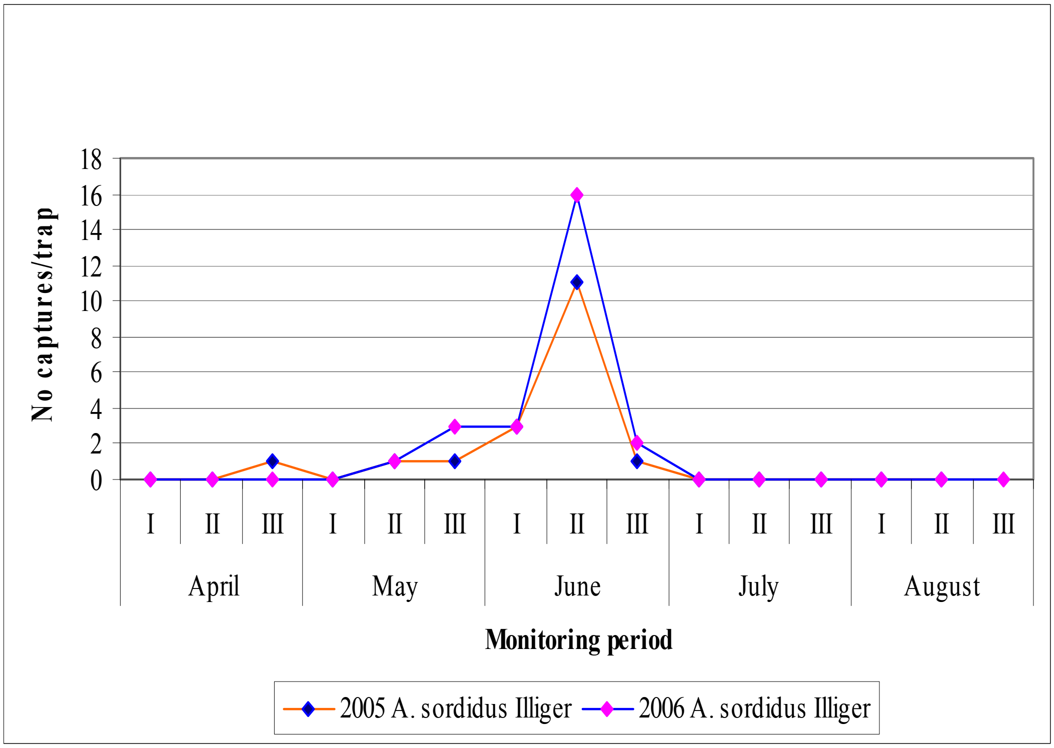

Fig. 7. Flight dynamic of *A. sordidus*

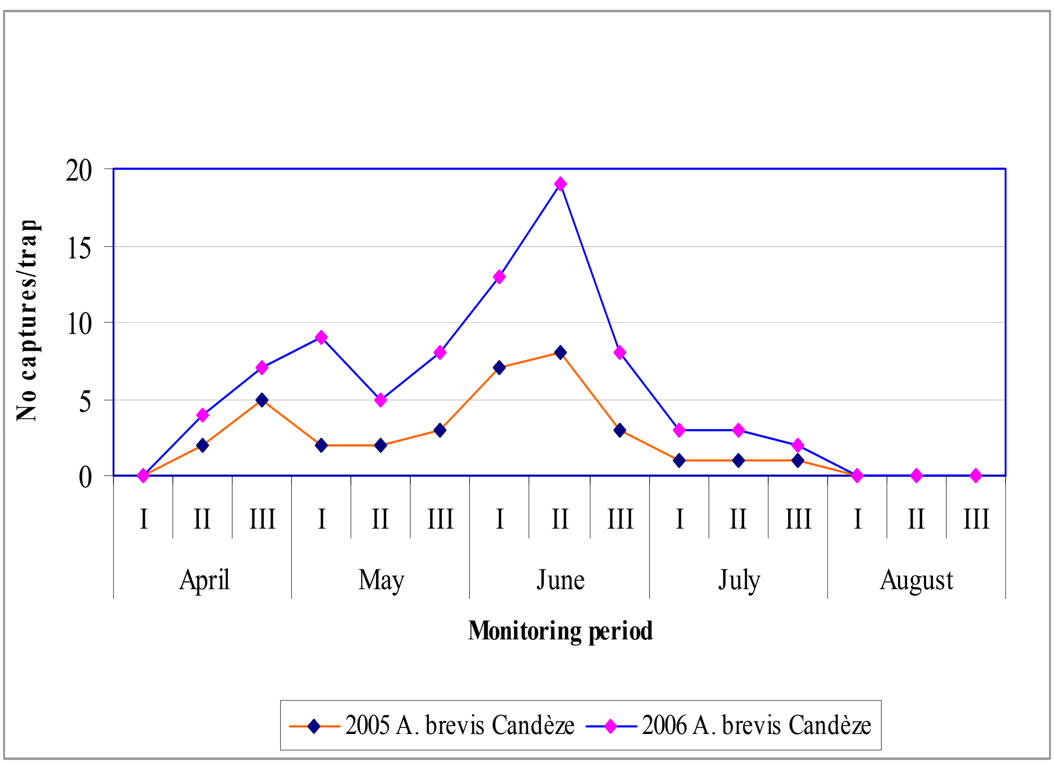

Fig. 8. Flight dynamic of *A. brevis*

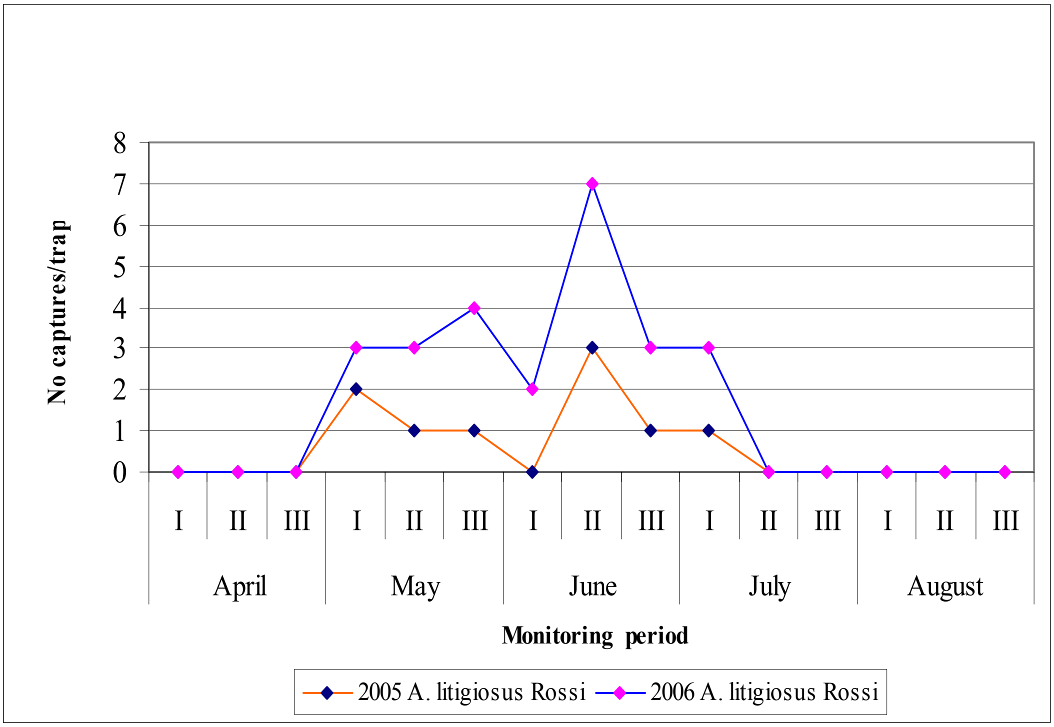

Fig. 9. Flight dynamic of *A. litigiosus*

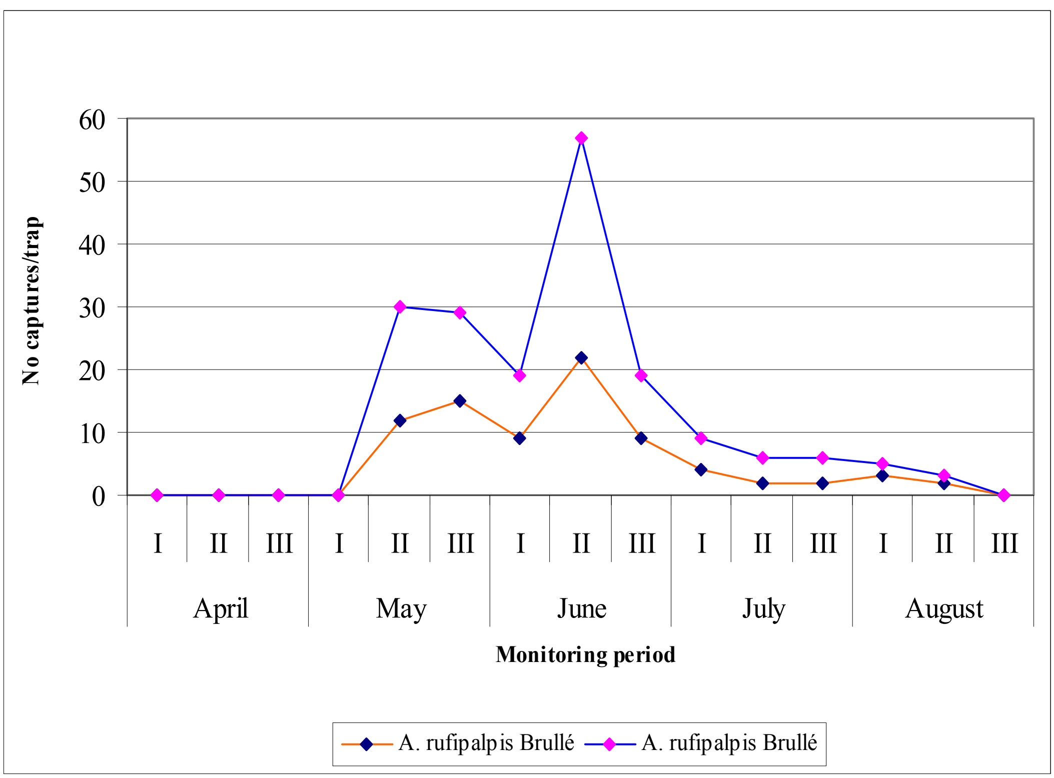

Fig. 10. Flight dynamic of *A.rufipalpis*

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RESEARCHES REFERRING BIODIVERSITY FROM APPLE ORCHARD FROM RESEARCH AND DEVELOPMENT ORCHARD STATION – BANEASA

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Keywords: Biodiversity, apple orchard, fauna, yellow sticky traps

ABSTRACT

Biological diversity represents a specific particularity of the earth life, which assure optimal functionality of ecosystems, existence and functionality of biosphere, in generally. But, in the last time, the problem of preserving biodiversity at the level of ecosystems, species, populations and genes, become more and more evident due to increasing of human activity on biosphere. In this respect, maintaining of biodiversity is necessary not only for actual life assurance, but even for the next generations, because it preserve the global and regional equilibrium, guarantee regeneration of biological resources and maintaining of a proper quality of environmental which is the guaranty of society evolution.
Purposes of the researches which are at the base of this presentation, is to: establishing of fauna structure on arthropod communities, at the epigeic level from tree level; grouping arthropod species in useful and damaging; characterising of invertebrate communities from point of view of abundance.

INTRODUCTION

Apple orchards are considered stable ecosystems, with precise interrelations between different trophic chains in which natural factors play an essential role. Disequilibrium between effectives of different populations, part of them being considered, by human as pest, part of them useful, usually named ”natural enemies of pests”, impose a change in strategy of pest control, which give importance to the maximising natural control factors, and to orientation of control measures to the less polluted methods.

MATERIALS AND METHODS

Researches were done during April-June 2006, at Research and Development Orchard Station – Baneasa, in a 7 year apple orchard with rows without weeds which alternate with rows with grass. In the period of vegetative repose, were done autumn plowing on rows without weeds. Cutting branches for forming and growing apples were done early in the spring before vegetation starting.

Variants have 3/4/2 m distance and 60-76 trees/row, in principal composed by varieties: Florina, Prima, Ionagored, Surprase, and Pionier.

Purposed objectives:

- Establishing fauna captured in yellow sticky traps type Pherocone AM/72 cm^2, traps which were putted in tree (fig. 1);
- Establishing fauna captured in Barber traps for fauna at the soil level (fig. 2);
- Establishing the most important diseases or apple trees (fig. 3).

Collected material was carried in the laboratory, preserved in 70^0 ethylic alcohols and identified.

Quantitative and qualitative evaluation of epigeic fauna, was done by capturing, in pitfall traps (Barber), in 5 replicates, opened for 7 days, during May –September, resulted area was de 136,0248 cm^2 or 0,0136024 m^2 . The distance between traps was 50 m and traps were filed 2/3 with formalin 3-4%. Also were installed yellow sticky traps (Pherocone AM), 3 traps/variant, traps were replaced after a week, captures were determined and registered. At the same date (once/week), was done a visual counting of the main pest and diseases, taking in account their evolution in orchard.

Taking in consideration that no all the specimens could be identified till the species level, this was done till the level of genus, family, order or classes.

RESULTS AND DISCUSSIONS

Abundance of invertebrate fauna from samples collected in Barber traps

In April from collected material of epigeic fauna, were identified 24 species or groups of arthropods which belong to: *Myriapoda*, *Crustacean*, *Insect* and *Arachnids* (table 1). The biggest part of the entomofauna present la the soil level belongs to *Insect*. From these the biggest relative abundance was registered by the species of *Carbides* family (73%), followed by *Lycosides* (60%), *Trombiculides* (54%), *Staphylinidae* (37%), *Iulidae* and *Formicidae* (27%).

In May from collected material of epigeic fauna, were identified 22 species or groups of arthropods which belong to: *Myriapoda*, *Crustacean*, *Insect* and *Arachnids* (table 2). From these the biggest relative abundance was registered by the species of *Iulidae* family (45 specimens), *Formicidae* (45 specimens) and *Carabidae* (33 specimens).

In June from collected material of epigeic fauna, were identified 32 species or groups of arthropods which belong to Myriapoda (*Scolopendra* sp.), Chilopoda (*Porcelio scaber*), Arachnida (*Lycosidae*), and Insecta (*Collembola*, *Orthoptera*, *Homoptera*, *Heteroptera*, *Coleoptera*, *Hymenoptera*, *and Diptera*). (table 3). From these the biggest relative abundance was registered by the species of *Formicidae* family (119 specimens) followed by *Carabidae* (39 specimens) and *Diptera – Brachicera* (89 specimens).

Abundance of invertebrate fauna from samples collected in Yellow Sticky Traps (type Pherocone AM)

Fauna collected in yellow sticky traps (Pherocone AM) in April was formed by 226 invertebrates (table 4), belonging to the following orders: *Orthoptera* – 2 (0.8%); *Heteroptera* – 9 (3.9%); *Thysanoptera* – 41 (18.1%); *Homoptera* – 25 (11%); *Neuroptera* – 3 (1.3%); *Coleoptera* – 28 (12.3%); *Hymenoptera* – 31 (13.7%); *Lepidoptera* – 29 (12.8%); *Diptera / Nematocera* – 37 (16.3%); *Diptera/Brachicera* – 21 (9.3%).

Fauna collected in yellow sticky traps (Pherocone AM) in May was formed by 488 specimens, useful and damaging (table 5). The biggest absolute abundance belong to the following orders: *Diptera* (281 specimens), *Homoptera* (85 specimens), *Coleoptera* (80 specimens).

Fauna collected in yellow sticky traps (Pherocone AM) in June was formed by 2,135 specimens, useful and damaging (table 6). The biggest absolute abundance belong to the following orders: Thysanoptera, Homoptera (*Aphididae, Cicadellidae*). Useful fauna has increased, most common being predator species (*Orius* sp, *Stethorus punctillum*, *Lycosidae*) and parasites species (*Calcidoidae*, *Braconidae*, *Ichneumonidae* and *Sciaridae*).

Observations referring to the diseases identifications

Taking into consideration the diseases which appeared in studied variants, observations were carried in different phonological stages of apple orchard (in spring), when all the buds were started to grow, from each varieties, from all cultivars, were analysed 1 tree from 5. Studied cultivars are resistant to powdery mildew and apple scab, excepted cultivar Ionagored where it was observed that there is a reserve of infected leaves with symptoms of apple scab (*Venturia inequalis*). At observed cultivars it was registered that exist a reserve of stone fruits (*Monilinia fructigena*, formed by diseased fruits on the soil surface, bat in this stage of vegetation didn't arise problems for the future fruits.

Taking into consideration that was done the cutting of diseased branches, in orchard, there were no identified sources of spreading of fire blight (*Erwinia amylovora*).

CONCLUSIONS

1. Fauna captured in apple orchard in Barber traps and yellow sticky traps, type Pherocone AM, was rich and diversified, in April, 573 specimens, in May, 743 and in June, 2742 specimens, most abundant belonging to the classes: *Myriapoda*, *Crustacea*, *Arachnida* and especially *Insecta*, it has to be underline that number of captured specimens arise with tree vegetation and of course with time;
2. Comparing the total fauna captured at the soil level in Barber traps with those captured in yellow sticky traps, at the leaves level, the last was more numerous with many predator and parasite specimens;
3. The most common predator species were spiders from *Lycosidae* family, at the soil level and species of *Coccinellidae*, , at the leaves level;
4. Parasites insect species were well represented being captured only in the yellow sticky traps, belonging, especially to the order *Hymenoptera*, superfamily *Chalcidoidea*.

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Table 1. Species of invertebrate fauna from samples collected in Barber traps during 5-12 April, 2006

No.	Systematic (species, family, order, class)		Numeric abundance (No.)	Relative abundance (%)
1.	*Scolopendra* sp.	*MYRIAPODA*	2	0.6
2.	*Lithobius forficatus* Gem.	*Chilopoda*	5	1.4
3.	*Tachypodoiulus niger* Fran.	*Iulidae/Diplopoda*	27	7.7
4.	*Porcellio scaber* Latr.	*Porcellionidae/Isopoda/ CRUSTACEA*	10	2.8
5.	*Alopecosa pulverulenta* Dunk.	*Lycosidae/ Araneae/ARACHNIDA*	60	17.3
6.	*Trombidium holosericeum* Sam.	*Trombiculidae/Acari*	54	15.5
7.	*Collembola*	*INSECTA*	4	1.1
8.	*Carabidae*	*Coleoptera/INSECTA*	73	21.9
9.	*Bembidion properans* Steph.	*Carabidae /Coleoptera*	1	0.2
10.	*Amara aenea* De Geer.	*Carabidae /Coleoptera*	2	0.6
11.	*Staphylinidae*	*Coleoptera*	37	10.6
12.	*Coccinella 7-punctata* L.	*Coccinellidae/Coleoptera*	1	0.2
13.	*Longitarsus parvulus* Payk	*Chrysomelidae/ Coleoptera*	1	0.2
14.	*Sitona cachecta* Gyll.	*Curculionidae/ Coleoptera*	1	0.2
15.	*Ceuthorrynchus* sp.	*Curculionidae/ Coleoptera*	1	0.2
16.	*Opatrum sabulosum* L.	*Tenebrionidae/Coleoptera*	2	0.6
17.	*Scarabeus* sp.	*Scarabeidae/Coleoptera*	1	0.2
18.	*Hyalesthes obsoletus* Sign.	*Cixiidae/Homoptera*	5	1.4
19.	*Javesella pellucida* Fabr.	*Delphacidae/Homoptera*	2	0.6
20.	*Calcidoidea*	*Hymenoptera*	11	3.2
21.	*Braconidae*	*Hymenoptera*	1	0.2
22.	*Formicidae*	*Hymenoptera*	27	7.7
23.	*Brachicera*	*Diptera*	14	4.0
24.	*Itonididae*	*Diptera*	5	1.4
	TOTAL		**347**	**100**

Table 2. Species of invertebrate fauna from samples collected in Barber traps during 3-10 May, 2006

No	Systematic (species, family, order, class)	Probe 1	Probe 2	Probe 3	Probe 4	Probe 5	Total
1.	***VERTEBRATA/Reptilia/ Squamata/ Lacertidae*** / *Lacerta agilis* L.	0	0	3	0	2	**5**
2.	**CHILOPODA /** *Lithobius forficatus* Gem.	2	0	0	0	0	**2**
3.	**DIPLOPODA/*Iulidae/***_Tachypodoiulus niger_ Fran.	9	4	8	17	7	**45**
4.	**ARACHNIDA/*Araneae/ Lycosidae/***_Alopecosa pulverulenta_ Dunk.	8	0	5	6	3	**22**
5.	***Trombiculidae/Acari/***_Trombidium holosericeum_ Sam.	2	4	3	5	9	**23**
	INSECTA						
6.	**COLLEMBOLA**	4	0	0	0	4	**8**
7.	**ORTHOPTERA/**_Gryllotalpa gryllotalpa_ Latr.	1	0	0	0	2	**3**
8.	***HOMOPTERA/***_Javezela pelucida_ Fabr.	2	0	0	1	0	**3**
9.	***HEREOPTERA/ Cydmidae*** *Tritomegas bicolour* Schw.	0	0	2	1	0	**3**
10.	***Carabidae*** /*Carabus* sp (larvă)	1	0	0	0	0	**1**
11.	*Harpalus distinguendus* Dftsch.	2	5	15	6	0	**28**
12.	*Harpalus cupreus* Duft.	0	0	0	1	0	**1**
13.	*Amara aenea* De Geer.	0	0	0	1	0	**1**
14.	*Bembidoin properans* Steph.	1	0	0	1	0	**2**
15.	***Curculionidae/***_Anthonomus_ sp.	0	1	0	0	0	**1**
16.	***Staphylinidae***	2	0	3	3	3	**10**
17.	**HYMENOPTERA/*Formicidae***	16	8	9	6	6	**45**
	DIPTERA						
18.	***Brachicera***	4	7	2	0	6	**19**
19.	***Itonididae***	3	0	0	0	0	**3**
20.	***Chironomidae***	0	0	0	3	2	**5**
21.	***Sciaridae***	0	0	2	2	0	**4**
22.	***Culicidae***	0	0	0	0	2	**2**
	TOTAL						**255**

Table 3. Species of invertebrate fauna from samples collected in Barber traps during 7-13 June, 2006

No.	Systematic (species, family, order, class)	Probe 1	Probe 2	Probe 3	Probe 4	Probe 5	Total
1.	**MYRIAPODA**/*Scolopendra* sp.	0	1	1	0	0	**2**
2.	**CRUSTACEA**/ *Porcellionidae/Isopoda* *Porcellio scaber* Latr.	2	0	2	0	0	**4**
3.	**DIPLOPODA** / *Iulidae/Tachypodoiulus niger* Fran.	10	6	4	7	12	**39**
4.	**ARACHNIDA**/ *Araneae/ Lycosidae* *Alopecosa pulverulenta* Dunk.	13	32	9	6	7	**67**
5.	*Trombiculidae/Acari* *Trombidium holosericeum* Sam.	9	3	3	1	7	**23**
	INSECTA						
6.	**COLLEMBOLA**	10	1	3	2	2	**18**
7.	**NEUROPTERA*/ Chrysopidae*** *Chrysopa carnea Steph*	0	1	0	0	0	**1**
8.	**THYSANOPTERA**	5	0	0	0	0	**5**
9.	***HETEROPTERA/Tingitidae*** *Stephanitis pyri* Fabr.	1	0	0	0	0	**1**
10.	**HOMOPTERA** ***Delphacidae/****Javezela pelucida* Fabr.	6	4	2	10	3	**25**
11.	***Aphididae***	25	2	7	3	13	**50**
12.	***Cicadellidae/****Cicadella viridis* L.	0	0	0	1	0	**1**
13.	***Heteroptera/*** *Myridae/Lygus pratensis* L.	1	0	1	0	0	**2**
	COLEOPTERA						**135**
	Carabidae						**99**
14.	*Carabus* sp (larvă)	5	1	5	4	4	**19**
15.	*Harpalus distinguendus* Duft.	13	4	3	6	10	**39**
16.	*Harpalus aeneus* L.	9	11	5	4	2	**31**
17.	*Amara aenea* De Geer	6	1	2	0	1	**10**
18.	**Nitidulidae**/*Meligethes aeneus* Fabr.	1	0	0	0	1	**2**
19.	**Curculionidae**/*Anthonomus* sp.	1	0	0	2	0	**3**
20.	**Pseliphidae**/*Pselaphus* sp.	0	1	0	0	0	**1**
21.	**Coccinellidae**/*Coccinella 7-punctata* L.	1	0	0	0	0	**1**
22.	**Silphidae**/*Siplha* sp.	3	0	0	0	0	**3**
23.	***Staphylinidae***	8	3	4	10	1	**26**
	HYMENOPTERA						
24.	***Formicidae***	28	18	35	22	16	**119**
25.	***Ichneumonidae***	0	2	1	0	0	**3**
26.	***Chalcididae***	4	1	0	3	1	**9**
27.	***Braconidae***	1	0	0	1	0	**2**
	DIPTERA						
28.	***Agromyzidae***	7	23	20	18	15	**83**
29.	***Chloropidae***						
30.	***Itonididae***	1	0	0	0	2	**3**
31.	***Sciaridae***	3	4	0	1	0	**8**
32.	***Culicidae***	1	1	0	1	4	**7**
	TOTAL						**607**

Table 4. Species of invertebrate fauna from samples collected in Yellow Sticky Traps (type Pherocone AM) during 5 -12 April, 2006

ORDER	Var. 1	Var. 2	Var. 3	Var. 4	Var. 5	TOTAL
Orthoptera	1	0	1	0	0	**2**
Heteroptera	2	1	0	5	1	**9**
Thysanoptera	5	7	8	10	11	**41**
Homoptera	6	3	7	4	5	**25**
Neuroptera	1	2	0	0	0	**3**
Hymenoptera	8	5	6	5	7	**31**
Coleoptera	8	6	5	5	4	**28**
Lepidoptera	5	7	2	8	7	**29**
Diptera /Nematocera	6	7	7	9	8	**37**
Diptera/ Brachicera	5	3	2	6	5	**21**
TOTAL	***47***	***41***	***38***	***52***	***48***	**226**

Table 5. Species of invertebrate fauna from samples collected in Yellow Sticky Traps (type Pherocone AM) during 3 - 10 May, 2006

No.	Systematic (species, family, order, class)	Probe 1	Probe 2	Probe 3	Probe 4	Probe 5	Total
	HOMOPTERA						**85**
1.	***Aphididae***	10	12	1	1	8	**32**
2.	***Cicadellidae/*** *Empoasca* sp.	8	0	1	0	0	**8**
3.	***Delphacidae/****Javesella pellucida* F.	0	0	0	1	0	**1**
4.	**THYSANOPTERA**	7	12	4	10	11	**44**
	COLEOPTERA						**80**
5.	***Lariidae*** *Spermophaeus sericeus* Geof	3	0	2	0	0	**5**
6.	**Cantharidae**	1	0	0	0	0	**1**
7.	**Coccinellidae**						
8.	*Stethorus punctillum* Weise	23	15	14	8	9	**69**
9.	*Halyzia sedecimguttata* L.	1	0	1	0	0	**2**
10.	*Propylea 14-punctata* L.	0	2	0	0	0	**2**
11.	***Elateridae/*** *Adrastus* sp.	0	0	0	0	1	**1**
	HYMENOPTERA						**42**
12.	***Tenthredinidae*** *Hoplocampa testudinea* L.	1	2	0	1	0	**4**
13.	***Calcidoidea***	1	8	14	3	10	**36**
14.	***Braconidae***	1	0	0	1	0	**2**
	DIPTERA						**281**
15.	***Brachicera***	17	28	23	21	23	**112**
16.	***Sciaridae***	3	1	2	0	0	**6**
17.	***Chironomidae***	14	4	10	13	13	**54**
18.	***Itonididae***	10	15	29	32	23	**109**
	TOTAL						**488**

Table 6. Species of invertebrate fauna from samples collected in Yellow Sticky Traps (type Pherocone AM) during 7 - 13 June, 2006

No.	Systematic (species, family, order, class)	Probe 1	Probe 2	Probe 3	Probe 4	Probe 5	Total
1.	**ARACHNIDA**/ *Araneae/ Lycosidae*	10	10	2	1	2	**25**
2.	**COLEMBOLLA**	33	0	0	5	0	**38**
	HETEROPTERA						
3.	*Orius* sp.	0	0	0	2	0	**2**
4.	**MECOPTERA/*Panorpidae*/** *Panorpa* sp	0	1	2	0	0	**3**
	HOMOPTERA						
5.	***Aphididae***	189	240	57	37	31	**554**
6.	*Psylla* sp.	3	9	6	5	2	**23**
7.	***Cicadellidae***	6	8	2	5	1	**22**
8.	*Empoasca solani* Curtis	11	8	2	6	2	**29**
9.	*Trialeurodes vaporariorum* West.	1	3	0	3	0	**7**
10.	**THYSANOPTERA**	118	112	82	36	33	**381**
	COLEOPTERA						
11.	**Staphylinidae**	0	3	1	2	0	**6**
12.	**Coccinellidae**						
13.	*Stethorus punctillum* Weise	3	1	0	1	2	**7**
14.	*Coccinella bipunctata* L.	1	0	0	0	0	**1**
15.	***Buprestidae/*** *Anhtaxia sp.*	2	0	2	1	0	**5**
16.	***Nitidulidae /*** *Meligethes aeneus* Fabr.	8	4	6	2	0	**20**
	LEPIDOPTERA						
17.	***Tortricidae***	0	0	0	3	0	**3**
	HYMENOPTERA						
18.	***Calcidoidea***	24	17	24	13	11	**89**
19.	***Braconidae***	1	2	1	3	2	**9**
20.	***Ichneunomidae***	0	4	0	2	0	**6**
21.	*Apis melifica* L.	1	0	0	0	0	**1**
	DIPTERA						
22.	***Agromyzidae***	25	22	31	38	33	**149**
23.	***Chloropidae***	71	27	169	41	79	**387**
24.	*Sciaridae*	61	35	35	113	24	**268**
25.	*Chironomidae*	2	2	0	0	0	**4**
26.	*Itonididae*	19	13	22	21	10	**85**
27.	*Culicidae*	3	0	1	2	0	**6**
28.	**EPHEMEROPTERA**	3	0	0	1	0	**4**
	TOTAL						**2135**

Fig.1. Installing yellow sticky traps (type Pherocone AM)

Fig. 2. Installing Barber traps

Fig. 3. Observations of diseases

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THE TECHNOLOGY OF THE PRODUCTION OF FRUIT TREES OF „KNIP-BAUM" TYPE IN THE MOLDOVA REPUBLIC
TEHNOLOGIA PRODUCERII POMILOR DE TIPUL "KNIP-BAUM" ÎN REPUBLICA MOLDOVA

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ABSTRACT

At the Moldovan-Dutch mixed industry „FRUIT NURSERIES" it was studied the technology of the production of crowned apple trees of „KNIP-BAUM" type. The first field was planted with bench grafts through perfected copulation. It was used bio-type M 9 as a rootstock, and as a scion – the varieties Golden delicious Reinders, Idared, Ionagored, Ionagold Boerekamp Early Queen, Granny Smith, Szampion, Braeburn and Gloster.
It was established that the grade of striking of the bench grafts at the varieties from the first field of fruit tree nursery was 96.0-99.0 %, the scion's diameter was 9.2-10.2 mm and the height – 94-126 cm. In the second field the capacity of forming sylleptic shoots depended on the variety and it was 4.5-11.0 piece/tree registering an amount length of 28.8-62.7 cm.

Intensificarea pomiculturii constă în obţinerea unei cantităţi maximale de fructe calitative şi competitive la o unitate de suprafaţă (1). Realizarea acestui obiectiv poate fi atins prin fondarea plantaţiilor de măr cu pomi de talie scundă (2,4) coroană proiectată, cu muguri de rod diferenţiaţi şi un sistem radicular bine dezvoltat (8)

În ultimii ani, în aşa ţări ca Olanda, Polonia, Germania, Italia şi alt. pomicultorii mai frecvent la înfiinţarea plantaţiilor de măr folosesc material săditor pomicol în vârstă de doi ani. Însă, în unele cazuri la înfiinţarea plantaţiilor de măr foloseşte material săditor pomicol necronat, sub formă de vargă (5).

Pentru înfiinţarea plantaţiilor superintensive de măr în Olanda se produc pomi cu vârsta de doi ani de tipul „knip-baum", cu calităţi biologice superioare (6,8). Astfel de pomi au înălţimea de cel puţin 1,5 m, 5-10 ramuri anticipate cu muguri terminali florali, amplasate orizontal şi lungime medie 20-25 cm (5,6,11).

În Republica Moldova înfiinţarea plantaţiilor de măr se efectuează cu pomi în vârstă de un an şi mai rar de doi ani, obţinuţi prin altoirea cu mugure dormind în şcoala de pomi.

Înfiinţarea şcolii de pomi cu altoiri la masă se foloseşte pe o scară mai redusă datorită conservatismului şi studierii insuficiente a proceselor tehnologice de obţinere a pomilor cronaţi pe parcursul a unui ciclu de doi ani.

În scopul soluţionării problemei menţionate, din anul 2004, în Republica Moldova, pe o suprafaţă de 6,5 ha, s-a implementat un proiect finanţat de Guvernul Olandei pentru producerea pomilor de măr altoiţi la masă de tipul „knip-baum" şi formarea coroanei din lăstari anticipaţi în câmpul 2 al şcolii de pomi (4).

MATERIAL ŞI METODĂ

Cercetările s-au efectuat în perioada anilor 2004-2005 în pepiniera pomicolă a întreprinderii mixte „Fruit Nurseries" fondată în urma colaborării între "Codru ST" SRL şi campania olandeză "Van Rijn International". Câmpul I a fost înfiinţat în a doua jumătate a lunii aprilie pe o suprafaţă de 6,5 ha cu altoiri la masă efectuate în luna martie folosind metoda de copulaţie perfecţionată cu ramură detaşată.

Ca portaltoi s-a folosit biotipul M 9, iar ca altoi soiul Idared omologat în Republica Moldova (martor) şi soiurile de perspectivă: Golden Delicious Reinders, Ionagold Boerekamp Early Queen, Granny Smith, Ionagored, Gloster, Szampion, Braeburn. Pentru altoire s-au folosit marcote cu diametrul de 10,0 mm şi ramuri altoi cu calităţi biologice superioare importate din Olanda.

Locul altoirii s-a legat cu peliculă specială, iar altoiul s-a parafinat. Altoirile obţinute s-au stratificat prin aşezarea lor verticală în containere, în aşa fel ca partea bazală a marcotei (20-25cm) să se afle într-un strat de nisip reavăn şi umed. Temperatura stratificării în frigider + 4^{o}C. Distanţa de plantare a altoirilor în şcoala de pomi 90x35 cm.

Primăvara, în anul 2005, tulpinile anuale au fost scurtate la înălţimea de 50 cm de la locul altoirii. Cu apariţia lăstarilor laterali s-a efectuat degajarea trunchiului lăsându-se numai cel terminal. În scopul obţinerii lăstarilor anticipaţi pe axul central mugurele terminal este stresat prin traumarea conului de creştere. Această operaţiune agrotehnică se repetă peste fiecare 5-7 zile. Pentru orizontalizarea lăstarilor anticipaţi se efectuează irigări mai frecvente şi fertilizări cu îngrăşăminte de azot.

Solul este menţinut ca ogor lucrat, irigarea prin aspersiune după necesitate. Partea aeriană a fost palisată la un tutor de bambuc.

Scopul cercetărilor constă în investigarea gradului de prindere a altoirilor efectuate la masă şi comportarea lor în pepiniera de pomi pe parcursul a doi ani de vegetaţie.

Numărul repetiţiilor pentru fiecare soi este 4. Numărul de pomi în fiecare repetiţie 20. Cercetările au fost îndeplinite în condiţii de câmp şi de laborator după metode acceptate de efectuare a experimentelor cu plantele pomicole.

REZULTATE ŞI DISCUŢII

Investigaţiile efectuate demonstrează că gradul de prindere a altoirilor la masă plantate în câmpul I al pepinierii de pomi pe variantele în studiu a constituit 96,0-99,0 % (tabelul 1).

Cel mai scăzut grad de prindere s-a înregistrat la soiul Szampion - 96,0 %, iar cel mai înalt la soiul Ionagored - 99,0 %. La celelalte soiuri gradul de prindere a constituit 97,5-98,5%.

Pentru obţinerea unui material săditor calitativ este necesar de folosit portaltoi cu diametrul de 7-10 mm (8). Portaltoiul M 9 folosit pentru altoirea la masă, a fost importat din Olanda având diametrul de 10 mm. La sfârşitul primei vegetaţii diametrul portaltoiului mai jos de locul altoirii a constituit 12,8-14,9 mm, adică, soiurile în studiu au înregistrat o creştere cu 2,8-4,9 mm.

Tabelul 1

Gradul de prindere şi indicatorii principali ai dezvoltării pomilor de măr altoiţi la masă în primul an de vegetaţie în pepiniera de pomi

Soiul	Gradul de prindere %	Diametrul mm		Înălţimea altoiului cm
		portaltoiului	altoiului	
Idared	97,5	13,6	9,6	112
Golden Reinders	98,0	12,9	9,3	112
Early Queen	98,5	14,9	9,9	108
Granny Smith	98,5	13,5	9,2	112
Ionagored	99,0	13,4	10,2	126
Gloster	97,5	12,8	9,9	117
Szampion	96,0	13,6	9,3	94
Braeburn	98,0	13,2	10,0	116

Cel mai mic diametru al portaltoiului s-a înregistrat la soiurile Gloster - 12,8 mm şi Early Queen - 12,9 mm, iar cel mai mare la soiul Granny Smith - 14,9 mm. La restul soiurilor indicatorul menţionat a constituit 13,2-13,6 mm. Investigaţiile efectuate demonstrează că diametrul portaltoiului în zona altoirii depinde de particularităţile biologice ale soiului.

Conform standardului SM -155, la pomii de măr de categoria I, altoiţi pe portaltoi pitic cu vârsta de un an, se atribuie plantele a căror diametru nu este mai mic de 10 mm şi înălţimea 110 cm la categoria II corespunzător 8 mm şi cel puţin 90 cm (12).

În conformitate cu standardul în vigoare, diametrul altoiului 10 mm şi mai mare înregistrează numai soiurile Braeburn - 10,0 mm şi Ionagored - 10,2 mm. La soiurile Gloster şi Granny Smith indicele în studiu a diminuat nesemnificativ constituind 9,9 mm. La soiurile Golden Delicious, Early Queen, Szampion şi Idared diametrul altoiului constituie respectiv 9,6; 9,3; 9,3 şi 9,2 mm.

Pe înălţimea altoiului valori mai mici de 110 cm înregistrează soiurile Szampion - 94 cm şi Granny Smith - 108 cm. La soiurile Idared, Golden Delicious şi Early Queen înălţimea altoiului constituie 112 cm. La soiurile Braeburn şi Gloster indicatorul în studiu constituie respectiv 116 şi 117 cm, iar la soiul Ionagored - 126 cm.

Investigaţiile efectuate demonstrează că din cele 8 soiuri studiate, numai pomii de soiurile Braeburn, Ionagored şi Gloster corespund după toţi parametrii categoriei I după calitate. Soiurile Idared, Golden Delicious, Early Queen corespund numai în conformitate cu partea aeriană, iar soiurile Szampion şi Granny Smith se atribuie categoriei II de calitate.

Deoarece, materialul săditor crescut, rămâne în câmpul II, partea aeriană este bine dezvoltată. În anul 2005 altoiul s-a scurtat la înălţimea de 50 cm de la locul altoirii şi operaţiunile tehnologice au fost dirijate la obţinerea lăstarilor anticipaţi pe axul central după tipul „knip-baum" practicat în Olanda (11).

La finele perioadei de vegetaţie (tabelul 2) înălţimea altoiului la soiurile în studiu a constituit 166-189 cm. Cele mai mari valori s-au înregistrat la soiurile Braeburn, Golden Reinders, Ionagored şi Idared 183-189 cm, iar cele mai mici la soiurile Gloster , Szampion, Granny Smith şi Early Queen 166-170 cm.

Diametrul trunchiului este un indicator care influenţează la stabilirea calităţii pomilor. Investigaţiile efectuate au demonstrat că diametrul trunchiului la pomii luaţi în studiu a constituit 16,1-17,2 mm.

Tabelul 2

Indicatorii principali ai dezvoltării părţii aeriene a pomilor de măr altoiţi la masă în anul doi de vegetaţie în pepiniera de pomi

Soiul	**Înălţimea altoiului, cm**	**Diametrul trunchiului, mm**	**Ramuri anticipate**		
			Cantitatea, buc.	**Lungimea medie, cm**	**Lungimea însumată, m/pom**
Idared	189	16,8	9,3	34,0	3,16
Golden Reinders	184	17,1	10,1	41,0	4,14
Early Queen	170	16,5	10,2	46,5	4,74
Granny Smith	169	16,8	11,0	38,9	4,24
Ionagored	185	17,0	9,4	55,7	5,23
Gloster	166	16,6	4,5	45,2	2,03
Szampion	168	17,2	10,6	28,8	3,06
Braeburn	183	16,1	7,9	62,7	4,95
Media	177	16,8	9,4	44,1	3,94

Cel mai mare număr de ramuri anticipate pe axul central al pomilor formează soiul Granny Smith - 11,0 buc, iar cel mai mic – 4,5 ramuri la soiul Gloster. Soiurile Golden Reinders, Early Queen şi Szampion formează pe axul central respectiv câte 10,1; 10,2 şi 10,6 ramuri anticipate. Soiurile Idared, Ionagored şi Braeburn formează în zona cronării respectiv 9,3; 9,4 şi 7,9 ramuri anuale.

Cantitatea de ramuri anticipate obținute pe axul central al pomilor la toate soiurile luate în studiu este suficientă de a forma baza coroanei în câmpul II al şcolii de pomi.

Lungimea medie a ramurilor anticipate depinde de particularitățile biologice ale soiului. Cea mai mare lungime medie formează soiul Braeburn – 62,7 cm, iar cea mai mică soiul Szampion – 28,8 cm. Soiul Idared considerat ca martor formează o lungime medie a ramurilor anuale de 34,0 cm. La celelalte soiuri luate în studiu lungimea medie a ramurilor anticipate s-a majorat cu 1,1 – 1,6 ori.

Lungimea însumată a ramurilor anticipate la soiurile luate în studiu depinde de cantitatea de ramificații şi lungimea medie a lor. Cea mai mare lungime însumată formează soiul Ionagored – 5,23 m/pom, iar cea mai mică soiul Gloster 2,03 m/pom. Restul soiurilor pot fi divizate în trei grupe după lungimea însumată a ramurilor anticipate. Către prima grupă se atribuie soiurile Szampion şi Idared (martorul) formând respectiv 3,06 şi 3,16 m/pom ramuri anticipate. Soiurile Golden Reinders şi Granny Smith au înregistrat o majorare în comparație cu martorul cu 1,3 ori, iar la soiurile Early Queen şi Braeburn respectiv cu 1,5 şi 1,6 ori.

În anul 2005 (fig. 1) suprafața foliară în şcoala de pomi a constituit 14,6-25,39 mii m^2/ha. La nivelul martorului s-a amplasat soiul Golden Reinders. La soiurile Granny Smith şi Gloster indicatorul în studiu s-a majorat cu 1,2-1,3 ori în comparație cu martorul. La soiurile Szampion şi Early Queen suprafața foliară s-a majorat cu 1,4 ori iar la soiurile Ionagored şi Braeburn cu 1,5-1,7 ori în comparație cu martorul. Prin urmare, soiurile cu o lungime însumată mai mare a ramurilor anticipate înregistrează o majorare directă a suprafeței foliare la o unitate de suprafață.

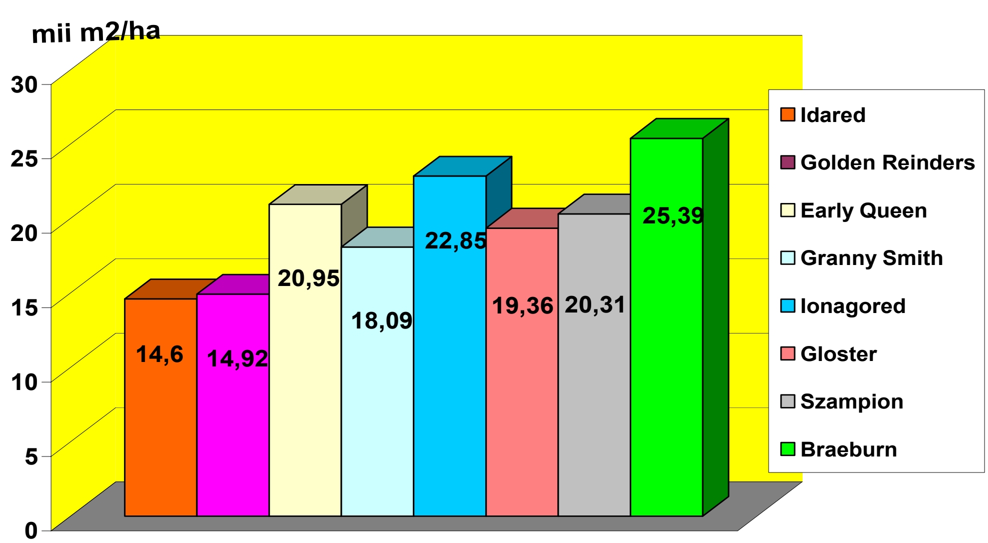

Fig. 1. Suprafața foliară a pomilor de măr altoiți la masă în anul doi de vegetație în şcoala de pomi

Rezultatele obținute demonstrează că toți indicatorii la soiurile în studiu în câmpul II al şcolii de pomi corespund categoriei I de calitate conform standardului în vigoare (12).

CONCLUZII

1. Particularitățile biologice ale soiului nu influențează asupra gradului de prindere a altoirilor la masă după plantarea pe teren deschis constituind 96,0-99,0 %.
2. Dintre variantele investigate la categoria I de calitate conform standardului SM -155 se atribuie tuturor soiurilor investigate atât după înălțimea altoiului (166-189 cm), diametrul trunchiului (16,1-17,1 mm), cantitatea de ramuri anticipate (4,5-11,0 buc), cât şi după lungimea medie a lor.
3. Suprafața foliară a şcolii de pomi depinde direct de particularitățile biologice ale soiului constituind în anul doi de vegetație 14,6-25,39 mii m^2/ha
4. Rezultatele obținute demonstrează că parametrii bioconstructivi al pomilor formați după tipul „knip-baum" înregistrează valori ce corespund standardului SM-155 „ Pomi altoiți de specii sâmburoase şi sămânțoase" şi pomii pot fi plantați în sistemul superintensiv de cultură.

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VITICULTURE & OENOLOGY

RESULTS OF THE SENSORY ANALYSIS OF SOME FETEASCA NEAGRĂ WINES PERFORMED BY TASTERS FROM ABROAD

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Keywords: Fetească neagră variety, senzory analysis, wine tasting

ABSTRACT

Five wines of Fetească neagră variety obtained in various areas of Romania were subjected to sensory analysis by a jury made of the students of the winemaking master course VINTAGE (Wine, Vine and Terroir Management) coordinated by Ecole Superieure d'Agriculture d'Angers, France. Using a specially adapted score sheet the wine tasters were required to evaluate the main wine characteristics: acidity, sugars, astringency, extract, colour intensity, aroma intensity. They also described freely the hues observed in colour and the perceived aroma. The paper presents the results of this evaluation, which can be of great interest for Romanian producers, as they convey the opinion of external observers on the wines made of a grape variety which is widely regarded as representative for the national assortment of red wines.

INTRODUCTION

As our country gets closer to joining the European Union the issues related to competition on the market become more and more acute in all fields of activity, including agriculture and wine production in particular. Under these circumstances, any information which might help the local producers in correctly positioning themselves on the market should be greatly valued. It is common knowledge that the Romanian viticulture and wine production is still insufficiently represented abroad, in spite of a generally recognized good potential. For example, the grape variety Fetească neagră is viewed by many specialists as a valuable resource, a national asset which might help us enter and stay on the competitive European and world markets of wines. At the same time, we need to have an evaluation of the variety as objective as possible, and this cannot be achieved without asking the opinion of foreign observers. Certainly the best way to do this is to participate actively in international wine contests; however, for various reasons, this is not yet a realistic option for many Romanian producers. This paper presents some results obtained using a different approach. The University of Agronomical Sciences and Veterinary Medicine of Bucharest, through the Department of Viticulture and Enology, has been involved in a very good relationship with 7 other similar institutions from Europe which have come together to establish the European Master Program "VINTAGE" (*Vine, Wine and Terroir Management*) coordinated by Ecole Superieure d'Agriculture d'Angers, France. Thanks to this, a session of sensory analysis was organized with the participation of the students in the VINTAGE master program. In this session five Romanian wines of Fetească neagră were thoroughly evaluated. The VINTAGE students are strictly selected young specialists in viticulture and winemaking with a relatively high level of field knowledge, destined to become the next specialists and managers in the field; at the same time, the VINTAGE master program is a high level training program with international recognition. These are arguments for the value of the results obtained from such a session of sensory analysis, which can shed a different light on the highs and lows of the Feteasca neagră variety and wines made of it, as seen by tasters from outside of the Romanian borders.

DATA AND METHODS

The five Fetească neagră wines subjected to evaluation are briefly presented in Table 1. The wine tasting session was carried out in March 2006 at the headquarters of ESA Angers, France. The wine tasters were 18 of the VINTAGE students, coming from all around the world. Samples were presented to the judges anonymously. A specially adapted scoring card was used, with scales or choices which were used to score the main characteristics of the wines (see the scales reproduced in the Results section).

On the scoring card the following 6 characteristics were represented in 100 mm long scales, from minimum to maximum, with some categories already marked on them, as follows:

- acidity: with the marked categories *flat character, low, average, high, aggressive character*;
- sweetness: *absent, weak, average, strong, very strong*;
- astringency: *non-astringent, velvety/soft, structured, tannic, rough*;
- extract in general (harmony, balance): *supple/thin, balanced, too thick*;
- colour intensity: *very low, low, average, high, very high*;
- total aroma intensity (aroma persistence): *very low, low, average, high, very high*.

For all these characteristics the judges made a mark on the scale; the distance in mm from the left-end of the scale and this mark, expressed in mm, was taken as the graded score (as such, the values ranged between 0 and 100).

There was also a free answer question which asked the judges to write down the colour nuance observed.

Finally, with regard to aroma, there were 6 aroma categories indicated. For each of them a series of 5 boxes was given, indicating 5 respective levels ranging from *weak* to *strong*; the judges were required to choose a certain box, and this was interpreted as giving that type of aroma a grade from 1 to 5. Besides that, for each of the 6 aroma categories there was a space where the judges could describe freely the discerned aroma. The 6 aroma types indicated were: flower scent, fruit fragrance, vegetal note, burned/spicy smell, complex/various notes, and "others".

The answers of the judges were analyzed with usual statistic techniques, and the results are presented below.

RESULTS AND DISCUSSIONS

The results regarding descriptors acidity, sweetness, astringency, extract, colour intensity and aroma intensity are shown in Table 2 and Figure 2 and then discussed in the following paragraphs.

Acidity. The wines appeared to show very similar acidity, with average scores between 40 and 47 points, and also with similar standard deviations (20 to 23 points). This, of course, is in good agreement with the analytical data (Table 1). According to the scoring scale, shown below, the average scores fall into the upper part of the interval between the categories of "low" and "av erage" acidity (Figure 1a). Of all the samples, FN1 was felt as the most acid wine and FN4 as the least acid.

Sweetness. The wine perceived as the sweetest was FN4 and the opposite was FN2 (average scores 49 and 25 points, respectively). The analytic data (Table 1) indicates FN5 as the sweetest wine; however, its high level of astringency (Figure 1b) must have affected the sweet wine sensation. The corresponding scale categories would be "weak" to "average" sweetness. Standard deviations ranged from 16 to 25 points.

Astringency. Scores ranged from 43 (FN_1) to 56 points (FN5), and standard deviations from 16 to 25 points. On the scoring scale these scores fall around the middle category, “structured” (Figure 1c). It was known that wine FN5 had been subjected to a 12 month maturation period in barique, so the result comes as no surprise. As mentioned before, this may also have influenced / reduced the sweet taste of this wine.

Extract in general (harmony, balance). Average scores were between 32 (FN4) and 44 points (FN5), somewhere to the left of the scale category “balanced” (Figure 1d). Standard deviations were between 12 and 28 points.

Colour intensity. There was more variability in the perception of this characteristic, with average scores from 35 points (FN4) to 61 points (FN5). As seen on the scale below, these scores are almost centered on the middle category, “average” (Figure 1e). The standard deviations ranged between 14 and 24 points.

Regarding colour there was also a free-answer question where judges could write down their impression regarding the colour nuance. A summary of these comments is given in Table 3.

Aroma intensity. The average scores were between 30 points (FN5) and 44 points (FN1), which means between “low” and “average” (Figure 1f), with standard deviations of 15 to 21 points. In addition, as mentioned above, the aroma was analyzed in more detail, and the results are shown in Tables 4-9 below.

CONCLUSIONS

1. From the jury’s general reaction it was apparent that the five wines of Fetească neagră selected for this session made a relatively good impression. Although not extremely impressive in any direction, the scores obtained for the various characteristics were in line with what can be expected from a decent red wine. The variety effect was quite strong – meaning that the scores granted to the five wines were relatively close. In other words, although the grapes have been grown in various places, the wines obtained maintained a set of features more or less constant.
2. The results of this study seem to confirm the capital of confidence granted to this variety by the Romanian experts. It is, however, extremely important to sustain the efforts to improve the wines of Fetească neagră and to continuously challenge the competitors from Europe and from around the world.

ACKNOWLEDGEMENT

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Tables

Table 1. The wines subjected to sensory analysis.

"Name"	Vintage	Region of origin	Alcohol % v/v	Residual sugar, g/l	Acidity, g/l tartric acid	Dry extract g/l
FN1	2003	Dealu Bujorului	13.0	3.0	4.90	25.0
FN2	2003	Murfatlar	12.7	3.5	6.25	30.0
FN3	2001	Dealu Mare	12.9	3.8	6.08	28.1
FN4	2000	Vanju Mare	13.2	10.8	5.00	27.0
FN5	2002	Dealurile Prahovei	13.0	11.6	5.85	38.0

Table 2. Results of the sensory analysis of wines.

Wine	Acidity	SD	Sweet-ness	SD	Astrin-gency	SD	Ex-tract	SD	Colour intensity	SD	Aroma intensity	SD
FN1	47.3	23.3	40.3	22.2	43.2	16.9	38.4	12.3	60.1	14.8	44.3	15.4
FN2	41.7	20.8	25.5	16.6	50.3	28.3	43.4	19.1	57.6	14.1	38.9	16.2
FN3	45.8	22.0	38.9	19.9	45.1	20.3	35.9	12.8	47.4	13.9	43.3	22.2
FN4	40.3	20.7	49.3	19.0	51.4	20.7	32.7	12.8	35.6	24.5	43.4	19.6
FN5	43.2	23.4	33.1	25.1	56.3	25.7	44.1	28.4	61.8	17.4	30.2	25.1

Table 3. Judges comments regarding the colour of the analyzed wines.

Wine	Comments of the judges
FN1	ruby, brown, red with traces of light orange, red+orange, dark red, brown red, brick-red, dark oxidated red
FN2	ruby red, brown ruby, red+blue, dark red, deep, purple-brown mix, burned red, red ruby, dark oxidated red, vermillion
FN3	cherry, clear ruby, weak red, dark ruby, red-blue shining, red cherry, light red, ruby red, violet, red+some purple, brilliant dark oxidated sherry, red/violet
FN4	pale ruby, clear red, brown, flat plain red, dark red + orange, burned orange, red-orange, light red, oxidated red, burned red, ruby red, dark red oxidated
FN5	purple cherry, violet red, dark brown, ruby brown, red+violet, purple red, violet, purple blue-red, purple+pink, strong violet, red strawberry/cherry, intense shining ruby

Table 4. Number of judges who granted a certain score for the "flower scent" aroma characteristic. The average score does not include the judges who did not answer.

Wine	Score 5	Score 4	Score 3	Score 2	Score 1	Average score	No answer	Judges' comments
FN1	0	2	3	3	6	2.1	4	violet, vanilla
FN2	0	1	1	7	4	1.9	4	
FN3	0	1	3	6	3	2.2	5	
FN4	0	3	3	5	4	2.3	3	
FN5	0	3	3	2	5	2.3	5	violet, rose

Table 5. Number of judges who granted a certain score for the "fruit fragrance" aroma characteristic. The average score does not include the judges who did not answer.

Wine	Score 5	Score 4	Score 3	Score 2	Score 1	Averag e score	No answer	Judges' comments
FN1	2	7	2	5	1	3.2	1	passion fruit, red berries, ripe fruit, red (rippen) fruit, prunes
FN2	1	5	3	3	3	2.9	3	red fruit, red-matured fruit, cerries, strawberries
FN3	1	5	4	3	3	2.9	2	raspberries, red fruit, cherries, strawberries
FN4	0	4	11	3	1	2.8	2	prunes, rippen fruit, marmelade, confiture
FN5	0	4	2	6	3	2.5	3	almonds, berries, peach, strawberries

Table 6. Number of judges who granted a certain score for the "vegetal note" aroma characteristic. The average score does not include the judges who did not answer.

Wine	Score 5	Score 4	Score 3	Score 2	Score 1	Average score	No answer	Judges' comments
FN1	0	1	1	6	7	1.7	3	pepper
FN2	1	1	3	4	6	2.1	3	green pepper
FN3	0	0	4	6	5	1.9	3	green pepper, wet grass
FN4	0	1	1	6	5	1.8	5	
FN5	0	1	3	6	5	2.0	3	green pear

Table 7. Number of judges who granted a certain score for the "burned/spicy smell" aroma characteristic. The average score does not include the judges who did not answer.

Wine	Score 5	Score 4	Score 3	Score 2	Score 1	Average score	No answer	Judges' comments
FN1	0	4	5	7	0	2.8	2	very burned, very wooden, woody
FN2	0	2	5	5	4	2.3	2	
FN3	0	2	2	8	3	2.2	3	
FN4	0	5	5	4	1	2.9	3	woody, charcoal/wood
FN5	0	1	5	7	1	2.4	4	

Table 8. Number of judges who granted a certain score for the "complex/various notes" aroma characteristic. The average score does not include the judges who did not answer.

Wine	Score 5	Score 4	Score 3	Score 2	Score 1	Average score	No answer	Judges' comments
FN1	0	2	9	4	0	2.9	3	fermented cheese, chocolate, fruit
FN2	0	2	3	8	2	2.3	3	
FN3	0	2	7	5	2	2.6	2	
FN4	0	3	4	7	1	2.6	3	
FN5	1	1	5	5	2	2.6	4	young wine, licorice

Table 9. Number of judges who granted a certain score for the "others" aroma characteristic. The average score does not include the judges who did not answer.

Wine	Score 5	Score 4	Score 3	Score 2	Score 1	Average score	No answer	Judges' comments
FN1	0	2	1	0	1	2.4	13	very intense floral, wood, alcohol
FN2	1	1	1	2	2	2.6	11	woody, pear, lactic+alcohol, animal, lactic
FN3	0	1	1	1	1	2.5	14	licorice, vanilla, honey
FN4	0	0	3	1	2	2.2	12	floral, honey, animal
FN5	0	2	1	0	2	2.6	13	chemical, CO_2

Figures

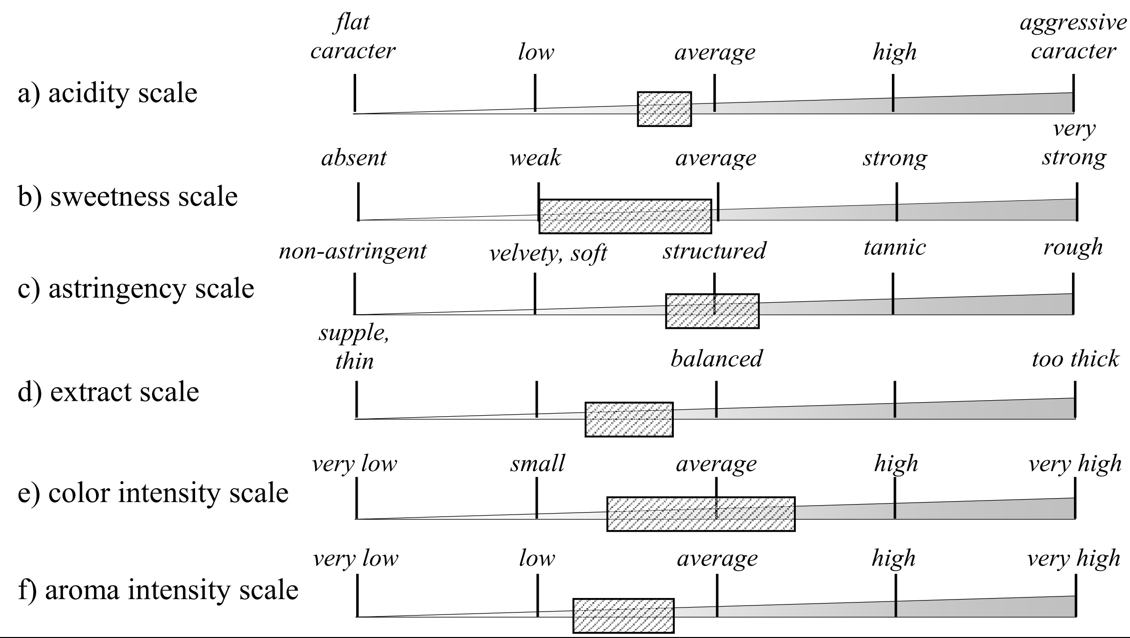

Fig. 1. Average results for the Feteasca neagra attribute on the descriptor scale

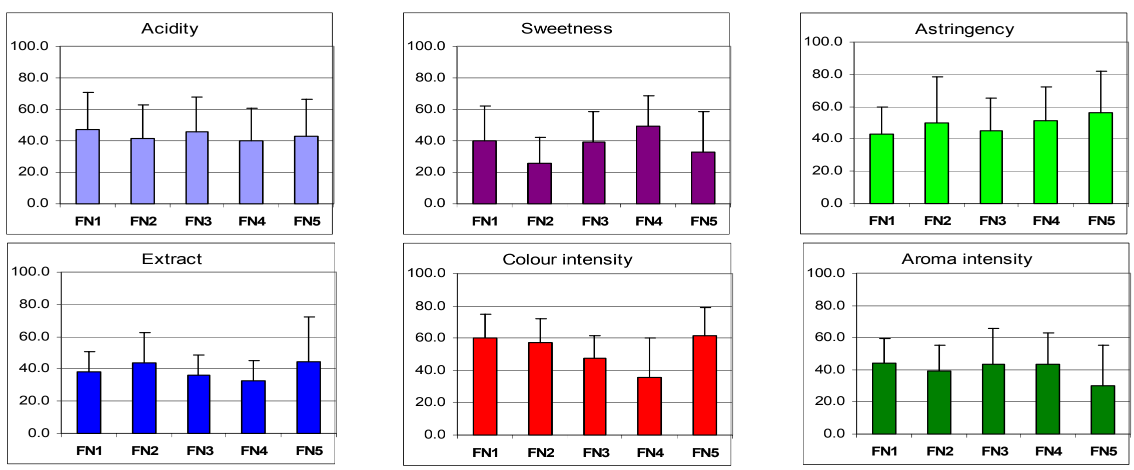

Fig. 2. The results of the evaluation of the Feteasca neagra descriptors

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THE BEHAVIOUR OF THE FN 7-20 OD. CLONE IN THE VINEYARD OF ODOBEŞTI UNDER THE CONDITIONS OF THE YEAR 2005. GROWTH PROCESSES AND METABOLISM

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ABSTRACT

A clone of Fetească neagră obtained at the Research and Development Station for Viticulture and Enology Odobeşti was followed throughout 2005 in a general study aiming at the optimization of the technological parameters in order to fully utilize the clone potential. Part of the study comprised observations on the physiological processes of the clone and the influence of various pruning methods. The presented results include the main multiannual and 2005 ecoclimatic parameters for the viticultural centre of Odobeşti, the number and length of shoots for the various variants at various phenological stages, the growth rate of the shoots and the relationship between the leaf surface area and sugar accumulation and grape yield. The usual inverse correlation between shoot number and shoot length was confirmed. The grape yield was correlated with the amount of sugars accumulated per vine. The accumulation of organic matters in leaves was maximum in July, the rate of photosynthesis reaching 6.22 mg dry substance/dm^2/h, compared to only 3.3 mg during veraison (August) and ripening stages.

INTRODUCTION

The increasing demand recorded recently for the Feteasca neagra wines lead to the zoning of this grape variety in most of Romanian vineyards with conditions for red wine production. Consequently, there have been reactivated the studies regarding the behaviour of this cultivar, in order to promote the obtainment of harvests with constant quality and quantity, considering the fact that the variety is notorious for its fluctuations from one year to another, more or less correlated with the climatic conditions. In this context, of a high interest became the scientific studies of the Feteasca neagra clones and their behaviour in various ecosystems. The studies performed internationally (Carbonneau 1990, Iacono 1991, Calo 1992, Bravdo 2000, showed that a constant grape production might depend on the pruning methods, bud load and other phytosanitary treatments.

In time, at the Research and Development Station for Viticulture and Enology Odobeşti were obtained several valuable lines through clonal selection, among which stands out the Feteasca Neagra clone FN 7-20 Od. Due to its productivity and quality features the clone was subjected to a thorough study, under the research project 3528-299/2004, aiming the optimization of the culture technology in order to fully exploit its biological potential in the ecosistem of Odobeşti viticultural region. The results presented in this paper represent the observations and determinations regarding the influence of various pruning methods and pruning level on the physiological processes of this clone under the conditions of the year 2005.

MATERIALS AND METHODS

The studies were performed in a plantation founded in 1997. The sol type on which the crop is planted is cernosium on clay, containing normal levels of nitrogen, phosphorous and potassium, and having a slight slope of 1%.

The experimental variants tested included various repartitions of the number of buds in accordance with the pruning method, as follows:

V1)- spur pruning; 10 spurs of 2 nodes and 10 spurs of 3 nodes on a vine;

V2)- Guyot pruning consisting of 5 units comprising a 2 node spur and a 8 node cane; Guyot training on medium-height trunk;

V3)- Guyot pruning consisting of 6 units comprising a 2 node spur and a 8 node cane; Guyot training on medium-height trunk;

V4)- Guyot pruning consisting of 6 units comprising a 2 node spur and a 10 node cane; Guyot training on medium-height trunk;

V5)- Guyot pruning consisting of 6 units comprising a 2 node spur and a 12 node cane; Guyot training on medium-height trunk.

The 5 variants were placed in plantation in accordance with the method of the latin square. Every experimental variant consisted of 5 repetitions of 3 vines each, totalling 15 vines per variant.

RESULTS AND DISCUSSIONS

In order to assess the growing processes and metabolism of vines, the climatic conditions of the year 2005 are presented in Table 1 together with the average of the data collected over the years in the viticultural center of Odobeşti. The values presented in Table 1 show that the viticultural centre of Odobeşti is included, according to a traditional classification (Teodorescu *et al.*, 1987), in the enoclimatic zone A2, meaning that it is suitable mainly for white wine production, but also for some red wine production.

Comparing to the multiannual average parameters, it can be seen that the year of 2005 offered less favourable conditions for quality grape production, being characterized by abundant rainfall and lack of sunshine.

This year, after assessing the bud viability and found a low percentage of bud losses during the winter, it was decided to apply normal pruning for the Feteasca neagra vines. Also, the phytosanitary treatments of the vine were those usually applied, taking however in consideration the climatic conditions of the year 2005.

Feteasca neagra is a cultivar with a relatively high percentage of sterile shoots (40-50%), therefore the operation of shoot thinning was also performed.

Observations and determinations were done on phenological stages, following the processes of growth and the fertility for every experimental variant.

For all experimental variants the vegetative period covered 186 days, from April 25 to October 29.

One of the analyses aimed to assess the total number of the shoots and their length for the clone FN 7-20 Od. The results in Table 2 show that the average number of the shoots on the one-year old spurs and canes increases from 30 in the case of V2 and V3 up to 38 for the variant V5.

The average length of the shoots is decreasing from 130 cm for the variant V2 down to 119 cm for V5, fact that confirms the reverse correlation between the number of the shoots and their length. Total length of the shoots on a vine takes increasing values according to the variant, starting with 37.5 m for V1 (the variant with spur pruning, having 50 buds/vine) and going up to 45.2 m for V5 (the Guyot pruning, having canes of 12 buds, totalling 84 buds/vine).

The growth rate of the shoots was also assessed and, as it can be seen in Figure 1, its evolution is not constant from one week to the other, but having ups and downs, being dependent on the weather conditions and on the phenological stage. For example, the decrease recorded around June 13th, which is the lowest rate observed coincides with the onset of the flowering stage.

The total leaf surface on a vine plays an essential role in the photosynthetic process, which in turn has great influence on the grape quality and the yield. Although it is much debate around this subject, the leaf to fruit ratio is suppose to have more important effect on wine quality than yield. Insuring an optimum leaf to fruit ratio is a technological must, since the nutrient of the plant is dependent on the leaf surface, pruning method and training system that may induce changes in the photosynthetic activity and sugar accumulation. Some of the parameters obtained for the clone FN 7-20 Od. are presented in Table 3.

As expected, the increase in grape yield is correlated the quantities of accumulated sugars per vine. The leaf surface to sugar ratio, that is the leaf surface that leads to the accumulation of one gram of sugar in the berries, was highest for V2, reaching the value of 82.4 cm^2/1 g of sugar.

Under the ecological and weather conditions of 2005, the clone FN 7-20 Od. recorded fluctuations in the dry substance accumulation, in accordance with the evolution of the temperature and relative humidity of the air, but also on the phenological stage.

During the vegetative season the photosynthetic intensity follows a certain evolution: increases continuously up to the veraison stage, reaches the maximum at the fruit set and fruit growing stage, after which the intensity slightly slows down. During the month of July, at the stage of intense berry growing, the clone FN 7-20 Od. also accumulates the highest quantity of organic matter in the leaves. In this phenological stage the value of the photosynthesis is also the highest, of 6.22 mg dry substance/dm^2/h (Table 4), due to the raise in the air temperature and the drop in the air relative humidity.

In the phenological stage of veraison (month of August) and at full ripening, the dry substance accumulation is rather weak, being dependent more on the cultivar and the age of the leaf. For example, the average value recorded for clone FN 7-20 Od. was in 2005 of 3.3 mg dry substance/dm^2/h, as opposed to only 2.7 mg dry substance/dm^2/h for the later ripening variety Plavaie or 3.9 mg dry substance/dm^2/h for the earlier rippening variety of Fetească albă (Table 4).

CONCLUSIONS

1. The 2005 was a year charactierized in the viticultural center of Odobesti by abundant rainfalls and shortage of sunshine hours in the vegetative season which in turn lead to grapes of lower quality, but still in the expected parameters for the feteasca neagra variety.
2. The studied experimental variants went through all the phenological stages in a period of 186 days, from April 25^{th} to October 29^{th}.
3. The average length of the shoots is decreasing from 130 cm for the variant V2 down to 119 cm for V5, fact that confirms the reverse correlation between the number of the shoots and their length.
4. The growth rate of the shoots is dependent on the weather conditions and on the phenological stage.
5. The increase in grape yield is correlated the quantities of accumulated sugars per vine. The leaf surface to sugar ratio was highest for variant V2, reaching the value of 82.4 cm^2/1 g of sugar.

6. The clone FN 7-20 Od. accumulates the highest quantity of organic matter in the leaves during the month of July, at the stage of intense berry growing. In this phenological stage the value of the photosynthesis is the highest, of 6.22 mg dry substance/dm^2/h, due to the raise in the air temperature and the drop in the air relative humidity.
7. In the phenological stage of veraison (month of August) and at full rippening, the dry substance accumulation is rather weak, recording only 3.3 mg dry substance/dm^2/h for the clone FN 7-20 Od.

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Tables

Table. 1. The main multiannual and 2005 eco-climatic parameters for the viticultural centre of Odobeşti

No.	Eco-climatic parameter	Odobeşti viticultural center (multiannual average value)	Odobeşti viticultural center, 2005
1.	**Year-round data**		
1.1	Average annual temperature (°C)	10,1	10,7
1.2	Annual rainfall (mm)	612	900,8
2.	**Vegetative period data (01.04-30.09)**		
2.1	Active termic balance (°C)	3142	3165,5
2.2	Sum of the sunshine hours	1461	1368,1
2.3	Rainfall (mm)	380	620,5
2.4	Hidrotermic coeficient (CH)	1,20	1,96
2.5	Oenoclimatic potential index (I A Oe)	4473	4163,1
3.	**July and August data (the months most relevant for the grape maturation and quality)**		
3.1	Average air temperature in July (°C)	21,4	21,5
3.2	Average of the maximum daily air temperatures in August (°C)	26,9	27,9
3.3	Average of the air humidity in August (%)	71	78,5
3.4	Average of the air humidity at 1:00 p.m. in August (%)	51	58

Table 2. The number and length of the shoots at July 14th, 2005

Variant	Average shoot number/vine	Shoot length:		
		average (cm)	absolute (m)	relative (%)
V1	30	125	37.5	89.4
V2	30	130	39.0	93.0
V3	35	124	43.4	103.5
V4	37	120	44.4	105.9
V5	38	119	45.2	107.8

Table 3. The influence of leaf surface on the sugar accumulation and grape yield for the FN 7-20 Od clone

Variant	Number of grapes/vine	Leaf surface (m^2/vine)	Grape yield (kg/vine)	Leaf surface (m^2/bunch)	Sugar (g/vine)	Leaf surface to sugar ratio (cm^2/1 g of sugar)
V1	11	2.07	1.42	0.18	293	70.7
V2	12	2.87	1.70	0.23	348	82.4
V3	18	2.89	2.00	0.16	406	71.1
V4	17	3.05	2.29	0.18	463	65.8
V5	21	4.01	2.51	0.19	502	79.8

Table 4. Photosynthesys evaluation as the dry substance accumulation

Variety	Dry substance accumulation at growth of the berries stage	Dry substance accumulation at the veraison stage
	mg dry substance/dm^2/h	
Feteasca neagra clone FN 7-20 Od	6.22	3.3
Feteasca alba	9.38	3.9
Plavaie 16 Od	8.07	2.7

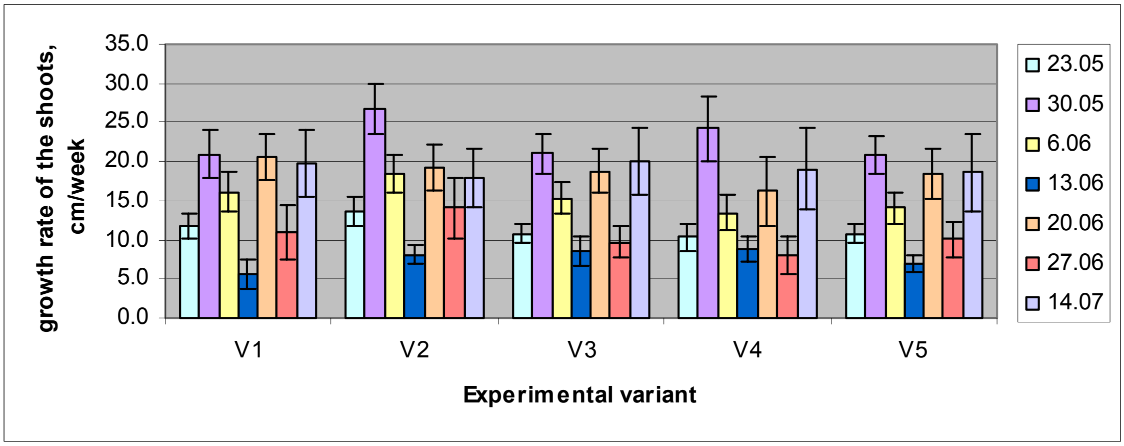

Fig. 1. Evolution of the growth rate of the shoots for the experimental variants measured weekly

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STUDY OF THE FERTILITY OF FETEASCĂ NEAGRĂ 7-20 OD. CLONE IN THE VINEYARD OF ODOBEŞTI UNDER THE CONDITIONS OF THE YEAR 2005

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Keywords: Fetească neagră variety, clone, vinegrowing

ABSTRACT

A clone of Fetească neagră selected at the Research and Development Station for Viticulture and Enology Odobeşti was studied in order to characterize its behaviour from the viewpoint of the relationship between the pruning method and the fertility. Five methods of pruning were applied, each of them to 15 randomly selected vines in the plantation. The measured parameters were: the number of fertile shoots, the number of total shoots and the number of inflorescences on each grapevine. The gathered data was treated statistically in order to evidentiate significant differences among variants. The results showed that the most fertile buds were concentrated between nodes 4 and 8, and the most suitable pruning method appeared to be a Guyot pruning (6 units of one spur of 2 nodes + one cane of 8 nodes), which offers a high percentage of fertile shoots while having a low number of buds per vine (60), associated with more manageable canopy, better protection against the diseases and more sunlight reaching down to the growing grapes.

INTRODUCTION

The Fetească Neagră clone FN 7-20 Od. was selected at the Research and Development Station for Viticulture and Enology Odobeşti and in time proved to have valuable properties that would recommend it for the cultivation on larger plantations. Due to its productivity and quality features the clone was subjected to a thorough study, within the research project 3528-299/2004, aiming at the optimization of the culture technology in order to fully exploit its biological potential in the ecosystem of Odobeşti viticultural centre. The results comprised in this paper represent the evaluation of the influence of the pruning method on the fertility of the clone under the conditions of the year 2005.

MATERIALS AND METHODS

Fetească Neagră is a variety with a medium potential fertility, fact that confirms the hypotesis that the most suitable pruning method would be the cane pruning with long canes (Gherasim *et al.*, 1959). Moreover, it is known that the Fetească neagră variety has its most fertile buds starting at the node 4 or 5 and going up to the nodes 18-20, fact that again suggest that the most appropriate pruning is one that includes canes. In order to test this hypothesis on our clone of Fetească Neagră, we tried in the plantation experimental variants with long canes, pruned in Guyot type on medium-height trunk, with units of one spur of 2 nodes and a cane of 8-12 nodes. Because the density of the plantation is 3700 plants/ha, pruning in longer canes is considered inappropriate because it would lead to a very thick canopy. The influence of these pruning methods was compared to the results obtained for a control with a spur pruning, the variants being presented in Table 1.

For every experimental variant 15 repetitions were done, the vines being randomly distributed in the plantation in accordance with the method of the Latin square.

The parameters measured for the assessment of fertility were: the number of fertile shoots, the number of total shoots and the number of inflorescences. In order to make the comparison of the results possible, for all the 5 experimental variants the average of the 15 corresponding vines was calculated, together with the standard deviation, SD.

RESULTS AND DISCUSSIONS

For the 5 experimental variants the following values resulted, as presented in Table 2. These data were afterwards evaluated for their significance.

As expected for a vigorous variety which begins to develop inflorescences from the node 4/5 or 5/6, the longer the canes, the more the number and the percentage of fertile shoots.

The same conclusion can be derived from the Figures 1a, 1b and 2a, where the number of the fertile shoots versus the number of buds/vine, the number of the total shoots versus the number of buds/vine and the percentage of fertile shoots versus the number of buds/vine are shown, respectively.

These results show that for some of the pruning methods applied there are differences as regards the number of the fertile shoots. However, the percentage of the fertile shoots does not seem to be affected by the particular pruning methods tested.

In order to verify these facts we applied statistical methods such as ANOVA coupled with the Fisher test for the pairwise comparison, and the results are shown in Tables 3, 4, 5 and 6. These tests compare the mean values of the experimental variants by pairs, assessing whether there really are significant differences in the fertility parameters due to the pruning method (the number of buds/vine).

In case of the number of fertile shoots there is a clear statistical difference between the experimental variants, as confirmed by the one-way ANOVA test. However, such clear differences could not be found between all pairs of variants. In accordance with the Fisher LSD test, the variants that are significantly different from one to another are V_1 with V_3, with V_4 and with V_5, and also V_2 with V_5 (Table 3).

It can be seen that the variants V_3, V_4 and V_5 do not differ significantly one from another and that the simple increase in the bud number just by leaving the canes longer then 8 nodes does not increase the fertility of the variety. This fact also suggests that the most fertile buds are concentrated between the node 4 and 8. Although some researchers (Gherasim *et al.*, 1959) reported that for this variety the optimum pruning is with long canes of even 16-18 nodes, our study does not confirm this.

The result obtained for the number of total shoots is expected to be somehow similar to that of the number of the fertile shoots (Table 4). Again, the ANOVA test found significant differences between the variants.

The Fisher method indicated clear differences between the pairs made of variant V_1 with V_4 and V_5, between V_2 with V_4 and V_5, between V_3 and V_4, as well as between V_3 with V_5.

From here we can draw the conclusion that the number of total shoots is not different for the variants with shorter canes, while starting with the variant V_4 with 10 node canes a significant difference appears, followed by a similar number of shoots for the variant V_5. Consequently, there are two groups, V_1-V_3 and V_4-V_5 which can be distinguished.

On the basis of these results we can conclude that the optimum pruning method for the Fetească neagră 7-20 Od. clone would be V_4, the one with Guyot pruning with 6 units of one spur of 2 nodes + one cane of 10 nodes, that makes 72 buds/vine.

The ONDOV specifications in force in the year 2005 regulating the production of DOC wines from the Fetească neagră variety did not mention any particular type of pruning, but limited the number of buds/vine to only 42 for almost all the viticultural centres in which Fetească neagră is cultivated, including the centre of Odobeşti.

Our studies show that there may be possible to leave a higher number of buds on a vine without affecting the quality of the harvest (fact confirmed by the preservation of the sugar quantity accumulated in the berries for the variants experimented in Odobeşti – results not shown).

In the case of the fertile shoots percentage too the ANOVA test indicated a significant statistical difference between the variants.

The Fisher test shown in Table 5 indicated clear differences between the pairs of variants made of V_1 with V_3, V_4 and V_5.

As in the case of the total number of shoots per variant, the results are grouped in two categories, one with short pruning (spurs and/or short canes) and one category with longer cane pruning. From the V_3 variant, the percentage of the fertile shoots for the group V_3-V_4-V_5 clearly increases, without showing significant differences from one to another inside this second category. Consequently we can conclude that the optimum variant is V_3, because the percentage of the fertile shoots is the highest, while the number of buds per vine is only 60, which in turn leads to a more reduced canopy to be managed, which means a better protection against the diseases and more sunlight available for the growing grapes.

Another reason for which the variant V_3 should be judged as optimum is that the number of inflorescences per vine is also optimal (Fig. 2b)

The ANOVA also confirmed for the number of inflorescences that there are certain differences between the variants which are statistically relevant. The Fisher test shows that the following variants are significantly different from one to another: V_1 cu V_3, V_4 and V_5, as well as V_2 with V_3, V_4 and V_5 (Table 6).

Again the results confirm the grouping in two categories: V_1 and V_2 with short pruning and V_3-V_4-V_5 with long pruning. The groups differ from each other, while the variants inside the groups show the same behaviour, irrespective of the number of the buds/vine. Consequently, taking into consideration all the above results, we conclude that the optimum variant for the pruning of Fetească neagră 7-20 clone Od. is V_3 with Guyot pruning of 6 units of one spur of 2 nodes and one cane of 8 nodes, totalling 60 buds per vine.

CONCLUSIONS

1. Being a vigorous variety, Fetească neagră begins developing inflorescences from the node 4/5 or 5/6; therefore the longer the canes, the more the number and the percentage of the fertile shoots. Although some researchers reported that for this variety the optimum pruning is with long canes of even 16-18 nodes, our study does not confirm this. Our research reveals that the most fertile buds are concentrated between the nodes 4 and 8.
2. The evaluation of the total number of shoots and the number of the inflorescences developed on the variants with different pruning methods led to the observation of two statistically different categories: V_1 and V_2 with short pruning (spurs and/or short canes), and category V_3-V_4-V_5 with longer cane pruning.
3. The optimum variant appeared to be V_3, because it belongs to the group with the highest percentage of the fertile shoots, while at the same time having the lowest number of buds per vine in the group (60 buds/vine). This is associated with a more manageable canopy, better protection against the diseases and more sunlight reaching down to the growing grapes.

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Tables

Table 1. Pruning methods applied in 2005 for the Fetească neagră clone 7-20 Od. for the determination of the fertility variation

Variant	Pruning method	Number of buds/vine	Units
V_1	Spur pruning	50	10 spurs of 2 nodes and 10 spurs of 3 nodes
V_2	Guyot pruning	50	5 units of one spur of 2 nodes + one cane of 8 nodes
V_3	Guyot pruning	60	6 units of one spur of 2 nodes + one cane of 8 nodes
V_4	Guyot pruning	72	6 units of one spur of 2 nodes + one cane of 10 nodes
V_5	Guyot pruning	84	6 units of one spur of 2 nodes + one cane of 12 nodes

Table 2. The average values and standard deviations for the fertility parameters of the Fetească neagră 7-20 Od. clone under the conditions of the year 2005

Variant	Buds/ vine	No. of fertile shoots		No. of total shoots		Fertile shoots %		No. of inflorescences	
		Average	SD	Average	SD	Average	SD	Average	SD
V1	50	6.87	3.70	29.73	7.56	24.20	17.37	11.33	5.43
V2	50	10.67	7.18	29.40	10.04	36.67	23.25	12.20	6.85
V3	60	15.47	6.49	29.00	7.97	44.60	16.75	18.87	7.00
V4	72	15.60	6.43	37.20	7.83	42.39	15.29	17.40	7.61
V5	84	16.60	10.01	37.53	15.05	43.65	18.85	21.00	7.16

Table 3. Pairwise Multiple Comparison Procedures (Fisher LSD Method) for the evaluation of the significance of the differences observed in the number of fertile shoots emerged in experimental variants with various pruning methods

Comparison of variants	Difference of means	LSD (alpha=0.050)	P	Difference ≥ LSD
V_5 / V_1	**9.730**	5.138	<0.001	**Yes**
V_5 / V_2	**5.930**	5.138	0.024	**Yes**
V_5 / V_3	1.130	5.138	0.662	No
V_5 / V_4	1.000	5.138	0.699	No
V_4 / V_1	**8.730**	5.138	0.001	**Yes**
V_4 / V_2	4.930	5.138	0.060	No
V_4 / V_3	0.130	5.138	0.960	No
V_3 / V_1	**8.600**	5.138	0.001	**Yes**
V_3 / V_2	4.800	5.138	0.067	No
V_2 / V_1	3.800	5.138	0.145	No

Table 4. Pairwise Multiple Comparison Procedures (Fisher LSD Method) for the evaluation of the significance of the differences observed in the number of total shoots emerged in experimental variants with various pruning methods

Comparison of variants	Difference of means	LSD (alpha=0.050)	P	Difference ≥ LSD
V_5 / V_3	**8.530**	7.350	0.024	**Yes**
V_5 / V_2	**8.130**	7.350	0.031	**Yes**
V_5 / V_1	**7.800**	7.350	0.038	**Yes**
V_5 / V_4	0.330	7.350	0.929	No
V_4 / V_3	**8.200**	7.350	0.029	**Yes**
V_4 / V_2	**7.800**	7.350	0.038	**Yes**
V_4 / V_1	**7.470**	7.350	0.046	**Yes**
V_1 / V_3	0.730	7.350	0.844	No
V_1 / V_2	0.330	7.350	0.929	No
V_2 / V_3	0.400	7.350	0.914	No

Table 5. Pairwise Multiple Comparison Procedures (Fisher LSD Method) for the evaluation of the significance of the differences observed in the percentage of the fertile shoots emerged in experimental variants with various pruning methods

Comparison of variants	Difference of means	LSD (alpha=0.050)	P	Difference ≥ LSD
V_3 / V_1	**20.400**	13.476	0.004	**Yes**
V_3 / V_2	7.930	13.476	0.245	No
V_3 / V_4	2.210	13.476	0.745	No
V_3 / V_5	0.950	13.476	0.889	No
V_5 / V_1	**19.450**	13.476	0.005	**Yes**
V_5 / V_2	6.980	13.476	0.305	No
V_5 / V_4	1.260	13.476	0.853	No
V_4 / V_1	**18.190**	13.476	0.009	**Yes**
V_4 / V_2	5.720	13.476	0.400	No
V_2 / V_1	12.470	13.476	0.069	No

Table 6. Pairwise Multiple Comparison Procedures (Fisher LSD Method) for the evaluation of the significance of the differences observed in the number of inflorescences emerged in experimental variants with various pruning methods

Comparison of variants	Difference of means	LSD (alpha=0.050)	P	Difference ≥ LSD
V_5 / V_1	**9.670**	4.988	<0.001	**Yes**
V_5 / V_2	**8.800**	4.988	<0.001	**Yes**
V_5 / V_4	3.600	4.988	0.155	No
V_5 / V_3	2.130	4.988	0.397	No
V_3 / V_1	7.540	4.988	0.004	**Yes**
V_3 / V_2	6.670	4.988	0.010	**Yes**
V_3 / V_4	1.470	4.988	0.559	No
V_4 / V_1	6.070	4.988	0.018	**Yes**
V_4 / V_2	5.200	4.988	0.041	**Yes**
V_2 / V_1	0.870	4.988	0.729	No

Figures

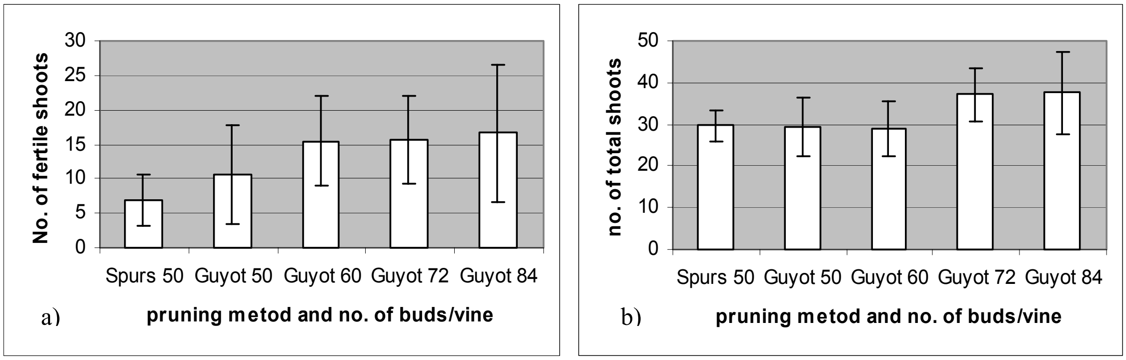

Fig. 1. The influence of the bud number/vine on the number of fertile shoots (1a) and on the number of total shoots (1b)

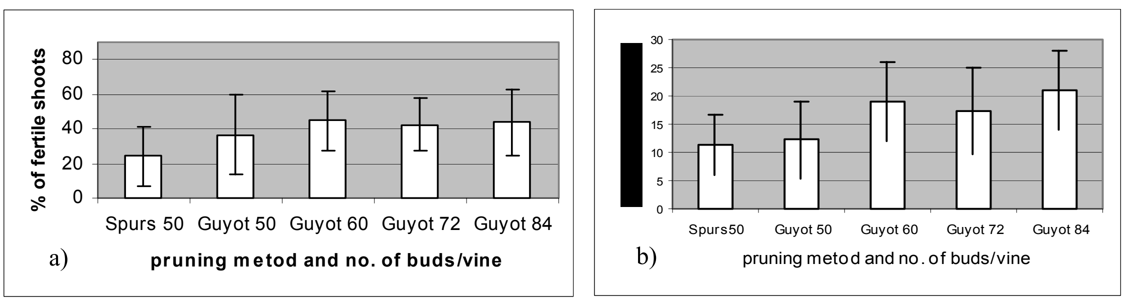

Fig. 2. The influence of the bud number/vine on the percentage of fertile shoots (2a) and on the number of inflorescences developed on vines (2b)

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EVALUATION OF THE FERTILITY COEFFICIENTS OF FETEASCĂ NEAGRĂ 7-20 OD. CLONE IN THE VITICULTURAL CENTRE OF ODOBEŞTI UNDER THE CONDITIONS OF THE YEAR 2005

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Keywords: Fetească neagră variety, clone, vinegrowing

ABSTRACT

The fertility coefficients of a clone of Fetească neagră variety were investigated under the conditions of year 2005 in the viticultural centre of Odobeşti. Five types of pruning methods were applied to the studied clone in order to assess the relationship between the pruning method and the fertility of the grapevine. Results are presented regarding the absolute fertility coefficient (CFA = number of inflorescences/number of the fertile shoots) and the relative fertility coefficient (CFR = number of inflorescences/ total number of the shoots). As far as CFA is concerned the study indicated that the spur pruning showed the lowest fertility, while long cane pruning led to increased fertility. As far as the relative fertility coefficient (CFR) is concerned the results were contradictory, showing values much lower than those previously reported in the literature. Further studies are probably required in order to draw a definitive conclusion on this latter aspect.

INTRODUCTION

Fetească Neagră is a Romanian red variety that rivals in quality the French varieties Cabernet Sauvignon and Merlot and is judged by many policy makers as the most suitable variety to be promoted for our wine exports. However, the surfaces covered with this variety are very limited at the moment, due, among other things, to the instability of the production of this variety from one year to another. In this context, the researchers should support the vinegrowers in their decision to plant more surfaces with this variety and offer them a clone of Fetească neagră with a good production potential. From this viewpoint an issue of interest is the fertility of the Fetească Neagră clones and the way in which this fertility can be influenced by pruning methods. Our studies were focused on the Fetească Neagră clone FN 7-20 Od selected at the Research and Development Station for Viticulture and Enology Odobeşti, which is the subject of the research project 3528-299/2004, aiming for the optimization of the cultural technology in order to fully express its biological potential in the ecosystem of Odobeşti viticultural centre. The results given in this paper represent the evaluation of the influence of the pruning method on the fertility coefficients of this clone in 2005, a year with weather conditions not too favourable for viticulture.

MATERIALS AND METHODS

The studies were performed in the plantation of the Research and Development Station for Viticulture and Enology Odobeşti on the clone of Fetească Neagră FN 7-20 Od.

For the experiments 5 types of pruning methods were selected (Table 1) in order to determine the influence of the pruning method on the fertility of the clone.

In order to minimize the experimental errors 15 repetitions were done for every variant, the vines being randomly distributed in the plantation in accordance with the method of the Latin square.

For the fertility evaluation the following coefficients were calculated:

- the absolute fertility coefficient (CFA = number of inflorescences/number of the fertile shoots) and
- the relative fertility coefficient (CFR = number of inflorescences/ total number of the shoots).

The fertility coefficients, their average and standard deviation were calculated for every variant.

RESULTS AND DISCUSSIONS

The fertility parameters are a subject of interest for the description of the overall behaviour of the clone of Fetească neagră 7-20 Od. In this study we present and discuss the values of the fertility coefficients CFA and CFR and the results obtained in the conditions of the year 2005 are shown in Figures 1a and 1b.

For both coefficients an ANOVA analysis was performed, followed by a Fisher test in order to check the statistical differences between the experimental variants. The results are gathered in Tables 2 and 3.

As far as the coefficient CFA is concerned (Table 2) the ANOVA test found significant differences between variants. According to the Fisher test these differences appear to exist between the following variants: V_1 with V_4, V_1 with V_2 and V_5 with V_4. These differences show that the fertility of the variant V_1, the one with spur pruning, is the lowest and that the other variants with longer pruning are more fertile.

For the coefficient CFR (Table 3) the ANOVA led to a inconclusive result, as the value of P was higher (P= 0.056); this means that it could not be confirmed or infirmed that a statistically significant difference does exist between variants, because the differences found between the average values are not sufficiently high to be accounted for by a biological phenomenon rather than by a sampling error. However, when applying also the Fisher test we found that some of the differences are indeed statistically significant. Such differences appear between the variants V_5 with V_1 and V_2, while between V_1 and V_2 we found no significant difference.

The CFA values fluctuate between 1.11 (V_4) and 1.87 (V_1), while the CFA takes values between 0.41 (V_1) and 0.65 (V_5). The values mentioned by other authors and cited in the literature (Gherasim *et al.*, 1959) for this variety are 1.3 the average value for the absolute fertility coefficient and 1.1 for the relative fertility coefficient. In our case, we found that, indeed, the values for CFA vary around the reported average value, but the highest value is encountered for the spur pruning variant, a fact which is not scientifically supported by the other data collected regarding this variety. This abnormal value may be due to the relatively high standard deviation of the measured values obtained for the 15 vines studies for spur pruning V_1, which is 1.87 ± 0.73. For the CFA value obtained for V_5, the calculated standard deviation is even higher, the value of V_5 being 1.80 ± 1.51 (Figure 1a).

The average values of CFA for the variants V_2-V_4 are considered the most relevant for the description of the variety potential, these values being 1.22 ± 0.35; 1.32 ± 0.44 and 1.11 ± 0.27, respectively.

The average values of CFR are, however, much smaller than expected (Figure 1b), especially when they are compared with the results obtained by others and reported as average in the Romanian ampelography (Gherasim *et al.*, 1959). Our calculated values fluctuate from 0.41 ± 0.26 (V_1) to 0.65 ± 0.33 (V_5), and none of the variants was came even close to the expected coefficient of 1.1, even if we take into consideration the value of the standard deviation.

The observed abnormalities may be due to the conditions of the year 2005 and to the characteristics of studied clone, which means that the clone should be monitored for some more years in order to draw a definitive conclusion. If the value of the relative fertility coefficient is confirmed to be low it is expected that this will also affect the average production of this Fetească neagră clone.

CONCLUSIONS

1. For the CFA coefficient the ANOVA method demonstrate and the Fisher test confirms that there are significant differences between experimental variants V_1 and V_4, V_1 and V_2, V_5 and V_4, meaning that the lowest fertility is for the spur pruning (V_1), and that the fertility increases in case of the long cane pruning.
2. For the relative fertility coefficient, although ANOVA method cannot confirm a difference between the variants, one is found by Fisher test; however, the results are contradictory. The values obtained for CFR are lower then normally expected, while the measurement errors shown by a relatively high standard deviation seem to be affecting the results.
3. The weather conditions of the year 2005 were not too suitable for the viticulture, fact that is reflected also in our results. In order to establish the real fertility coefficients of the FN 7-20 clone, the studies should be continued for some more years.

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Tables

Table 1. Pruning methods applied for the Fetească neagră clone 7-20 Od in 2005

Variant/ Abbreviation	Pruning method	Units	No. of buds/vine
V_1 (Spurs 50)	Spur pruning	10 spurs of 2 nodes and 10 spurs of 3 nodes	50
V_2 (Guyot 50)	Guyot pruning	5 units of one spur of 2 nodes + one cane of 8 nodes	50
V_3 (Guyot 60)	Guyot pruning	6 units of one spur of 2 nodes + one cane of 8 nodes	60
V_4 (Guyot 72)	Guyot pruning	6 units of one spur of 2 nodes+one cane of 10 nodes	72
V_5 (Guyot 84)	Guyot pruning	6 units of one spur of 2 nodes+one cane of 12 nodes	84

Table 2. Pairwise Multiple Comparison Procedures (Fisher LSD Method) for the evaluation of the significance of the differences observed in the values of absolute fertility coefficient (CFA) for experimental variants with various pruning types

Comparison of variants	Difference of means	LSD (alpha=0.050)	P	Difference ≥ LSD
V_1 / V_4	0.760	0.583	0.011	**Yes**
V_1 / V_2	0.650	0.583	0.029	**Yes**
V_1 / V_3	0.550	0.583	0.064	No
V_1 / V_5	0.070	0.583	0.811	No
V_5 / V_4	0.690	0.583	0.021	**Yes**
V_5 / V_2	0.580	0.583	0.051	No
V_5 / V_3	0.480	0.583	0.105	No
V_3 / V_4	0.210	0.583	0.475	No
V_3 / V_2	0.100	0.583	0.733	No
V_2 / V_4	0.110	0.583	0.708	No

Table 3. Pairwise Multiple Comparison Procedures (Fisher LSD Method) for the evaluation of the significance of differences observed in the values of the relative fertility coefficient (CFA) for experimental variants with various pruning types

Comparison of variants	Difference of means	LSD (alpha=0.050)	P	Difference ≥ LSD
V_5 / V_1	0.240	0.181	0.010	**Yes**
V_5 / V_2	0.220	0.181	0.018	**Yes**
V_5 / V_4	0.180	0.181	0.051	No
V_5 / V_3	0.090	0.181	0.325	No
V_3 / V_1	0.150	0.181	0.103	No
V_3 / V_2	0.130	0.181	0.157	No
V_3 / V_4	0.090	0.181	0.325	No
V_4 / V_1	0.060	0.181	0.511	No
V_4 / V_2	0.040	0.181	0.661	No
V_2 / V_1	0.020	0.181	0.826	No

Figures

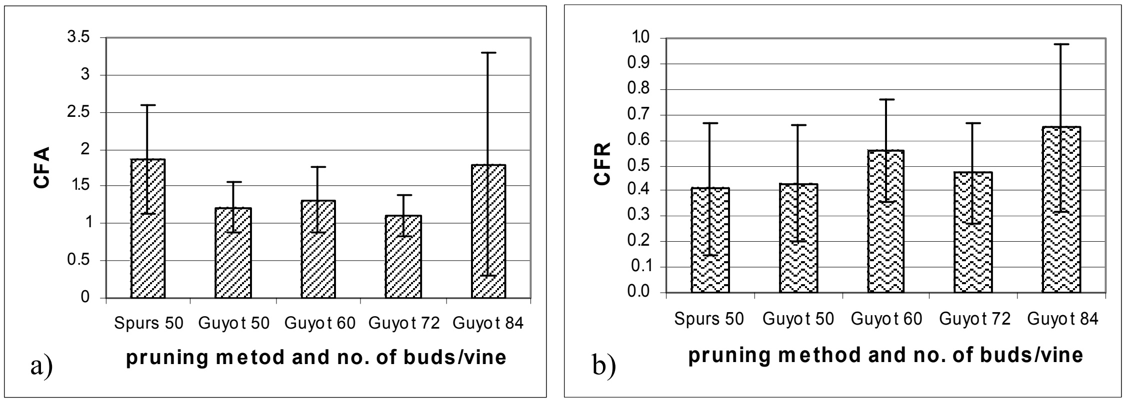

Fig. 1. The influence of the number of buds/vine on the absolute fertility coefficient (1a) and on the relative fertility coefficient (1b)

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AGROBIOLOGICAL, TECHNOLOGICAL AND ENOLOGICAL CHARACTERISTICS OF THE GRAPEVINE CULTIVAR PINOT NOIR AND THEIR CLONES – 777, 115, 375 IN THE CONDITIONS OF THE VINEYARD STEFANESTI-ARGES

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Keywords: quality, quantity, clones, adaptability, fertility, conditions climatic.

ABSTRACT

The study was achieved which the purpose of determining the onclination of each selection clone in the ecopedoclimatic conditions of the vineyard Ştefăneşti-Argeş, as well as outlining the natural disposition and the posibilites to utilize them. The presentation and the estimation of the agrobiological and productive features of the selection 777, 115, 375 implicate and makes it necessary to outline a meteorological factors complex, that can assure the maximum expression of this features, so that it can be realised a good production and the harmonies chemical compounds during the growing and maturation process of the grapes.

INTRODUCTION

The clonal selections of the Pinot noir sort that were obtained in France, 777, 115,375 and studded in the conditions of the vineyard Ştefăneşti-Argeş, present from the quantity and quality point of view very close values, but also valutes wich are close to the control, achieving the qualitative most favourable point which is necessary, with are intense coloured, balanced, coster, suited for keeping them (777, 115), but also for a limited keeping (375 – it is preferable to be consumed while is still young).

MATERIALS AND METHODS

The experiment was realized for the purpose of establishing the adaptability degree of these clonal selections, in a habitat with average favourability for obtaining red superior wines, by estimating and establishing the abilities and the possibilities of utilizing each clonal selection which was exanimate. To accomplish its objective, the research was developed during 2002-2004, in a comparative field from ampelograhic collection of the Institute of Research Development for Biotechnologies in Horticulture Stefanesti-Arges. The experimental plantation is represented by three French clones of Pinot Noir variety 777, 115,375 and Pinot Noir as control. The clonal selection were grafted on the roostock SO $_{4-5}$ (a) and 3309-$_{111}$ (b) and for all these the selected form of guidance was the medium one, and the type of cutting was Guyot semi high. To be able to operate in statistic-mathematic calculation, the experiment became three-factorial, 4 genotypes x 2 rootstocks x 3 different charges type, with 24 possible combinations as:
Element A – genotype, represented by clonally selections 777,115, 375 and Pinot Noir.
Element B – rootstocks utilized, So4-5 (a) and 3309-111 (b)
Element C – different fructification charges – 10 buds/m^2, 13 buds/m^2, 16 buds/m^2.

Data from culture centers from Wine-Growing Areas in Muntenia and Oltenia Hills (as part of these) were used to evaluate climatic conditions of Stefanesti- Arges vineyard; four synthetic indicators were used: hydrothermal coefficient, heliothermal coefficient, bio-climatic index, parameters of oenoclimatic ability.

RESULTS AND DISCUSSIONS

Before presenting the obtained results within the research, on the basis of the four synthetic indicators, calculated during 21 years (1984-2004), we established the favourability degree of Stefanesti-Arges vineyard to obtain superior red wines compared to The Region Muntenia and Oltenia (as part of these). The results were: the vineyard holds low heliothermal resources (1,93 against 2,15 registered in the region that belongs to), high hydric resources (1,30 against 1,03), inferior bio-climatic index of favourability to cultivate qualitative varieties (6,19 against 8,06) and low oenoclimatic ability parameters (4457 against 4683). Thus the vineyard has medium favourability to obtain superior quality red wines (table 1).

If we analyze the average value of each ecoclimatic parameters regarding eco-climatic conditions from Stefanesti vineyard, for each wine-growing year of study and the average of these years comparatively to values registered over many years (table 2), we ascertain that Stefanesti vineyard holds a medium-high degree of favourability to obtain superior quality wines, which justifies the expansion of varieties for red wines and their clonal selections.

Considering the main climatic elements registered during the researches we observe a relative uniformity regarding the pheonologycal spectrum of studied clonal selections, so the period of maturation and vegetation of these three selections can be determined on the basis of duration and calendaristic period. It is necessary to make a classification with a synthetic character: clonal selection 777 is an early selection, 115 is average - early and 375 is average (table 3).

To establish agro biological, technological and oenological potential of studied clonally selection the following indicators were analyzed: buds/vines percent, percentage of offshoots, coefficient of fertility, number of grapes/vine, average weight of a grape, weight of 100 grapes (table 4) as well as main physic-chemical parameters of the composition of wines obtained from these selections (table 5).

The data obtained after statistics analysis with Duncan test show that there are differences at the clonal level, so the highest bud viable percent was registered at clonal selection 375 (87,20%) against the other selections, but also against Pinot Noir studied as control. A significant difference was observed between selections 375 and 777 when they were grafted on rootstock 3309-111. It was also observed that the selection 375 has a higher buds viable percent than the other varieties at a 13 bud/m^2 and 16 bud/m^2 charge.

The interaction between two elements, clone/roostocks at percentage of offshoots can be appreciated by synthesizing results that show that the clone 375 (79.90%) registers significant differences against the control Pinot Noir (74,80%) and the selection 777 (73,17%), and significant differences against 115 clone (71,17%) regardless of utilized roostocks. We can also ascertain that element C (the charge) has consequences on element A, when the influence is significantly maintained for each charge.

The variation analysis realized for coefficient of fertility indicates the significant simple action of A element over B element, which is not statistically verified, but for 375 selection overcomes average values of other clonal selection.

The statistically analysis on the number of grapes on vine shows that the element acted significantly, so we observe once more the superiority of 375/3309-$_{111}$ clone which values overcome other clones with high differences regardless of studied roostocks or charges on vine.

For average weight of a grape, the variation analysis realized with Duncan test lines out the fact that no experimental variant analyzed registered any significant differences.

Following the same approach one can see that 375 selection with average weight of 100 grapes (116,96 g) is significantly different against Pinot Noir variety (113,50g), against 777 clone (115,92 g) and highly different against clone 115 (109,97 g).

The significant differences were observed also at the rootstock which was utilized, and higher values were obtained if clones were associated with 3309-_{111} rootstock - (118,33 g).

When the number of buds/m^2 grows one can observe that the differences are significant, and 375 clone is remarked once again (119,15 g) regardless of attributed charge, followed by control variety, 777 clone and 115 clone.

The wines of each clones selections has specific characteristic, so superior quality wines were obtained, with a high grade of alcol which varied from 13,78 v % to 15,6 v % with good acidity 6,4 g/l tartric acid-7,76 g/l tartric acid, potential of phenolic compounds 1,95-2,70 g/l, anthocyans 128-189,5 mg/l, of which clone 115 is remarked also from physic-chemical and organoleptical point of view by having a taste balance well related to the intensity and shade of typical colour of Pinot Noir variety.

CONCLUSIONS

1. French clones selections of Pinot Noir variety turn account their quantitative and qualitative potential of production in ecopedoclimatic conditions from vineyard Stefanesti-Arges.
2. Considering all analyzed parameters, clone 777 responds to actual demands for producing superior quality wines of D.O.C. type, so we can sustain that it is a qualitative selection.
3. The clone 115 demonstrated good adaptability in this wine-growing centre and good affinity to $SO_{4\text{-}5}$ rootstock. This selection proves high complexity so it can be recommended to different levels of production.
4. The clone selection 375 is the most productive in ecopedoclimatic conditions of Stefanesti – Arges vineyard and proved mixed characteristics, so it can be considered a quantity-quality clonal selection.

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Tables

Table 1. The values of synthetic indicators climatic

Tested	**heliothermal coefficient (Branas)**	**hydrothermal coefficient (Seleaninov)**	**bio-climatic index (Constantinescu)**	**parameters of oenoclimatic ability (Teodorescu)**
Ştefăneşti	1,84	1,38	5,73	4373
Topoloveni	1,95	1,28	6,25	4473
Valea Mare	2,00	1,22	6,60	4526
Vineyard Ştefăneşti	**1,93**	**1,30**	**6,19**	**4457**
The Region Muntenia and Oltenia	***2,15***	***1,03***	***8,06***	***4683***

Table 2. The values of the synthetic indicators that characterize Stefanesti-Arges vineyard during the study

Years	**heliothermal coefficient (Branas)**	**hydrothermal coefficient (Seleaninov)**	**bio-climatic index (Constantinescu)**	**parameters of oenoclimatic ability (Teodorescu)**
Values many years	**1,93**	**1,30**	**6,19**	**4457**
2002	2,28	1,45	5,4	4574
2003	2,83	0,83	10,8	5147
2004	2,42	1,32	6,5	4872
Average	***2,51***	***1,2***	***7,56***	***4864***

Table 5. The parameters of the wines obtained from clones 777, 115, 375

Experimental varieties	**Alcol % vol.**	**Total acidity g/l**	**total polyphenols g/l**	**Anthocyans mg/l**
777a	13,7	7,1	2,50	152,0
777b	14,0	7,36	2,20	128
115a	15,4	7,1	2,70	150,0
115b	13,8	7,3	2,10	150
375a	14,5	7,76	2,45	167,5
375b	14,9	7,5	2,55	167,5
Pinot noir	15,6	6,4	1,95	189,5

Table 3. The pheonologycal spectrum of studied clonal selections

Tested	budding			blooming			At colour appearance			Full maturity			Hardvest		
	2002	2003	2004	2002	2003	2004	2002	2003	2004	2002	2003	2004	2002	2003	2004
Pinot noir	20.04	30.04	**29.04**	1.06	30.05	1.06	30.07	24.07	30.07	17.09	**07.09**	22.09	**27.09**	**17.09**	**24.09**
	medium			**medium**			**medium**			**medium-early**					
777a	**15.04**	**27.04**	**29.04**	**28.05**	**28.05**	31.05	31.07	**23.07**	**29.07**	17.09	**07.09**	22.09			
777b	17.04	28.04	30.04	**28.05**	**28.05**	1.06	**29.07**	**23.07**	**29.07**	**16.09**	**07.09**	**21.09**			
	medium-late			**medium-late**			**early**			**early**					
115a	17.04	**26.04**	**28.04**	29.05	29.05	30.05	30.07	**22.09**	**28.07**	**16.09**	**06.09**	**21.09**			
115b	18.04	**28.04**	29.04	29.05	**28.05**	**30.05**	30.07	**23.07**	**29.07**	17.09	07.09	**21.09**			
	medium			**medium -early**			**early**			**medium -early**					
375a	17.04	30.04	29.04	31.05	30.05	4.06	31.07	27.07	1.08	19.09	08.09	22.09			
375b	18.04	1.05	30.04	29.05	1.06	5.06	**29.07**	28.07	3.08	19.09	09.09	22.09			
	medium			**medium**			**medium**			**medium**					

Table 4. The fertility and the productivity of studied experimental varieties

Experimental varieties		SO $_{4-5}$	3309-$_{111}$	10 (buds/m^2)	13 (buds/m^2)	16 (buds/m^2)
buds/vines percent	777	84.70 a	83.17 *b*	85.70 a	83.55 b	82.55 *b*
	115	84.60 a	86.90 a	84.10 a	85.70 ab	87.45 a
	375	87.20 a	88.09 a	86.55 a	88.90 a	87.45 a
	Pinot noir	85.60 a	86.00 *ab*	85.45 a	86.00 *ab*	85.95 a
percentage of offshoots	777	73.17 *ab*	73.23 *b*	79.00 a	71.55 *b*	69.05 a
	115	71.17 *b*	74.30 *ab*	76.70 a	68.70 *b*	72.80 a
	375	79.90 a	82.30 a	87.35 a	83.30 a	72.65 a
	Pinot noir	74.80 *ab*	76.60 *ab*	80.95 a	74.55 *b*	71.60 a
coefficient of fertility	777	1.32 a	1.30 a	1.39 a	1.22 a	1.32 a
	115	1.27 a	1.27 a	1.22 a	1.28 a	1.32 a
	375	1.34 a	1.32 a	1.35 a	1.24 a	1.39 a
	Pinot noir	1.31 a	1.30 a	1.32 a	1.25 a	1.35 a
number of grapes/vine	777	22.03 a	22.43 a	20.30 *b*	21.60 *b*	24.80 *b*
	115	23.00 a	23.33 a	19.10 *b*	22.70 *b*	27.70 a
	375	24.40 a	27.33 a	23.25 a	27.85 a	26.50 *ab*
	Pinot noir	23.13 a	24.40 a	20.90 *ab*	24.05 *b*	26.35 *ab*
average weight of a grape	777	85.79 a	89.95 a	89.47 a	88.78 *ab*	85.36 a
	115	86.32 a	88.76 *ab*	91.66 a	93.25 a	77.73 *b*
	375	86.36 a	84.80 *b*	86.67 a	84.78 *b*	85.29 a
	Pinot noir	85.99 a	87.76 *ab*	89.27 a	88.93 *ab*	82.43 *ab*
weight of 100 grapes	777	113.50 *b*	118.33 a	112.00 *b*	116.40 *ab*	119.35 a
	115	109.97 *c*	111.27 *b*	111.20 *b*	107.75 *c*	112.90 *b*
	375	116.97 a	117.40 a	115.00 a	117.40 a	119.15 a
	Pinot noir	113.50 *b*	115.70 a	112.85 *b*	113.90 *b*	117.15a

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RESEARCH ON THE INFLUENCE OF THE TYPES OF PRUNING AND OF THE BUD LOADS ON THE GROWTH AND ON THE FRUCTIFICATION OF GRAPEVINE

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ABSTRACT

This paper reports the results concerning the influence of the types of pruning and of the bud loads on the vigour of the vine, on the grape yield and on the quality of the cultivar Fetească regală during 2003-2005.
The experimental data prove a differentiate influence of the type of pruning and the bud loads, especially on the vigour of the vine and on the grape yield. The highest influence on the accumulation of sugar in the grape was that of the experimental years while the type of pruning and the bud loads had an insignificant influence.

INTRODUCTION

The annual pruning of the grapevine aims, along with the preservation in time of the shape of grapevine, at reaching equilibrium between the growth vigor and the yield, by maximizing quality.

The maximizing of the quality of the grapes yield represents a major objective of the current viticulture; nowadays the phrase “the quality of wine originates in the vineyard” is more and more common.

The choice of the type of pruning and of the bud load is based on the characteristics of the grapevine variety, on the pedo-climatic factors, on the row direction, planting distance, rootstock, climatic accidents (Hidalgo, 2002; Fregoni, 2005).

The worldwide viticulture uses various types of pruning and bud loads, adjusted to various culture conditions, grapevine varieties and yield objectives (Palliotti and Cartechini, 2002; Baeza et al., 2005; Kliewer and Dokoozlian, 2005; Şerdinescu et al., 2006; Vásquez et al., 2006).

MATERIALS AND METHODS

The experiment was conducted during 2003-2005 on a 9 year plantation with the cultivar Fetească regală, 21 Bl clone, grafted on the rootstock Kober 5 BB, with a planting distance of 2.2/1.2 m. The plantation is in Bucharest (N 44^0 25', E 26^0), University of Agronomical Sciences and Veterinary Medicine, Department of Viticulture and Enology.

There have been used four types of pruning (multiple Guyot; Guyot with periodically replaced arms; Cazenave cordon and spur-pruned cordon) and 3 bud loads (10, 15 and 20 buds/sq. m).

The performed measuring had in view the quantity of one year old wood eliminated by pruning, the fruit yield and the sugars concentration upon the harvesting of grapes.

The purpose of the research was to optimize the pruning and the bud loads to ensure the maximum quality of the grape yield.

RESULTS AND DISCUSSIONS

The applied types of pruning and bud loads influenced differently the vigour of the vines, the grape yield and its quality.

The vegetative vigour of the vine has been valuated by means of the 1 year old wood quantity eliminated by pruning. Analyzing the variation of the influence of the types of pruning on the quantity of wood eliminated by pruning (table 1) slight differences are found as compared to the control represented by the experience average, insignificant, except the Guyot type of pruning with periodically replaced arms, in 2003, which generated a significant decrease of vigour. Both in 2004 and in 2005, the multiple Guyot pruning determined a significantly distinct plus of vigour. In 2005, a significant decrease of vigour was determined on the Cazenave cordon.

Significant differences between the quantities of wood eliminated by pruning are found as well during the experiment years. Thus, in 2004 and especially in 2005 there have been the highest quantities of wood eliminated by pruning, and this was due, in principal, to the state of water supply of the soil during the vegetation period.

Concerning the influence of the bud loads attributed upon pruning on the vines vigour valuated based on the wood eliminated by pruning (table 2), a growth is found, at the same time with the growth of the load. For a 10 buds/sq. m. load (in 2003 and 2004), a lower quantity of wood has been eliminated, as compared to the experience average, the difference being significant. For a 20 buds/sq. m. a significant plus of vigour resulted, both in 2003 and in 2004.

Analyzing the variation of the influence of the types of pruning on the grape yield (table 3), there has been found great difference from one type of pruning to the other. Thus, in 2003, significant production minuses have been recorded, as compared to the control, for multiple Guyot, Guyot on demi-high stem and distinctly significant for Guyot with periodically renewed arms. In the same year, the spur-pruned cordon provided a very significant plus of production.

In 2004, the lowest production was obtained for the multiple Guyot (3.14 kg/vine), the difference being significantly negative as compared to the control, the same situation being recorded for the spur-pruned cordon. For the Guyot with periodically renewed arms the highest grapes productions was recorded (3.06 kg/vine), the statistics showing a very significant plus as compared to the control.

Concerning the influence of the bud load on the grape yield (table 4), the highest values were ensured for 20 buds/sq. m (the differences being significantly positive in 2003 and 2005). On the contrary, for the 10 buds/sq. m load, the differences were, statistically, very significantly negative in 2003 and 2005, and 2004 distinctly significantly negative as compared to the control.

The sugars concentration in the must at the harvesting of grapes was slightly influenced by the types of pruning and by the bud loads attributed by pruning (tables 5 and 6). A lower accumulation of sugars has been found with the spur-pruned cordon in 2003, this being determined by the high grape yields (4.82 kg/vine), and the differences being distinctly significantly negative.

Very high differences concerning the accumulation of sugars are found year by year; thus, in 2003 – a very dry year, with rich heliotermic resources, there have been recorded sugar concentrations rarely seen with the cultivar Fetească regală (210 g/l), while in 2004 (a year rich in precipitations and with lower heliotermic resources) there have been accumulated only 163.4 g/l sugars.

Therefore, it results that the highest differences concerning the sugars accumulations are provided by the conditions of the experimental year, and the lowest by the types of pruning and the bud loads.

CONCLUSIONS

1. Choosing the types of pruning and a balanced bud load is an important condition in achieving a quality grape yield.
2. The sugar content does not vary significantly depending on the type of pruning and on the bud load. High differences concerning the sugars accumulation in the must upon the harvesting of grapes are found during the experimental years.
3. Attributing moderate bud loads upon pruning (15 buds/sq. m) determined the highest sugars accumulations.

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Table 1. The influence of type of pruning on pruning weight (kg/vine, 2003-2005)

Type of pruning	2003			2004			2005		
	Pruning weight (kg/vine)	Difference (kg/vine)	Significance	Pruning weight (kg/vine)	Difference (kg/vine)	Significance	Pruning weight (kg/vine)	Difference (kg/vine)	Significance
Multiple Guyot	1,25	0,21	-	1,72	0,47	**	1,85	0,47	**
Guyot with periodically renewed arms	0,79	-0,25	0	1,00	-0,25	-	1,44	0,06	-
Guyot on demi-high stem	1,14	0,10	-	1,13	-0,12	-	1,27	-0,11	-
Cazenave Cordon	0,93	-0,11	-	1,09	-0,16	-	1,10	-0,28	0
Spur-pruned cordon	1,09	0,05	-	1,30	0,05	-	1,25	-0,13	-
Average	1,04	0,00	Control	1,25	0,00	Control	1,38	0,00	Control

2003	2004	2005
DL 5% = 0,22	DL 5% = 0,25	DL 5% = 0,26
DL 1% = 0,32	DL 1% = 0,37	DL 1% = 0,39
DL 0,1% = 0,48	DL 0,1% = 0,56	DL 0,1% = 0,58

Table 2. The influence of bud load on pruning weight (kg/vine, 2003-2005)

Bud load	2003			2004			2005		
	Pruning weight (kg/vine)	Difference (kg/vine)	Significance	Pruning weight (kg/vine)	Difference (kg/vine)	Significance	Pruning weight (kg/vine)	Difference (kg/vine)	Significance
10 buds/m^2	0,75	-0,30	0	1,01	-0,24	0	1,14	-0,25	-
15 buds/m^2	1,04	-0,01	-	1,19	-0,06	-	1,44	0,05	-
20 buds/m^2	1,35	0,30	*	1,54	0,29	*	1,58	0,19	-
Average	1,05	0,00	Control	1,25	0,00	Control	1,39	0,00	Control

2003	2004	2005
DL 5% = 0,22	DL 5% = 0,22	DL 5% = 0,26
DL 1% = 0,36	DL 1% = 0,37	DL 1% = 0,43
DL 0,1% = 0,68	DL 0,1% = 0,69	DL 0,1% = 0,81

Table 3. The influence of the type of pruning on grapes' yield (kg/vine, 2003-2005)

Type of pruning	2003			2004			2005		
	Yield (kg/vine)	Difference (kg/vine)	Significance	Yield (kg/vine)	Difference (kg/vine)	Significance	Yield (kg/vine)	Difference (kg/vine)	Significance
Multiple Guyot	2,69	-0,57	000	3,14	-0,57	000	2,60	0,32	**
Guyot with periodically renewed arms	2,92	-0,34	00	4,35	0,65	***	3,06	0,78	***
Guyot on demi-high stem	2,51	-0,75	000	3,73	0,02	-	2,88	0,60	***
Cazenave Cordon	3,38	0,12	-	3,61	-0,10	-	1,37	-0,91	000
Spur-pruned cordon	4,82	1,56	***	3,71	-0,00	-	1,47	-0,81	000
Average	3,26	0,00	Control	3,71	0,00	Control	2,28	0,00	Control

2003	2004	2005
DL 5% = 0,21	DL 5% = 0,22	DL 5% = 0,22
DL 1% = 0,30	DL 1% = 0,33	DL 1% = 0,32
DL 0,1% = 0,46	DL 0,1% = 0,49	DL 0,1% = 0,49

Table 4. The influence of bud load on grapes' yield (kg/vine, 2003-2005)

Bud load	2003			2004			2005		
	Yield (kg/vine)	Difference (kg/vine)	Significance	Yield (kg/vine)	Difference (kg/vine)	Significance	Yield (kg/vine)	Difference (kg/vine)	Significance
10 buds/m^2	2,13	-1,14	000	3,40	-0,31	0	2,29	0,01	-
15 buds/m^2	3,57	0,31	-	3,85	0,14	-	2,17	-0,11	-
20 buds/m^2	4,10	0,83	**	3,87	0,16	-	2,39	0.11	-
Average	3,27	0,00	Control	3,71	0,00	Control	2,28	0,00	Control

2003	2004	2005
DL 5% = 0,33	DL 5% = 0,28	DL 5% = 0,31
DL 1% = 0,55	DL 1% = 0,46	DL 1% = 0,52
DL 0,1% = 1,04	DL 0,1% = 0,86	DL 0,1% = 0,98

Table 5. The influence of the type of pruning on sugar accumulation (g/l, 2003-2005)

Type of pruning	2003			2004			2005		
	Sugar (g/l)	Difference (g/l)	Significance	Sugar (g/l)	Difference (g/l)	Significance	Sugar (g/l)	Difference (g/l)	Significance
Multiple Guyot	213,80	3,5	-	171,5	8,1	*	175,00	4,02	-
Guyot with periodically renewed arms	214,80	4,5	-	163,2	-0,2	-	170,50	-0,48	-
Guyot on demi-high stem	215,60	5,3	-	161,3	-2,1	-	165,30	-5,68	-
Cazenave Cordon	210,10	-0,2	-	159,1	4,3	-	170,70	-0,28	-
Spur-pruned cordon	197,20	-13,1	00	161,9	-1,5	-	173,40	2,42	-
Average	210,30	0,00	Control	163,4	0,00	Control	170,98	0,00	Control

2003	2004	2005
DL 5% = 6,59	DL 5% = 5,96	DL 5% = 7,14
DL 1% = 9,60	DL 1% = 8,68	DL 1% = 10,39
DL 0,1% = 14,38	DL 0,1% = 13,00	DL 0,1% = 15,57

Table 6. The influence of bud load on sugar accumulation (g/l, 2003-2005)

Bud load	2003			2004			2005		
	Sugar (g/l)	Difference (g/l)	Significance	Sugar (g/l)	Difference (g/l)	Significance	Sugar (g/l)	Difference (g/l)	Significance
10 buds/m^2	207,60	-2,70	-	161,10	-2,30	-	172,50	1,50	-
15 buds/m^2	211,70	1,40	-	166,60	3,20	-	169,80	-1,20	-
20 buds/m^2	211,60	1,30	-	162,50	-0,90	-	170,70	-0,30	-
Average	210,30	0,00	Control	163,40	0,00	Control	171,00	0,00	Control

2003	2004	2005
DL 5% = 7,64	DL 5% = 5,06	DL 5% = 6,24
DL 1% = 12,65	DL 1% = 8,38	DL 1% = 10,33
DL 0,1% = 23,68	DL 0,1% = 15,69	DL 0,1% = 19,34

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INFLUENCE OF THE PRUNING ON THE VEGETATIVE AND REPRODUCTIVE BALANCE OF GRAPEVINE

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Keywords: grapevine, pruning, equilibrium, growth, yield

ABSTRACT

In view of determining the equilibrium between growth and fructification, 3 indicators resulted from an experiment with 5 types of pruning and 3 bud loads on the cultivar "Fetească regală" have been used: the ratio grape yield / pruning weight, the growth-yield balance index, as well as the leaf area necessary to obtain a gram of fruit.
The highest sugars accumulations have been recorded for values of 1,5 – 4,0 for the grape yield / pruning weight ratio, for values of 25 – 50 for the growth-yield balance index, as well as for the leaf areas of 8 – 18 sq. cm per gram of fruit.

INTRODUCTION

Reaching equilibrium between the grapevine growing and fructification processes is a major desiderate of the current viticulture aiming at a high quality.

The equilibrium between the vine growing and fructification is ensured not only by the favorable climatic conditions, grapevine variety, rootstock, planting distances, but as well by the type of pruning, bud load, green pruning, fertilization, irrigation etc. (Maccarone and Scienza, 1996; Petrie et al., 2006; Howell, 2001; Burzo et al., 2005; Irimia, 2006; Ion, 2006; Şerdinescu et al., 2006).

The term "equilibrium", which has become more and more common in viticulture, is used when the vegetative growth and the yield, on the one hand, and the fruit yield and their quality, on the other hand, are in equilibrium.

Although the Ravaz index has been known for a long while, at present it is gaining in importance when it is observed in choosing the field, the grapevine variety and the rootstock, as well as the cultural practices in view of reaching a consistent and quality yield (Howell, 2001).

In order to ensure the vines equilibrium, a series of factors shall be taken into account: the vine is a perennial plant, so that the influence of the cultural techniques used in a year can be felt several years later; in vine growing regions with a cold climate there are great fluctuations of the climatic conditions from one year to another; sometimes bud overloads can result in negative consequences for the quality of the yield or for the cane maturation.

The objective of this study was to determine the variation interval for the relation "yield/pruning weight", for the growth-yield balance index, as well as for the relation "square cm leaf area/gram of fruit" for the cultivar "Fetească regală" and to determine the values compatible with maximum sugars accumulations.

MATERIALS AND METHODS

Research have been carried out during 2003-2005 on the plantation of the Viticulture and Enology Department within the University of Agronomic Sciences and Veterinary Medicine, Bucharest, set up in 1994 with the cultivar "Fetească regală", 21 Bl clone, grafted on Kober 5 BB, with a planting distance of 2,2 / 1,2 m.

We have performed a bifactorial experiment with 5 types of pruning (multiple Guyot; Guyot with periodically renewed arms; Guyot on a demi-high stem; Cazenave cordon; spur-pruned cordon and 3 bud loads – 10, 15 and 20 buds/sq. m).

The observations and the measuring specify the growth vigour of the vines assessed based on the quantity of one year old wood eliminated by pruning (kg/vine), grape yield (kg/vine), total leaf area of the vine (sq. m/vine) and sugars accumulation in grapes (g/l).

The following indices for the determination of the growth and fructification equilibrium have been used:

- Ravaz index, witch represents the ratio between the grape yield and the pruning weight;

- the growth-yield balance index (GYBI), according to Maccarone and Scienza, (1996). This index represents the ratio between the pruning weight × 100 / grape yield + "pruning weight", expressed in kg/vine and shows the percent contribution of the vegetative part in the total yield;

- the leaf area necessary for a gram of fruit (sq. cm/g), by relating the total leaf area to the grape yield.

The resulted data have been used to determine a series of correlations between these indicators and the content of sugars in the grapes.

RESULTS AND DISCUSSIONS

The ratio between the grape yield and the pruning weight (Ravaz index) varies during the experiment period from 1,0 to 6. Between the values of this ratio and the sugars accumulation in grapes upon the harvesting of grapes negative linear correlations have been determined; as this ratio increases, a lower sugars accumulation has been found (fig. 1, 2 and 3).

The growth-yield balance index recorded values between 16 and 53. Correlating the values of this index with the sugars accumulation in grapes, positive linear correlations have been determined, as shown in figure 4 and 5, for correlation coefficients significantly distinct.

It has been found as well that the yield of the leaf area in "sq. cm leaf area/fruit gram" accounts for the differences in sugars accumulations of various types of pruning and bud loads. The values of this ratio, during the three years of experiments, were between 3 and 25 sq. cm/g. figures 6, 7 and 8 show an optimum leaf area productivity between 8 and 18 sq. cm/g.

CONCLUSIONS

1. From the experiment with the 5 types of pruning and the 3 bud loads many values of the "yield/pruning weight" parameters resulted, the index for the growth-yield balance and for the leaf area necessary to obtain a gram of fruit (sq. cm/g), as indices of the equilibrium between the growing and the fructification process.
2. For the cultivar "Fetească regală", this equilibrium can be accounted for values of the ratio "yield/pruning weight" between 1,5 and 4,0 (in 2003 and 2004) and between 1,0 and 1,5 (in 2005).

3. The optimum values of the vegetative and productive equilibrium index are between 25 and 50.
4. A leaf area between 8 and 18 sq. cm/g of fruit is compatible with maximum sugars accumulations in fruits upon the harvesting of grapes.

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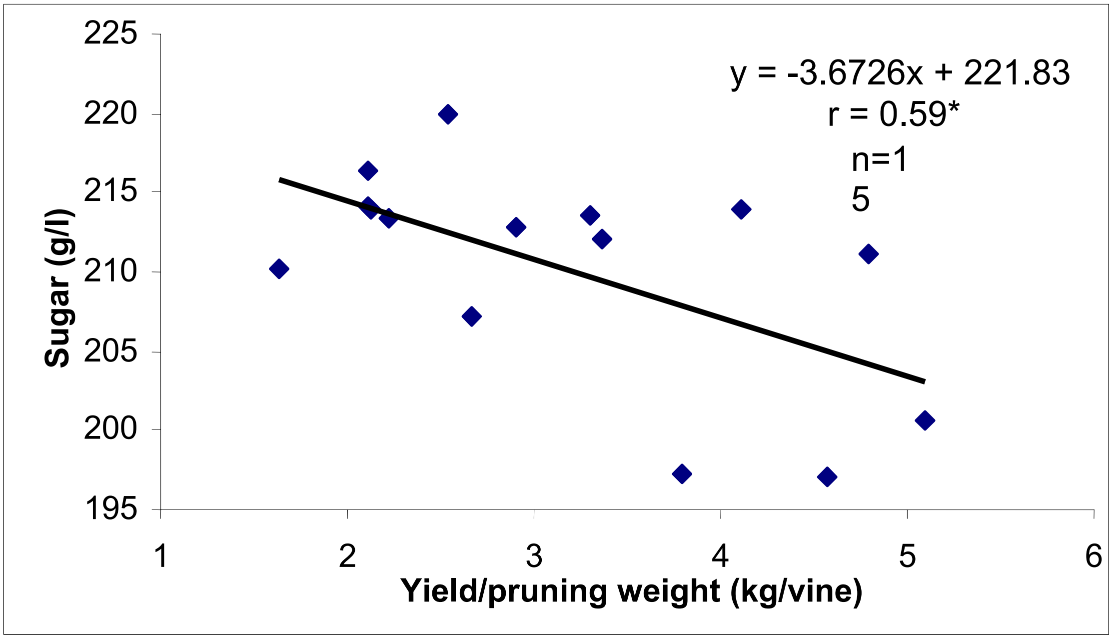

Fig. 1 – Correlation between „yield/pruning weight” ratio and sugar concentration in fruit (2003)

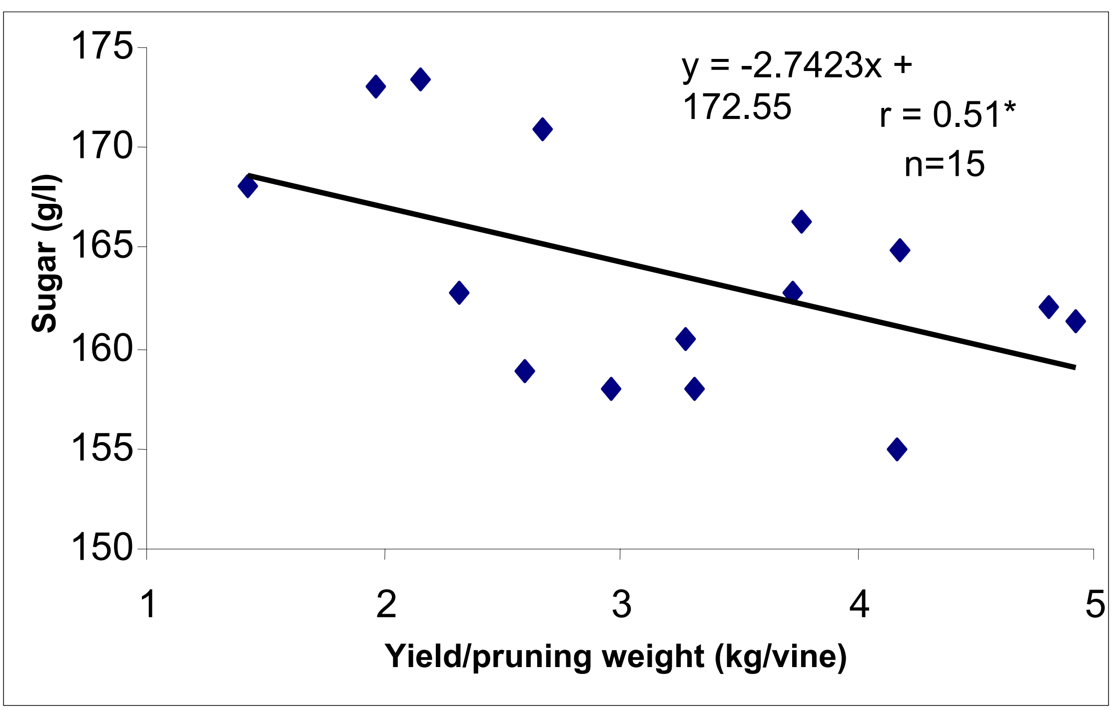

Fig. 2 – Correlation between „yield/pruning weight” ratio and sugar concentration in fruit (2004)

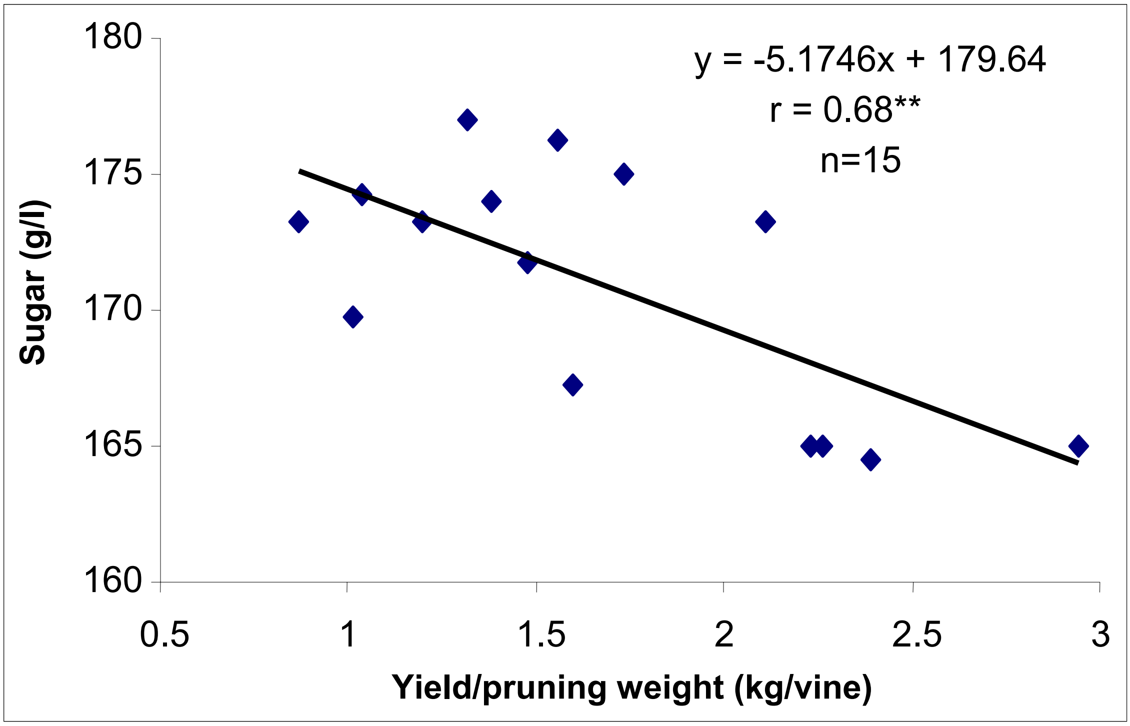

Fig. 3 – Correlation between „yield/pruning weight" ratio and sugar concentration in fruit (2005)

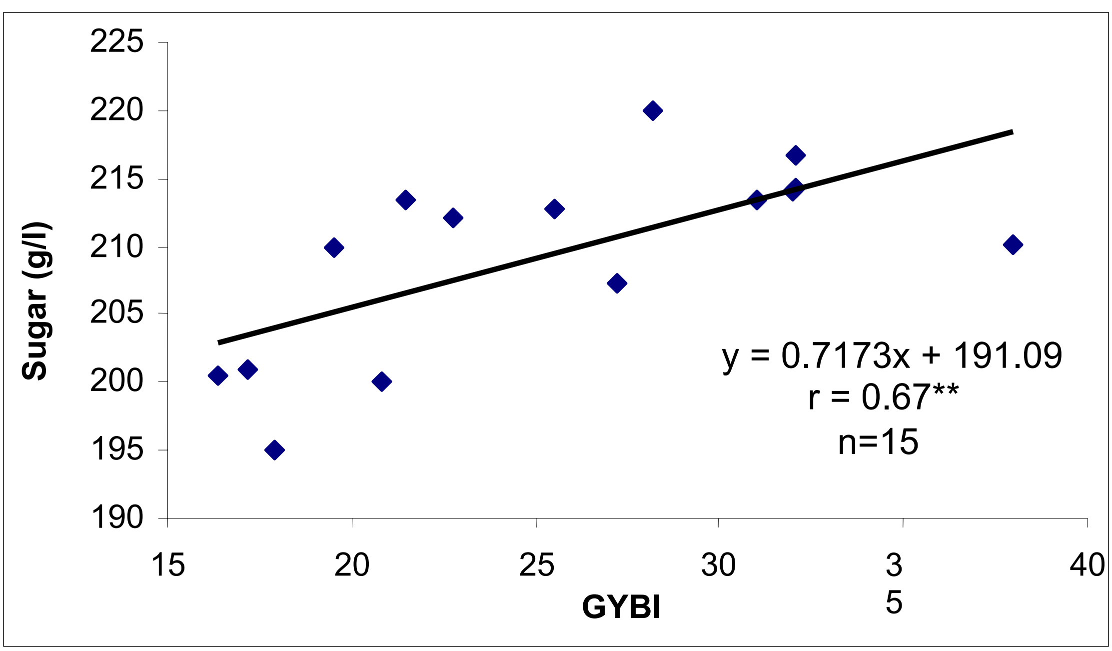

Fig. 4 – Correlation between vine's „growth-yield balance index" (GYBI) and sugar accumulation in fruit (2003)

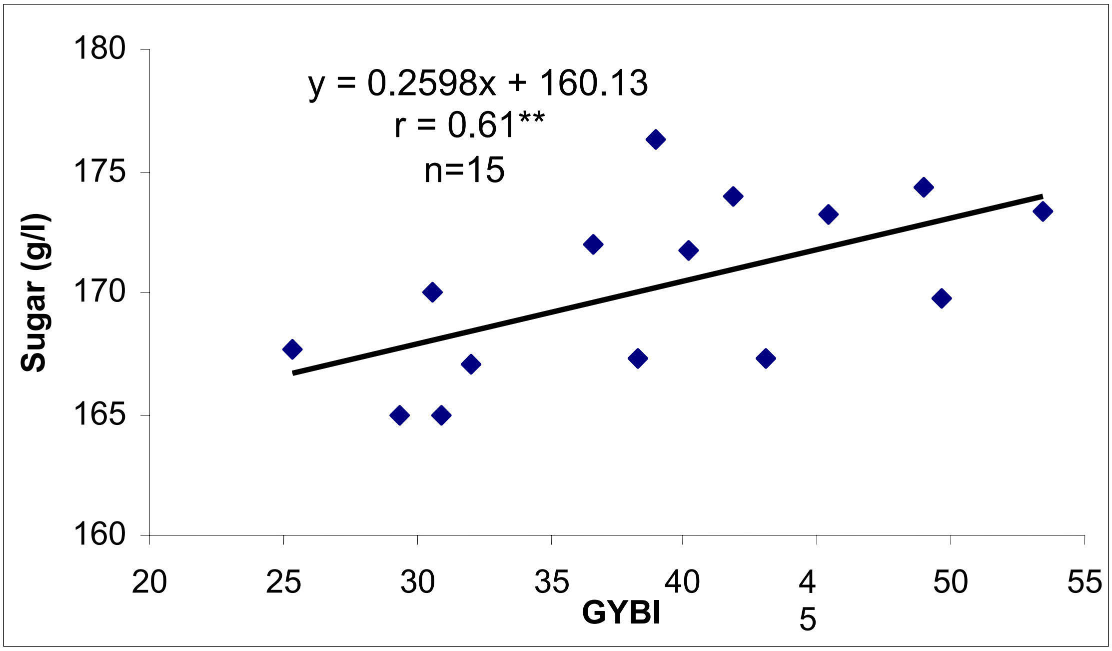

Fig. 5 – Correlation between vine's „growth-yield balance index" (GYBI) and sugar accumulation in fruit (2005)

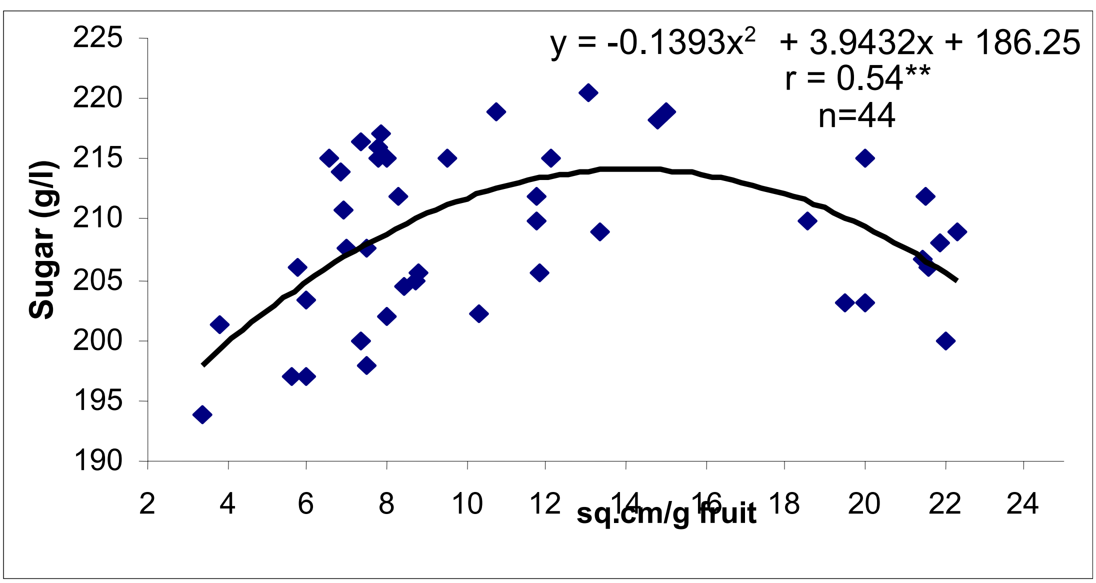

Fig. 6 – Correlation between sq.cm leaf area/g fruit and the sugar accumulation (g/l) in the fruit (2003)

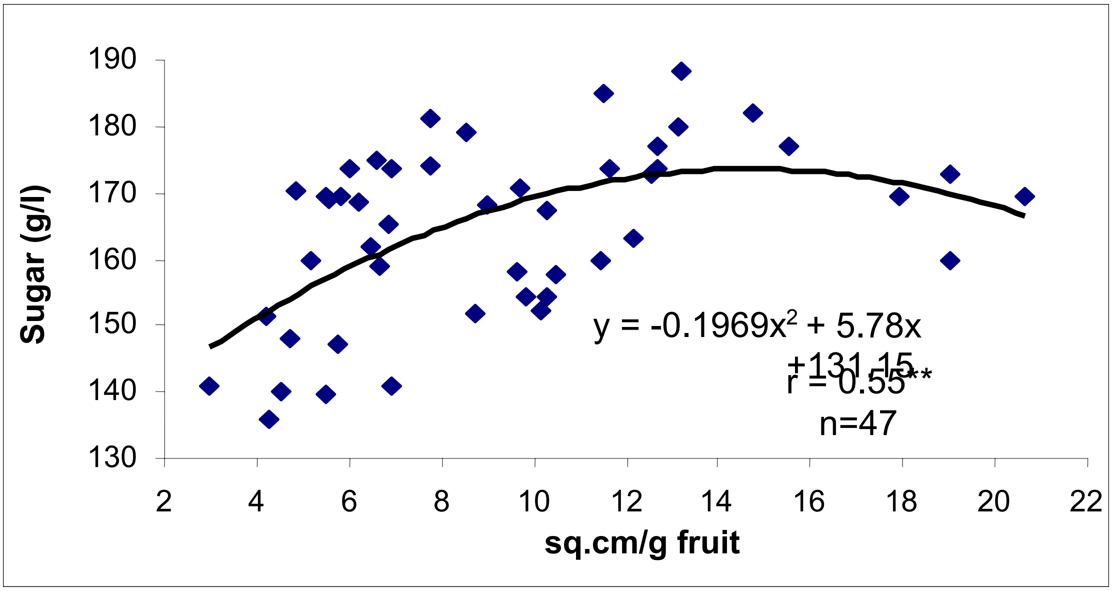

Fig. 7 – Correlation between sq.cm leaf area/g fruit and the sugar accumulation (g/l) in the fruit (2004)

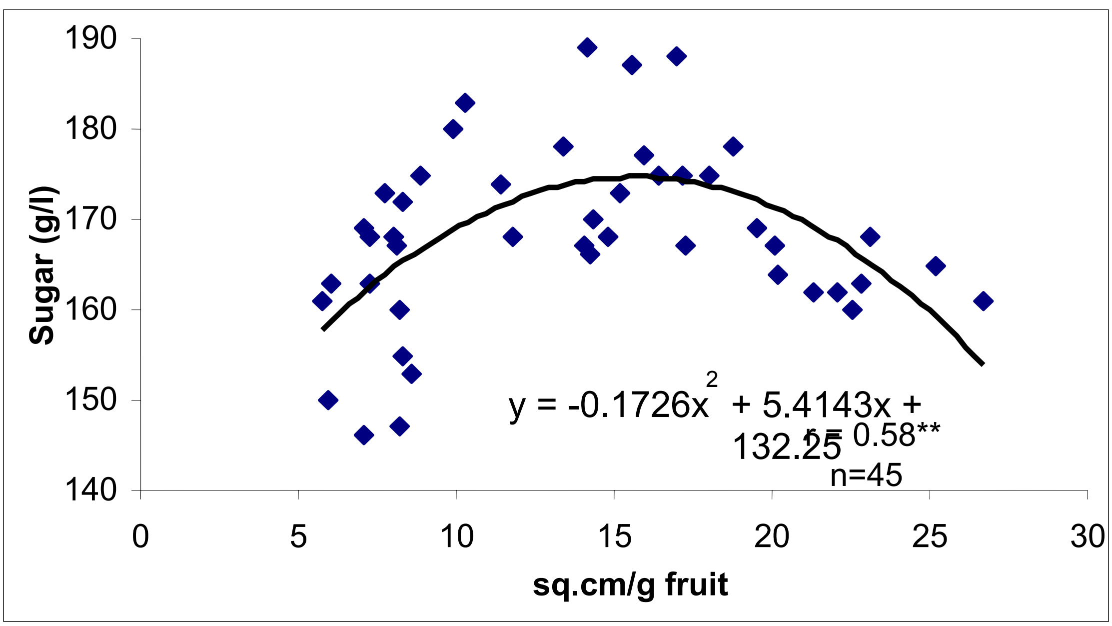

Fig. 8 – Correlation between sq.cm leaf area/g fruit and the sugar accumulation (g/l) in the fruit (2005)

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BEHAVIOUR OF MAMAIA APRICOT VARIETY GRAFTED ON THREE SOILS TYPES IN THE NEDEIA – BISTRETU AREA

BÂNDEA Flavius-Nistor, VOICULESCU Nicolae

INTRODUCTION

At the beginning of the 60` of the past century in our country a full program has been developed at the national level for drainage of some lakes and swamps located near the major rivers. The programme had as goal the extension of agriculture on some impracticable lands, fact called „the development of the socialist agriculture” The most important part of this program was applied on the Danube riverside. Accordingly, in a few years hundreds of thousand hectares of underwater lands were transformed in agricultural field. This huge investment was intended to dam and drain some of the bottoms of the lakes.

The resulting lands were used afterwards for agriculture, either for growing cereal crops as it was the case of Greaca region, or for fruit trees growing as in the cases of the bottom of the lakes in Potelu – Corabia and Nedeia – Bistreţu regions.

In the years immediately after the drainage the yield of the crops reached record levels, fact that seemed to prove that the application of the drainage program was well justified. However, gradually, the crop yields started to decrease, being much under the average harvest obtained in some other fields from around the country.

For the fruit tree growing the situation was even much complicated, since in the beginning, when the plantations were young, the trees seemed to developed normally, while in the following years, withering phenomena started to appear, first sporadically (in individual trees) and then in groups of trees. the beginning of the fructification period appeared the fading process first on a few fruit trees afterwards extended on entire areas from the plantations. In the same time, the fruits obtained from such plantations were more and more of low quality. In time the surfaces covered with non – productive plantations alarmingly grew. The specialists started to think that the soil conditions were not appropriate for fruit growing trees.

For this reason the motivation to investigate more these soils became high and ample eco-pedological studies were started, in a tentative to identify and explain the causes of this phenomena.

MATERIALS AND METHODS

A study of the soil-plant relationship has been performed on the Mamaia apricot variety grafted on wild apricot of 22-23 years of age, cultivated on three different types of soil: psamosoil mollic– SRCS (Mollic Arenosols – WRB – SR, Psammentic Hapludolls – USDA - ST) low alkaline, psamosoil gleyic – SRCS (Endogleyic Arenosols – WRB SR, Endoaquic Udipsamments – USDA – ST) and Entiantrosoil mixic low alkaline (Anthropic Regosols – WRB – SR)

The research methodology of the soil-plant-climate relationship includes two different phases, one on the field and another in the laboratory/office.

In the field phase the applied working methodology was the one specific for this type of research, but improved and updated while the studies were advancing. In the laboratory phase, for the processing of the biometrical values and for the radicular system parameters a methodology developed by the authors was applied along with an already established I.C.P.A. methodology.

Sampling. The soil sampling was performed in the normal structure for physical tests and in a mixed structure for chemical tests. For the sampling of soil and for the study of the radicular system the Oskamp-Dragavțev method modified by Voiculescu has been applied. The soil profiles were done under the main branch and in the case of fruit trees planted on versants downhill. The dimension of the flat wall of the profile was 120 x 120 cm, this been directed toward the tree trunk at 1 m distance.

The recording of the observations made on the radicular system is done in a schematic form that includes a grid drawn on the studied profile wall. In the soil file description of the soil is includes the succession of horizons, the thickness of layer and its colour both in real terms and in Munsell symbols.

In the office phase the results obtained in the filed phase were processed and some specific numerical indicators were proposed in order to describe the soil-fruit tree relationship, highly recommended for being used in this specifies field of research.

Radicular frequency (F.R.) – represents the number of roots or the sum of roots, calculated on depth layers, from 10 to 10 cm on the soil profile, up to 100 cm depth.

The surface of radicular section (S.S.R.) – it is a synthetic indicator that quantifies the number of roots and their branching capacity. The surface of radicular section it's express in mm^2 and it is calculated on depth layers, from 10 to 10 cm on the soil profile, up to 100 cm depth.

The trunk of real age (T.V.R.) - was used with good results for the characterization of the plantations and fast assessment of the productive potential of orchards based on the trunk measurement done in the plantation.

The conventional age trunk *(T.V.C.)* – is another biometrical indicator used in correlation with soil proprieties. This biometrical indicator is calculated by sorting in ascending order the trunk thicknesses of several fruit trees of predetermined and predefined ages and by using the values of the annual growth rate in the specific eco-pedological conditions (optimum, moderate or critical).

By laboratory analysis the content of various macro- and micro- elements and the pH of soil layers were determinate. Morover, several physical characteristics of soils were determinate, among which the aeration porosity, the content in colloidal clay and the resistance at penetration.

RESULTS AND DISCUSSIONS

The granule distribution analysis of this soils shows that the fine sand represents over 70% and that the clay content of less than 2 μ is between 5,1 and 14,9%. The soil composition consists of 3–4 types of clay such as smectit, illite, chlorite and kaolinite. In case that the organic fraction in the soil is insignificant, that is the humus content is only about 0,33 – 1,45%), the capacity of water exchange should rely on the mineral fraction. Obviously, the components of the studied soils varied from one to another. According to our studies it turns out that better conditions for vegetation correspond to a type of soil with clay composition of 5,5 – 7,8 %, consisting of clay types other than chlorite and with the preponderance of the smectit in a proportion of at least 51%, the later being the clay with the highest exchangeable capacity.

Another condition that influences the exchange absorption processes of the mineral elements of the soil is the soil reaction (pH). The optimal values of pH for the apricot culture is between 7,3 – 8,4.

From the data reported in diagrams 1, 2 and 3 it could be seen that these soils have medium to excessive content of iron (3-84 ppm), other data reveal a low content of zinc and a medium to excessive of copper (1-8 ppm).

Due to the ionic antagonism Ca/Na and to their buffer effect conditions for relative good vegetation are created on the psamosoil mollic low alkaline, provided to the maximum values of Na are 10.8 % coming from the T horizon (of 80 cm depth) and those of to $CaCO_3$ are 4-19 %.

At the radicular system level the observed effect is the death of the roots in a proportion of 10 – 20% (Fig 1, 2, and 3). On the entiantrosoil mixic low alkaline, at the same soil depth, the percentage of Na from T horizon had a maximum value of only 6.4, but in spite of its and $CaCO_3$ lower content that lead to a buffer effect of 3.8 – 7.4%, the effect in the radicular system was that all the roots of the fruit trees withered and died.

Because of the excessive aeration on the psamosoil mollic low alkaline the vegetation conditions are relatively better, while the iron content is about 3-4 ppm and also the manganese contents is only about 1–5 ppm. On the entiantrosoil mixic low alkaline on which the fruit trees are dying, the iron content it also about 3 – 4 ppm, but manganese level reaches 17-15 ppm, having an intoxication effect on the roots.

In Table 1 there are reported the biometrical indicators of the radicular system.of the fruit trees describing the conditions for vegetation.

CONCLUSIONS

Analysis from the point of view of the mineral composition reflects that on soils containing the four types of clay smectite, illite, chlorite and kaolinite the most inappropriate soil for fruit tree growing is the one containing high concentration of smectite (about 47%) and also when the chlorite content is high.

The aeration and water circulation inside the soil varieties largely in accordance with the soil type. Our study shows that conditions for relatively better vegetation are correlated with the values of the porosity of aeration that varies between 34 and 36%. A lower value for porosity aeration, between 23 and 30%, associated with the Entiantrosoil mixic low alkaline leads to the death of the fruit trees.

The determined optimum values for the apricot culture on these soils are 23-30% aeration.

By analyzing the variation of the pH values on the three studied types of soil it was determined that in all cases the pH values of 5.8 to 9.0 are beyond the optimum range.

Another factor that leads to the death of fruit trees is the unbalance between the microelements from soil. The excesses of these microelements lead in time to the debilitation of the fruit trees. This phenomenon is observed at a low content in zinc (0 – 1 ppm), a medium to excessive content of iron and copper (1 – 8 ppm), along with an extreme variation of both on the profile and from soil to soil.

The characteristics of soils of Nedeia – Bistretu region, Dolj County, directly limit the growth and normal development, as well as the yield, of the apricot fruit trees, variety Mamaia/wild apricot.

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Table 1

The vegetation condition of the apricot fruit trees variety Mamai/savage expressed by biometrical indicators of the radicular system on the soils of Nedeia – Bistretu region, Dolj county.

Soil	**General condition**	**Radicular system Surface of the radicular section**		
		Total (mm^2)	**Live roots (%)**	**Dead roots (%)**
Psamosoil mollic low alkaline	critical	147	74	26
Psamosoil gleyic	critical	237	62	38
Entiantrosoil mixic low alkaline	dead	-	-	-

Diagram 1

Influence of soil proprieties on the radicular system of apricot variety Mamaia/wild apricot on the psamosoil mollic low alkaline of Nedeia – Bistretu region

PA (% Vol)	pH (H_2O)	Iron (ppm)		Sodium		S.R.S.D.r. (%)	Name and thickness of the horizon
		Roots	soil	roots (ppm)	Soil (% din T)		
33	8,7	2031	3	472	4,3	10,8	Am – 25 cm
32	8,9	1231	4	778	7,4	21,3	Acac – 23 cm
37	8,9	661	2	1209	10,3	19,5	Cca_1ac – 36 cm
-	8,9	2341	2	1497	14,6	92,7	Cca_2ac – 16 cm

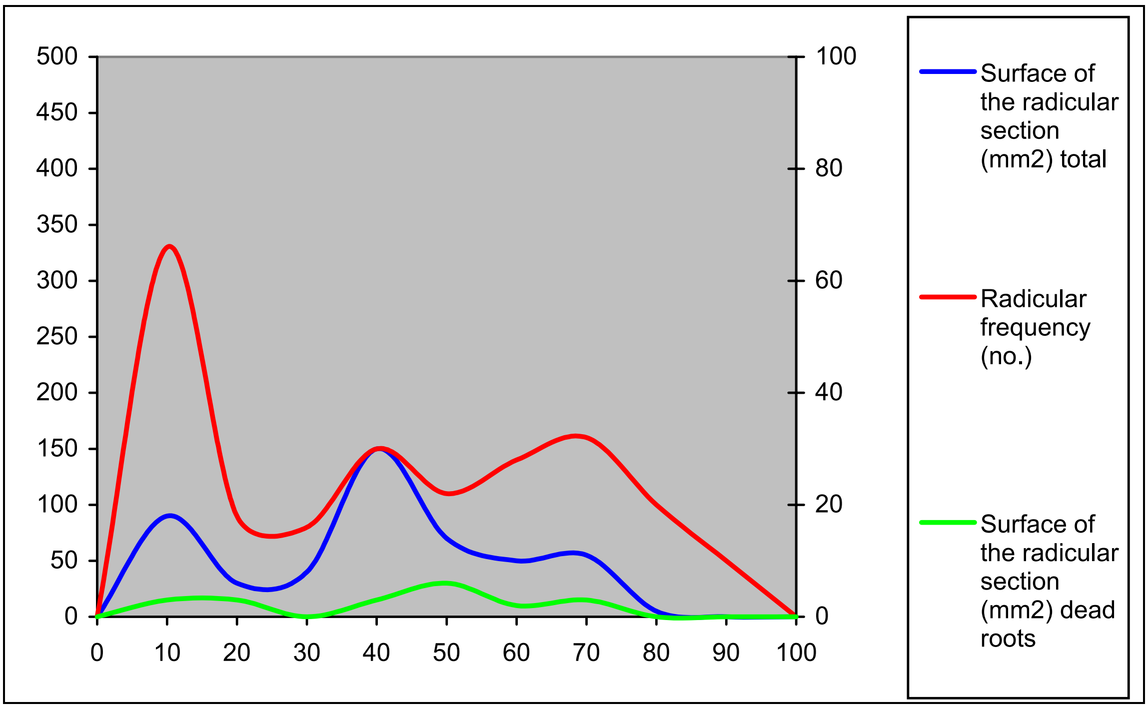


Diagram 2

Influence of soil proprieties on the radicular system of apricot variety Mamaia/wild apricot on the Entiantrosoil mixic low alkaline, of Nedeia – Bistretu region

PA (% Vol)	pH (H_2O)	Iron (ppm)		Sodium		S.R.S.D.r. (%)	Name and thickness of the horizon
		Roots	Soil	Roots (ppm)	Soil (% din T)		
38	8,8	961	12	844	6,2	42,3	Amac – 22 cm
34	8,9	443	9	1023	6,4	82,4	Acac – 18 cm
31	9,0	-	6	-	11,8	97,8	Cac – 12 cm
25	8,5	-	31	-	5,2	41,4	I – 28 cm
24	8,3	-	83	1004	1,7	100	II – 20 cm

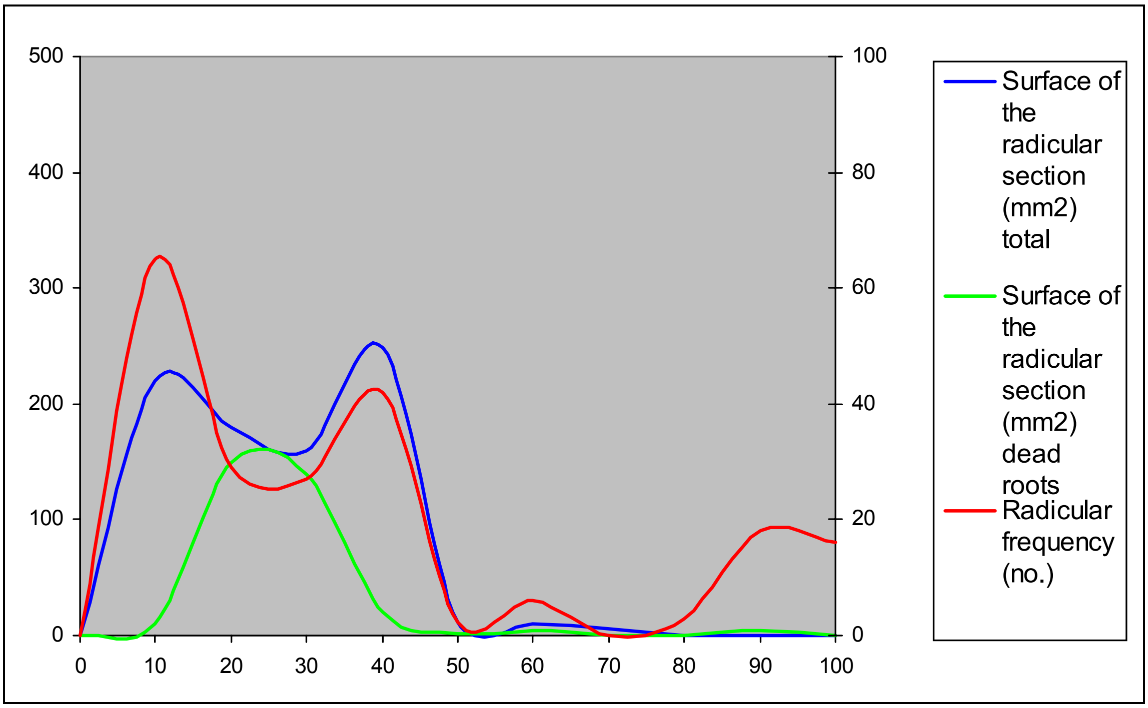
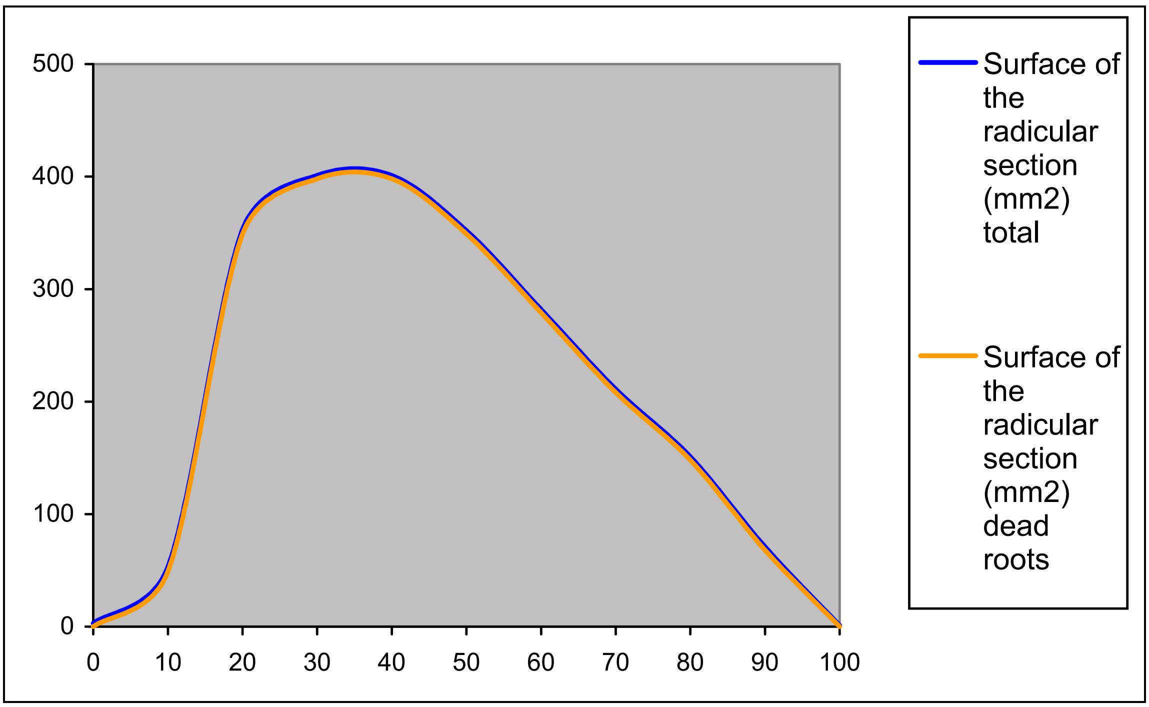


Diagram 3

Influence of soil proprieties on the radicular system of apricot variety Mamaia/wild apricot on psamosoil gleyic the of Nedeia – Bistretu region

PA (% Vol)	pH (H_2O)	Iron (ppm)	Natriu (% din T)	S.R.S.D.r. (%)	Name and thickness of the horizon
25	8,6	9	4,8	100	Ao – 19 cm
28	8,8	14	5,1	100	AC – 13 cm
22	8,9	8	6,4	100	Cac – 28 cm
24	8,5	27	3,3	100	I – 10 cm
11	8,6	39	5,9	100	II – 10 cm
-	8,8	51	4,8	100	III – 20 cm



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THE BEHAVIOUR OF SOME VARIETIES AND HYBRIDS FROM THE EXPERIMENTAL VINEYARD MURFATLAR AT THE DOWNY MILDEW, OIDIUM AND BOTRYTIS IN THE NATURAL INFECTION CONDITIONS

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Keywords: vine varieties, phitosanitary status, main diseases attacks

ABSTRACT

In the period of 2004-2005, in SCDVV Murfatlar centre was made studies on some varieties from the experimental plots and from ampelographic collection, concerning their behaviour of the downy mildew, oidium and botrytis attacks – in natural conditions of the infection. After the attack degree on the each variety and using own method for to appreciate the level of resistance and/ or sensibility, the behaviour of varieties had 6 estimation levels, as following: OR – variety or hybrid with some resistance, MR – variety or hybrid medium resistant, PR – variety or hybrid few resistant, MS – variety or hybrid medium sensible, FS – variety or hybrid very sensible. Following these classes of appreciation was obtained results concerning the behaviour of these variety or hybrid at the downy mildew, oidium and botrytis attacks. In the table group (new variety or perspective hybrids) was remarked the varieties Victoria, Azur, Silvana, Greaca, Cuzovski, Splendid, Sevka, Tamina şi Dobrogea. Concerning the resistant varieties like Brumăriu, Chamboursin, Garonnet, Dathier de Santvalier, Varousset, Roucaneuf, Perla de Zala, Seyve Vilard 18402, in the conditions of 2004-2005 years was sensible at downy mildew not only on the leafs but also on the clusters, having however a good resistance at oidium and botrytis on the clusters. Between the basic varieties of the vineyard, only varieties Riesling Italian, Sauvignon, Pinot noir and Muscat Ottonel proved some resistance at the diseases attack and the varieties Fetească neagră, Cabernet Sauvignon, Merlot, Pinot gris and Chardonnay was very and medium sensible, especially at the downy mildew attack on the leafs and clusters.

INTRODUCTION

The promotion into vineyard of the varieties with resistance at the main sisease attack is important in the context of the implementation of the integrated fight concept in viticulture.

The systematic observation made on the area and diseases evolution help directly the producers by supplying data concerning the long and short term prognosis and a correct notifying for the next treatments who must be applied ((Baniţă P. 1977; Ceami T., 2001; Ilie Elena, 2004; Filip I., Chemal M., 1976; Filip I., 1994; Filip I., Florica Guluţă, 2004, Neamţu I., 1994; Oşlobeanu M., 1980, 1991; Ranca Aurora, 2004).

In this paper are presented the results concerning the behaviour of some varieties and hybrids of the main diseases attack in the natural (strong) infection conditions of the period 2004-2005 in the Murfatlar vineyard.

MATERIAL AND METHODS

In the period 2004-2005, in SCDVV Murfatlar research centre was made observations concerning the resistance of the main diseases attack.

The observations on the downy mildew attack on leaf and clusters were made in 25-26.08 period and the oidium attack on the clusters was observed in 27-28.08 period, checking 500 organs in the 0-6 scale.

The attack of botrytis was noted before harvest with 3-4 days, using the same scale. With the obtained data was calculated the frequency (F) and intensity (I) of attack. The expression of the attack presented by calculating the degree of the attack (GA% = F x I/ 100).

Because the GA values was between 0-100, was considered suitable to use the own scale of assessment of the behaviour of varieties at the main disease attacks, as if presented: OR – variety with some resistance (0-10 GA%), MR – variety medium resistant (11-20 GA%), PR – variety few resistant (21-30 GA%), MS – variety medium sensible (31-50 GA%), FS – variety very sensible (51-100 GA).

RESULTS AND DISCUSSIONS

From the data presented in table 1, resulting that the climatic conditions of the 2004-2005 year – vegetative period (May – September) in the Murfatlar centre the average air temperature was between 15,8 ^{0}C and 24,3 ^{0}C, the atmospheric humidity between 70 and 83% and the precipitations summed 382, 5 mm from 2004 and 425,8 mm from 2005. Was registered a high number of days with dew and mist.

In these conditions, rich in precipitations and atmospheric humidity, with numerous days with dew and persistent mist the downy mildew, oidium and botrytis attack was very strong, affecting mainly the clusters.

From the analysis of results it's came out the studied varieties aren't immune at these diseases, even those from the varieties known like resistant.

The relationship between vine and diseases is in dependence of the specific features of varieties and the climatic conditions. From the specific features of varieties most important are the content in tannin, phitoalexines, antocyannes, sugar, acidity, nitogen, the plant habitus, the density of berries on the cluster, the tickness, elasticity and resistance of berry skin, the thickness of the pruine ahell (Oslobean, 1980,1991).

In the table 2 is presented the behaviour of some table varieties from the experimental plots at the main diseases attacks, in the conditions of period 2004-2005 years.

More resistant where the next varieties: Victoria, Azur, Silvana, Greaca, Cuzovski, Splendit, Sevka, Tamina, Dobrogea.

The wine varieties behaviour is presented in the table 3.

Its came out the some resistance at diseases attack are the next varieties: Mamaia, Magaraci, Blauerzweigelt and Crâmposie Selection.

In table 4 is presented the behaviour of varieties with biological resistance at the mains diseases. Very sensible at the downy mildew attack, on leafs, was the varieties: Chambourcin and Garonnet. The attack on the clusters was important at Perla de Zala and Seyve Villard 18402, the majority had some resistance at the oidium and botrytis attacks on the clusters.

Concerning the behaviour of the basis varieties from the vineyard at the mains diseases attacks it was observed a high sensibility of Feteasca neagra, for botrytis: Sauvignon and for oidium: Merlot (table 5).

CONCLUSIONS

1. The climatic conditions of period 2004-2005 at Murfatlar were favourable for the main diseases attacks: downy mildew, oidium and botrytis in natural's conditions of infections.
2. It was marked a number of varieties and perspective hybrids that are some resistance at the attacks.
3. The futures programmes for the phtosanitary treatments must keep in consideration these data.

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Tables

Table 1. The climatic conditions from vegetative period May - September 2004-2005 Murfatlar centre

Month	Year	The average temp ^{0}C	Precipitation mm	No. of raining days	The atm. humidity %	Days with dew and mist
May	2004	15,8	140,8	14	83	25
	2005	18,0	24,0	8	76	20
June	2004	21,4	65,2	7	82	16
	2005	21,9	27,2	7	77	13
July	2004	23,9	31,9	7	78	14
	2005	24,3	207,2	13	67	25
August	2004	22,8	144,0	7	72	26
	2005	24,4	24,6	6	70	12
September	2004	18,1	0,6	1	85	9
	2005	20,5	142,8	17	85	23

Table 2. The behaviour of some table varieties from the experimental plots at the main diseases attacks, in the conditions of 2004-2005 years – Murfatlar centre.

Crt. no.	Variety	Downy mildew/ leafs		Down mildew/ clusters		Oidium/ clusters		Botrytis/ clusters	
		GA %	Classification	GA %	Classification	GA %	Classification	GA %	Classification
1	Muscat timpuriu de Bucuresti	36,0	MS	59,2	FS	6,0	OR	14,9	MR
2	Aromat de Iaşi	49,5	MS	38,9	MS	7,6	OR	4,4	OR
3	Calina	47,5	MS	32,0	MS	7,2	OR	13,4	MR
4	Timpuriu de Cluj	61,0	FS	49,0	MS	8,6	OR	9,5	OR
5	Cetatuia	70,0	FS	60,0	FS	16,2	MR	11,2	MR
6	Napoca	49,0	MS	49,0	MS	10,1	ORMR	11,3	MR
7	Augusta	57,3	FS	46,0	MS	8,5	OR	10,6	OR
8	Victoria	10,0	OR	8,3	OR	5,0	OR	9,3	OR
9	Azur	5,6	OR	9,3	OR	3,1	OR	5,7	OR
10	Splendid	14,1	MR	4,7	OR	2,5	OR	14,1	MR
11	Dobrogea	3,70	MR	5,6	OR	4,6	OR	8,6	OR
12	Silvana	4,0	OR	6,9	OR	2,0	OR	8,1	OR
13	Tamina	27,0	PR	8,2	OR	6,4	OR	17,9	MR
14	Greaca	5,6	OR	3,7	OR	5,2	OR	12,7	MR
15	Sevka	3,3	OR	12,2	MR	2,2	OR	13,4	MR
16	Cuzovski	6,0	OR	3,5	OR	3,8	OR	13,6	MR

Table 3. The behaviour of some wine varieties from the experimental plots at the main diseases attacks, in the conditions of 2004-2005 years – Murfatlar centre

Crt. No	Variety	Downy mildew/ leafs		Down mildew/ clusters		Oidium/ clusters		Botrytis/ clusters	
		GA %	Classification	GA %	Classification	GA %	Classification	GA %	Classification
1	Blauerzweigelt	3,1	OR	7,2	OR	2,5	OR	2,6	OR
2	Magaraci	0,6	OR	1,8	OR	1,1	OR	10,1	OR
3	Mamaia	1,1	OR	1,4	OR	0,5	OR	5,6	OR
4	Cramposie Selecție	8,0	OR	31,5	MS	5,0	OR	15,3	OR
5	Furmint liber fecundat	37,0	MS	41,0	MS	5,1	OR	10,4	OR
6	Columna	49,0	MS	59,8	FS	5,1	MS	7,0	OR
7	Ozana	50,4	FS	69,6	FS	31,5	OR	6,8	OR
8	Băbească gri	57,3	FS	65,4	FS	3,4	OR	10,9	OR
9	Codana	68,2	FS	67,8	FS	4,6	OR	12,6	MR
10	Miorita	72,0	FS	66,9	FS	3,5	OR	8,1	OR
11	Sarba	76,0	FS	75,0	FS	3,2	OR	4,7	OR

Table 4. The behaviour of some wine varieties with biological resistance from the experimental plots at the main diseases attacks, in the conditions of 2004-2005 years – Murfatlar centre

Crt. no.	Variety	Downy mildew/ leafs		Down mildew/ clusters		Oidium/ clusters		Botrytis/ clusters	
		GA %	Classification	GA %	Classification	GA %	Classification	GA %	Classification
1	Brumariu	36,3	MS	47,4	MS	4,0	OR	5,2	OR
2	Chambourcin	53,6	FS	43,8	MS	6,4	OR	5,9	OR
3	Garonnet	50,3	FS	39,7	MS	4,0	OR	3,7	OR
4	Dathier de S	30,1	PR	32,4	MS	44,0	OR	4,1	OR
5	Verousset	36,0	MS	44,0	MS	3,6	OR	3,7	OR
6	Roucaneuf	46,0	MS	24,7	PR	3,9	OR	3,9	OR
7	Perla de Zala	43,5	MS	69,2	FS	1,7	OR	4,4	OR
8	Seyve Villard 18402	48,0	MS	52,6	FS	5,4	OR	3,4	OR

Table 5. The behaviour of some wine basis varieties from the experimental plots at the main diseases attacks, in the conditions of 2004-2005 years – Murfatlar centre

Crt. no.	Variety	Downy mildew/ leafs		Down mildew/ clusters		Oidium/ clusters		Botrytis/ clusters	
		GA %	Classification	GA %	Classification	GA %	Classification	GA %	Classification
1	Chardonnay	4,6	MS	44,0	MS	1,2	OR	10,6	OR
2	Pinot gris	45,0	MS	39,0	MS	2,4	OR	7,3	OR
3	Riesling italian	3,5	OR	4,0	OR	1,3	OR	8,1	OR
4	Sauvignon	2,2	OR	1,0	OR	2,0	OR	19,7	MR
5	Muscat Ottonel	2,9	OR	34,0	MS	2,0	OR	2,0	OR
6	Merlot	2,7	OR	49,0	MS	2,9	OR	7,1	OR
7	Pinot noir	3,4	OR	6,4	OR	7,6	OR	7,3	OR
8	Cabernet Sauvignon	64,0	FS	30,1	PR	23,7	PR	10,3	OR
9	Fetească neagră	64,0	FS	64,0	FS	17,0	MR	21,7	MR

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MORPHO-ANATOMICAL AND ETHNOBOTANICAL ASPECTS OF LEAVES IN SOME ORNAMENTAL PLANTS

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Key words: leaf, morpho-anatomy, ethnobotany, taxonomy, Christian's names, ornamental plants.

SUMMARY

The paper presents morph-anatomical and ethnobotanical aspects concerning some ornamental species cultivated in "I. Todor" Botanical Garden of U.S.A.M.V. Bucharest. The species represented by herbs, bushes and trees were selected using Christian and botanical terminology of Romanian people and ethnobotanical criterion. Morphological and anatomical aspects of leaves are presented regarding the epidermis and types of mature stomata apparatus and trichomes. Original morphological and anatomical photos are shown and a unique polytomic identification key was elaborated below.

INTRODUCTION

Ethnobotany is the study of the relationship between plants and people: from "ethno" - study of people and "botany" - study of plants. Ethnobotany is considered a branch of ethnobiology. Ethnobotany studies the complex relationships between (uses of) plants and cultures. The focus of ethnobotany is on how plants have been or are used, managed and perceived in human societies and includes plants used for food, medicine, divination, cosmetics, dyeing, textiles, for building, tools, currency, clothing, rituals, social life, and music.

Though the term "ethnobotany" was not coined until 1895 by the US botanist Harshberger, the history of the field begins long before that. In AD 77, the Greek surgeon Dioscorides published "*De Materia Medica*", which was a catalog of about 600 plants in the Mediterranean. It also included information on how the Greeks used the plants, especially for medicinal purposes. This illustrated herbal contained information on how and when each plant was gathered, whether or not it was poisonous, its actual use, and whether or not it was edible (it even provided recipes). Dioscorides stressed the economic potential of plants. For generations, scholars learned from this herbal, but did not actually venture into the field until after the Middle Ages.

Beginning in the 20th century, the field of ethnobotany experienced a shift from the raw compilation of data to a greater methodological and conceptual reorientation. This is also the beginning of academic ethnobotany. Today the field of ethnobotany requires a variety of skills: botanical training for the identification and preservation of plant specimens; anthropological training to understand the cultural concepts around the perception of plants; linguistic training, at least enough to transcribe local terms and understand native morphology, syntax, and semantics (Martin 1995, Cotton 1997).

The species were selected using Christian and botanical terminology of Romanian people and ethnobotanical criterion. These criteria are used by ordinary people to recognize the plants from different families. Several studies related to spontaneous plants were made to complete botanical literature (Jalbă 1999, Niţă 1999).

Our morpho-anatomical, ethnobotanical researches regarding ornamental species will complete former studies, successfully.

The species were represented by herbs and trees: *Aster novae-angliae* L. and *Helianthus tuberosus* L. (*Asteraceae*); *Begonia rex* Putz. and *B. semperflorens* Link et Otto (*Begoniaceae*); *Berberis vulgaris* L. and *Mahonia aquifolium* (Pursh) Nutt. (*Berberidaceae*); *Buxus sempevirens* L. (*Buxaceae*); *Cercis siliquastrum* L. (*Caesalpiniaceae*); *Coleus blumei* Hort. ex Cobeau (*Lamiaceae*); *Hepatica transsilvanica* Fuss (*Ranunculaceae*); *Paliurus spina-christi* Miller (*Rhamnaceae*); *Ailanthus altissima* Miller (Swingle) (*Simaroubaceae*). There are cultivated in Romania for ornamental purpose and are represented by annual or perennial herbs (6), bushes (4) and trees (2).

The main objective of this study is to complete the morphology of leaves with anatomical aspects, used to differentiate these ornamental species. An original polytomic identification key was elaborated based on morpho-anatomical characteristics of investigated plants with an important taxonomic role.

MATERIALS AND METHODS

The morphological study assumed only the measurements of the leaf characteristics. The anatomic study was made also to the level of foliar lamina. Leaves epidermal peels were obtained from the middle region of leaf, from half-way of mature plant. The materials were cleared with chloral hydrate. Numerical characteristics were undertaken at MC-7 microscope.

The prepared material was viewed and photographed at MC-7 microscope with a Nikon Camera. The photos of leaf are presented in Figures 1-12. We used in this study the author's plant names according with plant nomenclature in Flora of Romania (Ciocârlan 2000).

We collected these ornamental species and put them together in Herbaria. Numerous photos of plants specimens are done.

RESULTS AND DISCUSSIONS

Ethnobotanical aspects:

The popular and Christian's names and the ethnobotanic utilities used bellow are collected from Borza (1968), Tătaru (1993), Săvulescu (1953-1964), Chirilă (1999) and Ciocârlan (2000). The popular names are listed in Romanian because they are so difficult to translate; on the other hand if the translate is possible, the sense of these popular expressions are be lost.

- *Asteraceae* family:

***Aster novae-angliae* L.** (English name: "Purple dome", "St. Maria's flower") - **popular names** (Romanian name: pocrovă, Dumitraş, steliță, săpunele, salbă moale, sălcioară, scânțeiuțe, stele chineze, vinețele) and **Christian name** (floarea Sf. Mării); **range:** Eastern to North America, naturalized in several areas of Europe, including Romania*.

Ethnobotany: ornamental; the root is analgesic, astringent, expectorant and febrifuge; a poultice has been used in the treatment of pain, fevers ; the ooze of the roots has been sniffed in the treatment of catarrh; a decoction of the whole plant has been used in the treatment of fevers and weak skin**. The plant habitus, morphology of leaf and original anatomical aspects of epidermis is presented in Fig. 1.

***Helianthus tuberosus* L.** (Engl. name: "Jerusalem artichoke", "St. Maria's flower") - **popular names** (Rom. name: baraboi, baraboi înfloriți, baraboi porceşti, brojbă, bulibă, cartoafe de iarnă, cartofel, cartofi dulci, cartofi porceşti, ciocaribe, ciocarepi, crumpi porceşti, damoveți, floarea baraboiului, floare soare de grădină, flori galbene, gălbinele, gherghine galbene, gulii, guraline, mere de pământ, măr de iarnă, morcovi, napi de pământ, napi porceşti, napi turceşti, napti, nati, napul porcului, pere iernatice, picioarcă, picioare, picioică, picioică iernatică, picioici curate, piciogne, picionci, picioance, pirole, putoacă, sfeclă, topinambur) and **Christian names** (floarea Sf. Mării, picioicile lui Dumnezeu); **range:** Eastern to North America- Nova Scotia to Minnesota and Kansas; Canada; occasionally naturalized in Europe, including Romania*.

Ethnobotany: tubers- raw or cooked; the tuber develops a pleasant sweetness during the winter, especially if subjected to frosts, and is then reasonably acceptable raw; otherwise it is generally best cooked, and can be used in all the ways that potatoes are used; they are rich in inulin, a starch which the body cannot digest, so Jerusalem artichokes provide a bulk of food without many calories; some people are not very tolerant of inulin, it tends to ferment in their guts and can cause quite severe wind; the inulin from the roots can be converted into fructose, a sweet substance that is safe for diabetics to use; the roasted tubers are a coffee substitute; aperient; cholagogue; diuretic; stomachic; tonic, aphrodisiac, cholagogue, diuretic, spermatogenetic, stomachic, and tonic, Jerusalem artichoke is a folk remedy for diabetes and rheumatism**. The plant habitus, morphology of leaf and original anatomical aspects of epidermis is presented in Fig. 2.

- *Begoniaceae* family:

Begonia rex Putz. (Engl. name: "Iron cross", "angels") – **popular names** (Rom. name: begonia, ghiață, baroşniță, urzică) and **Christian names** (cruce de fier, îngeraşi); **range:** India and South China, cultivated in Romania*.

B. semperflorens Link et Otto (Engl. name: "Easter") - **popular names** (Rom. name: baroşniță, begonia, bețivă, ceară roşie, curechi, dumitriță, ghețar, ghiață, ghețişoare, hrişcă, mireasă, țigancă, urzică, vadană, viața omului, viişoară, zăhărel) and **Christian names** (crăciuniță, Paşte); **range:** native to Brasil, cultivated in Romania.

Ethnobotany of studied begonias/ another *Begonia* species: antiphlogistic; antispasmodic; the tuberous roots and fruits are anodyne, antiphlogistic and antispasmodic, stimulates blood circulation; a decoction is used in the treatment of traumatic pain, gonorrhoea, post-partum vaginal discharge, amenorrhoea and snakebites; medicinal uses: ophthalmic; poultice; stomachic; the juice of the plant is drunk to relieve headaches; the crushed leaves are used as a poultice on sore nipples; the root juice is used as an eyewash to treat conjunctivitis; it is also consumed in the treatment of peptic ulcers; *B. semperflorens* flowers are edible**. The plant habitus, morphology of leaf and original anatomical aspects of epidermis is presented in Fig. 3, 4 for both *Begonia* species.

- *Berberidaceae* family:

Berberis vulgaris L. (Engl. name: "Devil's bit") – **popular names** (Rom. name: acriş roşu, agriş roşu, cătină de râuri, ciulini, cloceni, dracenă, dragină, drăghină, drăgină, glojdan, holeră, lemn galben, măcriş boeresc, măcriş cu spini, măcriş de râuri, măcrişel, măcrişul caprei, măcriş de camp, măcriş iepuresc, măcriş păsăresc, măcriş spinos, măcriş spin) and **Christian names** (dracilă, dracină); **range:** native to central and southern Europe, northwest Africa and western Asia; it is also naturalized in northern Europe, including the British Isles and Scandinavia, and North America*, including Romania (widespread).

Ethnobotany: edible parts: fruit; leaves, used like condiment and tea; fruit - raw or cooked; rich in vitamin C, the fruit has a very acid flavour and is mainly used in preserves; a refreshing lemon-like drink can be made from the fruit; young leaves - used as a flavouring or they can be used in much the same way as sorrel (*Rumex acetosa*); the dried young leaves and shoot tips make a refreshing tea; medicinal uses: antibacterial; antipruritic; antirheumatic; antiseptic; appetizer; astringent; cancer; cholagogue; diaphoretic; diuretic; expectorant;

hepatic; homeopathy; laxative; ophthalmic; purgative; refrigerant; stomachic; tonic; barberries have long been used as a herbal remedy for the treatment of a variety of complaints: all parts of the plant can be used though the yellow root bark is the most concentrated source of active ingredients; the bark and root bark are antiseptic, astringent, cholagogue, hepatic, purgative, refrigerant, stomachic and tonic; the flowers and the stem bark are antirheumatic; the roots are astringent and antiseptic; a tea of the roots and stems has been used to treat stomach ulcers; a tincture of the root bark has been used in the treatment of rheumatism, sciatica**. The plant habitus, morphology of leaf and original anatomical aspects of epidermis is presented in Fig. 5.

Mahonia aquifolium (Pursh) Nutt. (Engl. nake: "Dead's flower") – **popular name** (Rom. name: mahonie) and **Christian name** (floarea mortului); **range:** *Oregon-grape* is a native plant on the North American west coast from British Columbia to northern California, occurring in Douglas-fir forests and brushlands; it is the state flower of Oregon; naturalized in Europe*, cultivated in Romania.

Ethnobotany: antibacterial; antitumor; blood tonic; cholagogue; diuretic; laxative; ophthalmic; tonic; is used to treat loss of appetite and debility; its current herbal use is mainly in the treatment of gastritis and general digestive weakness, to stimulate the kidney and gallbladder function and to reduce catarrhal problems; the root and root bark is alterative, blood tonic, cholagogue, diuretic, laxative and tonic; it improves the digestion and absorption and is taken internally in the treatment of psoriasis, syphilis, haemorrhages, stomach complaints and impure blood conditions; externally, it has been used as a gargle for sore throats and as a wash for blurry or bloodshot eye; the fruit is an excellent gentle and safe laxative; it is used orally in the treatment of various enteric infections, especially bacterial dysentery**. The plant habitus, morphology of leaf and original anatomical aspects of epidermis is presented in Fig. 6.

- *Buxaceae* family:

Buxus sempevirens L. (Engl. name: "God's wood") – **popular names** (Rom. name: băngiu, bănuleț, bănuței, cimişer, cimişir, cinşir, cletaică, coacăze, drogonițe, iadără, merişor turcesc, pospang, puspan, puşpan, simişir, simşir, sospain, sospan, verdeață) and **Christian name** (lemnul Domnului); **range:** are native to western and southern Europe, southwest, southern and eastern Asia, Africa, Madagascar, northernmost South America, Central America, Mexico and the Caribbean, with the majority of species tropical or subtropical; only the European and some Asian species are frost-tolerant. Centers of diversity occur in Cuba, China and Madagascar*.

Ethnobotany: The leaves have been used in France as a substitute for hops (*Humulus lupulus*) in making beer; medicinal uses: alterative; antiperiodic; antirheumatic; cathartic; cholagogue; diaphoretic; febrifuge; homeopathy; narcotic; odontalgic; oxytoxic; sedative; tonic; vermifuge; although it has been used medicinally in the past as a sedative and to treat syphilis, box is very rarely used in modern herbalism; the leaves and the bark are alterative, antirheumatic, cathartic, cholagogue, diaphoretic, febrifuge, oxytocic and vermifuge and have been used as a quinine substitute in the treatment of malaria; the bark can be harvested at any time of the year and is dried for use in decoctions; the plant has not been fully tested for its toxic side effects; the wood is also diaphoretic, in full dose it is narcotic and sedative, in overdose it is convulsant and emetico-cathartic; a tincture of the wood has been used as a bitter tonic and antiperiodic, it has also had a reputation for curing leprosy; a volatile oil distilled from the wood has been prescribed in cases of epilepsy and is used in dentistry; a homeopathic remedy is made from the plant in the treatment of rheumatism**. The plant habitus, morphology of leaf and original anatomical aspects of epidermis is presented in Fig. 7.

• *Cesalpiniaceae* family:

Cercis siliquastrum L. (Engl. name: "Judas tree"; "European Redbud") – **popular name** (Rom. name: arbore de Iudea) and **Christian name** (Arborele lui Iuda); **range:** South Europe to East Asia; native to the south of Europe and southwest Asia, in Iberia, southern France, Italy, Greece and Asia Minor*, cultivated in Romania.

Ethnobotany: edible parts: flowers; seedpod; flowers – raw, with a sweetish-acid taste, they are a nice addition to the salad bowl; the flower buds are pickled and used as a condiment; seedpods – raw; wood - very hard, beautifully grained, takes a very fine polish, used for veneers**. The plant habitus, morphology of leaf and original anatomical aspects of epidermis is presented in Fig. 8.

• *Lamiaceae* family:

Coleus blumei Hort. ex Cobeau (Engl. name: "HollyVirgin's lap") – **popular names** (Rom. name: gura leului, mireasă, nevastă frumoasă, noroc, ureche, urechea porcului, ursomic, urzică, urzică de grădină, urzică moartă, urzicuță) and **Christian name** (poala Maicii Precista); **range:** native to tropical Africa and Asia*, cultivated in Romania.

Ethnobotany: edible parts: root (cooked); ornamental**. The plant habitus, morphology of leaf and original anatomical aspects of epidermis is presented in Fig. 9.

• *Ranunculaceae* family:

Hepatica transsilvanica Fuss (Engl. name: "brave man's cross") – **popular name** (Rom. name: trei răi, trei crai) and **Christian name** (crucea voinicului); **range:** native to Carpathian Mountains and Transylvania; wild and rare plant in Romania.

Ethnobotany: because is a rare plant no information about its ethnobotany are available; the following data are regarding *H. nobilis*: astringent; demulcent; diuretic; tonic; vulnerary; the leaves and flowers are astringent, demulcent, diuretic, rubefacient, tonic and vulnerary; it is a mild remedy that is little used in modern herbalism, but it is sometimes employed in treating disorders of the liver and gall bladder, indigestion; externally, it is applied to skin diseases, slow healing cuts; the plant should be used with caution, due to its toxicity*. The plant habitus, morphology of leaf and original anatomical aspects of epidermis is presented in Fig. 10.

• *Rhamnaceae* family:

Paliurus spina-christi Miller (Engl. name: "Jeruselem thorn", "Christ's thorn") – **popular names** (Rom. name: mărăcine, păliur, spinul asinului) and **Christian name** (spinul lui Christos); **range:** South Europe, to West Asia*, wild and rare plant in Romania.

Ethnobotany: edible parts: fruit., raw or dried for later use. a pleasant sub-acid taste, somewhat resembling dried apples; medicinal uses astringent; diuretic; tonic. anticathartic, astringent, diuretic and tonic**. The plant habitus, morphology of leaf and original anatomical aspects of epidermis is presented in Fig. 11.

• *Simaroubaceae* family:

Ailanthus altissima Miller (Swingle) (Engl. name: "earth's cross", "tree of heaven") – **popular names** (Rom. name: arbore puturos, brânca ursului, cenuşar, cenuşer, ciumac, lemn acru, lemn domestic, mastacăn, mastacin, nelemn, nuc puturos, nuc sălbatic, nucar, oțătar, oțetar, oțetnic, platan, pom nărod) and **Christian name** (crucea pământului); **range:** native from east Asia south to northern Australasia; naturalized and invasive in Romania*.

Ethnobotany: the tree is used in homeopathic "remedies" for cancer; reported to be antiseptic, astringent, bactericidal, cardiac, cathartic, depressant, emetic, protisticidal and vermifuge; tree-of-heaven is a folk remedy for asthma, cancer, diarrhea, dysentery, dysmenorrhea, dysuria, ejaculation (premature), epilepsy, eruption, fever, gonorrhea, leucorrhea, malaria, spasms, stomachic, tumors of the breast; the fruits are used for ophthalmic diseases and dysentery; emmenagogue, used for hemorrhoids; the root bark is used for cough, gastric and intestinal upsets; the vermifuge properties do not act on round worms or earthworms; resin extracted from the roots and leaves is a revulsive or vesicant; the disagreeable odor of the plant may cause some people to feel sleepy; the leaves, bark of the trunk, and roots are put into a wash for parasitic ulcers, itch, and eruptions**. The plant habitus, morphology of leaf and original anatomical aspects of epidermis is presented in Fig. 12.

The next paragraphs present morphological and anatomical aspects of species, listed alphabetically in Table 1.

Table 1 Morphological aspects of leaves and petioles:

Taxon	Leaf morphology
Ailanthus altissima	The leaves are arranged alternately on the stem, and can be 30-60 cm long (occasionally up to 1 m long on vigorous young sprouts) and contain 11-33 leaflets, occasionally up to 41 leaflets; each leaflet has one to three teeth on each side, close to the base.
Aster novae-angliae	Alternate, sessile, clasping, auriculate, oblong to lanceolate, entire, to 8cm long, 2cm wide, variously pubescent above and below, reduced in inflorescence; auricles rounded; cauline leaves less than 1,5cm apart, dense on stem.
Begonia rex	Deep, emerald green leaves are blotched and spotted silvery green, banded in velvety blackish-plum. A large blush of blackish-plum completes the centers, hinted with light metallic rose.
Begonia semperflorens	Oblique to ovate leaves, petiolate, denticulate, shinny, the inferior ones with redish petioles and blade about 8-9cm long, 6-7cm wide, with ciliate margins; superior leaves sessile, and convolute, hornet-shaped at the base.
Berberis vulgaris	The leaves on long shoots are non-photosynthetic, developed into three-spined thorns 3-30 mm long; the bud in the axil of each thorn-leaf then develops a short shoot with several normal, photosynthetic leaves; these leaves are 1-10 cm long, simple, and either entire, or with spiny margins.
Buxus sempervirens	The leaves are opposite, rounded to lanceolate, and leathery; they are small in most species, typically 1.5-5 cm long and 0.3-2.5 cm broad.
Cercis siliquastrum	Simple, rounded to heart-shaped leaves, alternate, with entire margins, pale green, with a redish spot on adaxial side.
Coleus blumei	Colorful variegated leaves, typically with sharp contrast between the colors; the leaves may be green, pink, yellow, maroon, and red; leaves ovate, crenate-serrate, petiolate, with opposite position.
Helianthus tuberosus	Leaves alternative, elongated-ovate to ovate-lanceolate, with a short petiole, long acuminate, strongly dentate, with rigid hairs on the upper side, abaxial pale green.
Hepatica transsilvanica	The leaves are basal and dark leathery green, each with three obtuse lobes, ± acute or rounded ones.
Mahonia aquifolium	Pinnate leaves 10-50cm long with 5-15 leaflets, with sinuous-spiny to dentate margins, adaxial dark green, shinny, rigid, coriaceous; in autumn become purple.
Paliurus spina-christi	Alternative leaves, shortly petiolate, elliptic or ovate to subrounded, asimetrical, 2-4cm long, obtuse, rounded at the base, truncate, entire margins, or slowly crenate-serrate; adaxial dark green shinny, abaxial pale green, with arcuate nervures from the base of lamina.

Anatomical aspects of mature leaves are presented in Table 2. Numerous original characteristics of epidermis (adaxial and abaxial), type of stomata and trichomes (protective or secretor) are shown.

Table 2 Original anatomical aspects of mature leaves

Taxon	Leaf epidermis	Stomata characteristics
Ailanthus altissima	Short unicellular protective trichomes on midvein on ad. side; ad. ep. and ab. ep. with polygonal cells, undulate walls "Ω"-shaped, both ep. with stomata	Amphistomatic leaf, stomata type: anomocytic; ad. ep. L > w, L / w: 21-23μ / 11-13μ; ab. ep. L > w, L / w: 23-24μ / 8-13μ
Aster novae-angliae	long protective trichomes, 1-3-celled; ad. ep. with polyedric cells (with 5-8 sides), straight walls "U"-shaped; ab. ep. with polygonal cells and stomata; undulate walls, "Ω"-shaped; ab. ep. with stomata	Hypostomatic leaf, stomata type: anomocytic; L > w, L / w: 14-15μ / 3-6μ
Begonia rex	ad. ep. with polyedric cells, straight walls "V"-shaped, with protective multiserriate trichomes, very long; cells of ab. ep. with undulate walls "Ω"-shaped, ab. ep. with stomata; cells with antocyan pigments	Hypostomatic leaf, stomata type: anisocytic; L > w, L / w: 16-20μ / 13-16μ
Begonia semperflorens	ad. ep. and ab. ep. with polyedric cells, straight walls "V"-shaped; ab. ep. with groups of 2-5 stomata; cells with antocyan pigments	Hypostomatic leaf, 2-5 stomata grouped in helicocytic apparatus; L > w, L / w: 24-29μ / 15-16μ
Berberis vulgaris	glabrous, ad. ep. and ab. ep. with polygonal cells, undulate walls "Ω"-shaped, ab. ep. with stomata	Hypostomatic leaf, stomata type: anomocytic; L > w, L / w: 18-19μ / 15-16μ
Buxus sempervirens	glabrous; ad. ep. and ab. ep. with polyedric cells (with 5-8 sides), straight walls "U/V"-shaped; ab. ep. with stomata	Hypostomatic leaf, stomata type: anomocytic; L < w, L / w: 20-21μ / 22-24μ
Cercis siliquastrum	glabrous; ad. ep. and ab. ep. with polyedric cells (with 5-7 sides), straight walls "U/V"-shaped; ab. ep. with stomata	Hypostomatic leaf, stomata type: anomocytic; L > w, L / w: 18-19μ / 10-13μ
Coleus blumei	glabrous; ad. ep. with polygonal cells, cells with undulate walls "U/Ω"-shaped; ab. ep. with very undulate walls, "Ω"-shaped, stomata, secretory (peltate and capitate glands) and protective multicelled trichomes present on ab. ep.; cells with antocyan pigments	Hypostomatic leaf, stomata type: anomocytic and rare diacytic; L > w, L / w: 16-18μ / 11-13μ
Helianthus tuberosus	ad. ep. with polyedric cells, straight walls "U/V"-shaped; ab. ep. with protective trichomes 1-5-celled, undulate walls "Ω"-shaped, both ep. with stomata	Amphistomatic leaf, stomata type: anomocytic; ad. ep. L > w, L / w: 15-16μ / 10-11μ; ab. ep. L > w, L / w: 21-24μ / 8-11μ
Hepatica transsilvanica	long unicellular protective trichomes on ad. ep.; ad. ep. and ab. ep. with polygonal cells, undulate walls "Ω"-shaped, both ep. with stomata	Amphistomatic leaf, stomata type: anomocytic; ad. ep. L < w, L / w: 31μ / 32μ; ab. ep. L > w, L / l: 39μ / 19μ
Mahonia aquifolium	glabrous; ad. ep. and ab. ep. with polygonal cells, undulate walls "Ω"-shaped; ab. ep. with stomata	Hypostomatic leaf, stomata type: anomocytic and actinocytic; L > w, L / w: 14-15μ / 15-16μ
Paliurus spina-christi	glabrous; ad. ep. and ab. ep. with polyedric cells (with 5-6 sides), straight walls "U/V"-shaped; ab. ep. with stomata	Hypostomatic leaf, stomata type: anomocytic; L > w, L / w: 16-17μ / 9-10μ

Legend to table: *ad. ep.* - adaxial epidermis (superior), *ab. ep.* - abaxial epidermis (inferior), *L / w* - stomata length / width (in μ), *st.* - stomata.

Taxonomy of investigated ornamentals plants:

Based on morphological and anatomical characteristics of investigated species, an original polytomic identification key was elaborated and presented below.

A Herbaceous plants
B Woody plants: bushes (**Bb**) and trees (**Bt**)
C Leaves lasting: plant with failing leaves (**Cf**) or persistent (**Cp**)
D Color of leaves: green (**Dg**), or variegated (**Dv**)
E Plants with simple leaves: palmate venation (**Pa**) or pinnate (**Pi**)
F Plants with compose leaves: pinnate leaves with odd number of leaflets (multifoliolate leaf)
G Type of leaf: petiolate (**Gp**), sessile- amplexicaule (**Gs**)
H The disposition of leaves: alternative (**Ha**), opposite (**Ho**)
I Lamina type: amphistomatic (**Ia**) or hypostomatic (**Ih**)
J Stomata type: anizocytic (**Jz**), anomocytic (**Jn**), actinocytic (**Jc**), diacytic (**Jd**); grouped stomata (**Jp**)
K Trichom type: protective- uniseriate (**Ku**) or multiseriate (**Km**) and secretor glands (**Ks**)
L Plants with glabrous leaves.

Ailanthus altissima - Bt Cc Dg F Gp Ha Ia Jn Ku; ***Aster novae-angliae*** - A Cf Dg Pi Gs Ha Ih Jn Ku;
Begonia rex - A Cf Dv Pa Gp Ha Ih Jz Km; ***Begonia semperflorens*** - A Cf Dv Pa Gp Ha Ih Jp L;
Berberis vulgaris - Bb Cf Dg Pi Gp Ha Ih Jn L; ***Buxus sempervirens*** - Bb Cp Dg Pi Gp Ho Ih Jn L;
Cercis siliquastrum - Bt Cf Dg Pi Gp Ha Ih Jn L; ***Coleus blumei*** - A Cf Dv Pi Gp Ho Ih Jn/Jd Ku/Ks;
Helianthus tuberosus – A Cf Dg Pi Gp/Gs IaJn Ku; ***Hepatica transsilvanica*** - A Cf Dg Pa Gp Ha Ih Jn Ku;
Mahonia aquifolium - Bb Dg Pi F Gp Ha Ih Jn Jc L; ***Paliurus spina-christi*** - B Cm Dg Pi Gp ha Ih Jn L.

CONCLUSIONS

1. There are few data in references from different scientific publications regarding the morpho-anatomical characteristics of ornamental plants.
2. From all 12 investigated species 2 are with opposite leaves (others are alternative), 2 present pinnate-compose leaves (10 have simple leaf), 3 present palmate venation (others are pinnate leaves).
3. *Begonia rex*, *Begonia semperflorens*, *Mahonia aquifolium* and *Buxus sempervirens* have waxy and thick epidermis.
4. Amphistomatic leaves in *Ailanthus altissima, Helianthus tuberosus, Hepatica transsilvanica*; other species present hypostomatic leaves.
5. Protective trichomes, simple and multicelullar in *Ailanthus altissima, Aster novae-angliae, Helianthus tuberosus, Hepatica transsilvanica, Coleus blumei*, and multiseriate in *Begonia rex* (*B. semperflorens* with ± glabrous leaves); secretor trichomes (peltate and capitate glands) in *Coleus blumei.*
6. Anizocytic stomata in *Begonia rex*; 2-5 grouped stomata in *B. semperflorens*, diacytic in *Coleus blumei*, anomocytic in other species.
7. The smallest stomata (14-15µ) are *Aster novae-angliae* and *Mahonia aquifolium*; the bigger stomata (39µ) in *Hepatica transsilvanica*.
8. In the future we are going to add in our study new morpho-anatomic and ethnobotanic data about another Christian-named plants like weeds or well-known medicinal plants. In conclusion, the presented study is partial.

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Fig. 1 *Aster novae-angliae* L.: habitus and leaf epidermis
(adaxial *Ead* and abaxial *Eab* epidermis) [orig.]

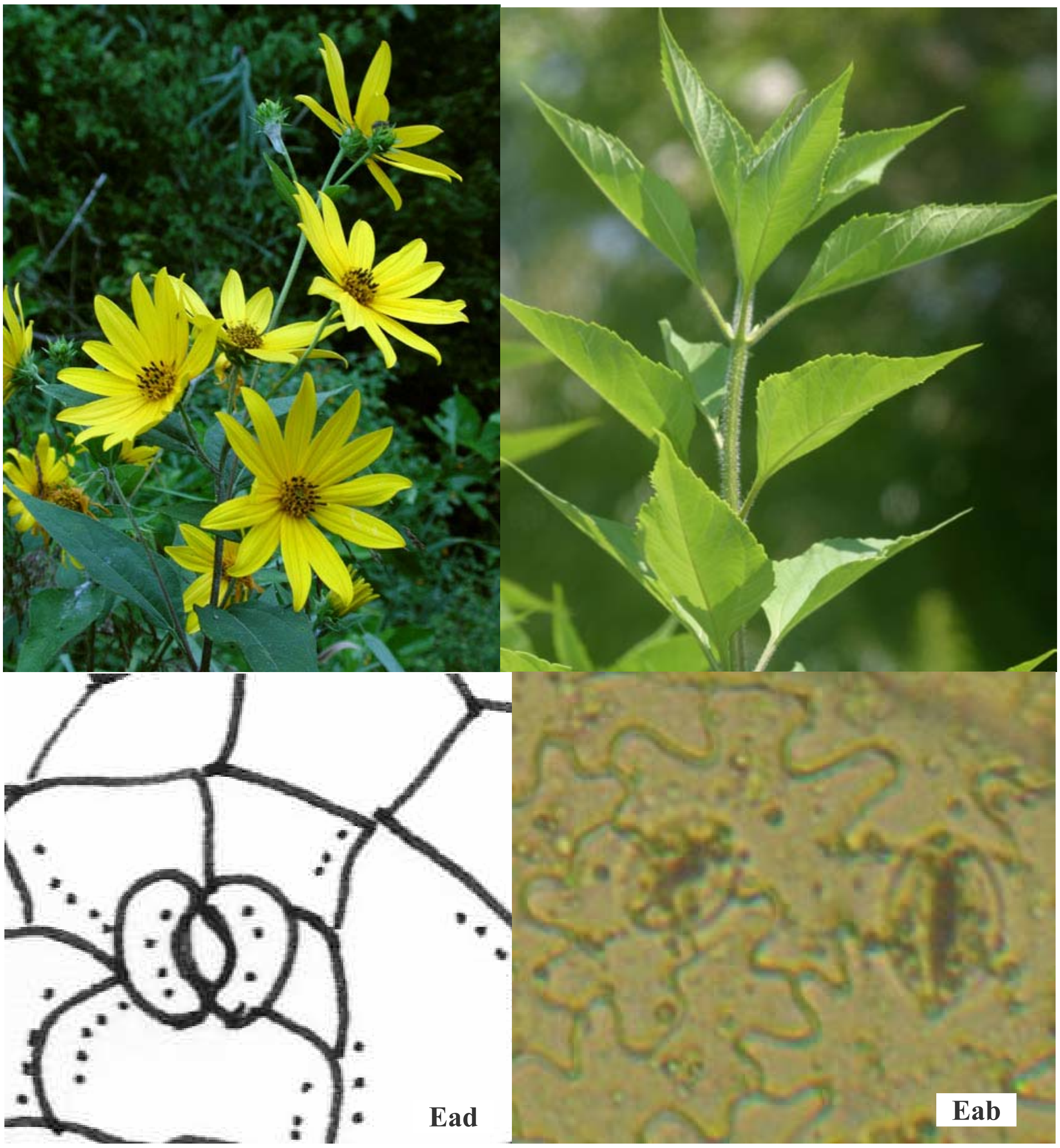

Fig. 2 *Helianthus tuberosus* L.: habitus and leaf epidermis [orig.]

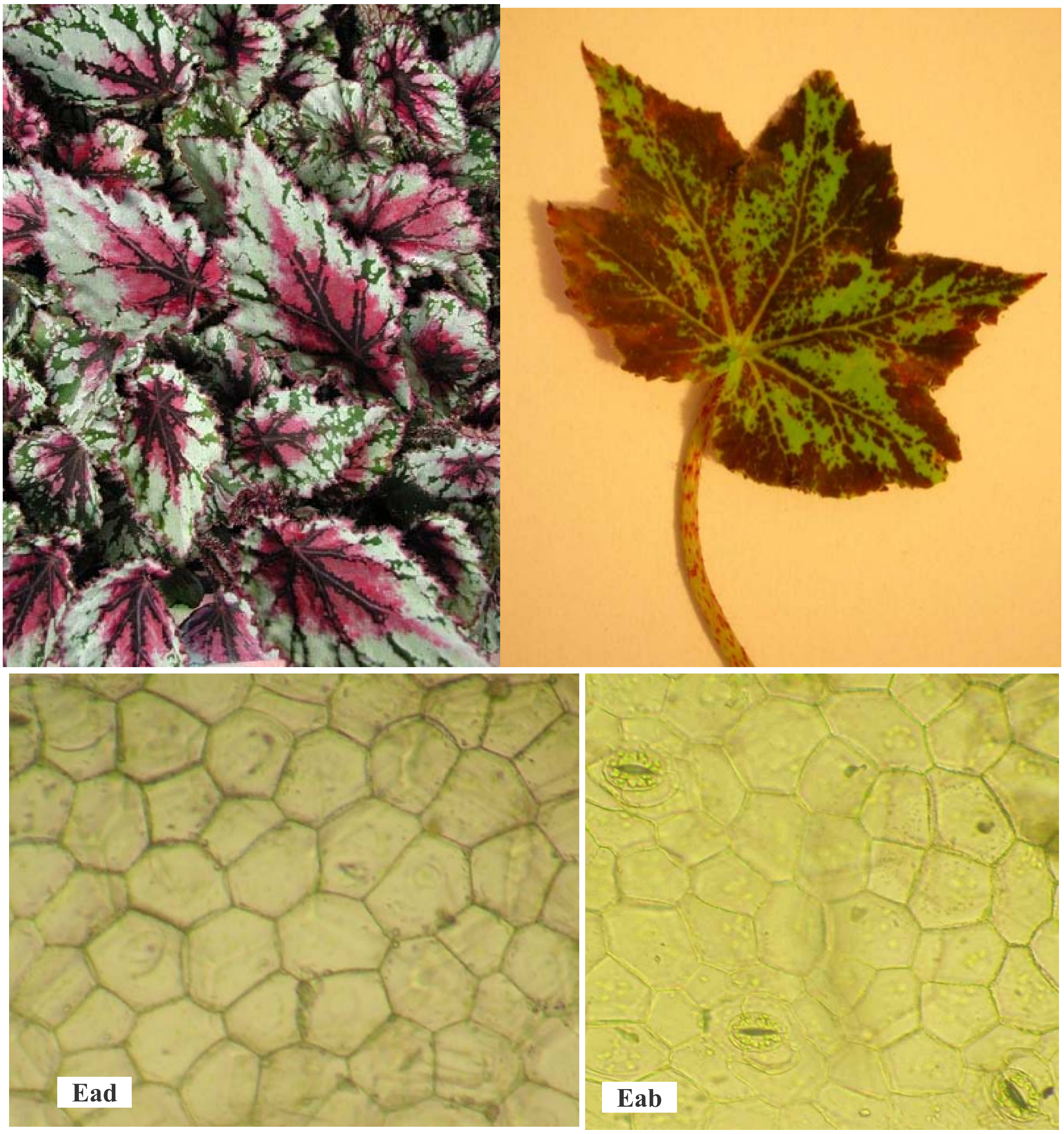

Fig. 3 *Begonia rex* Putz.: habitus and leaf epidermis [orig.]

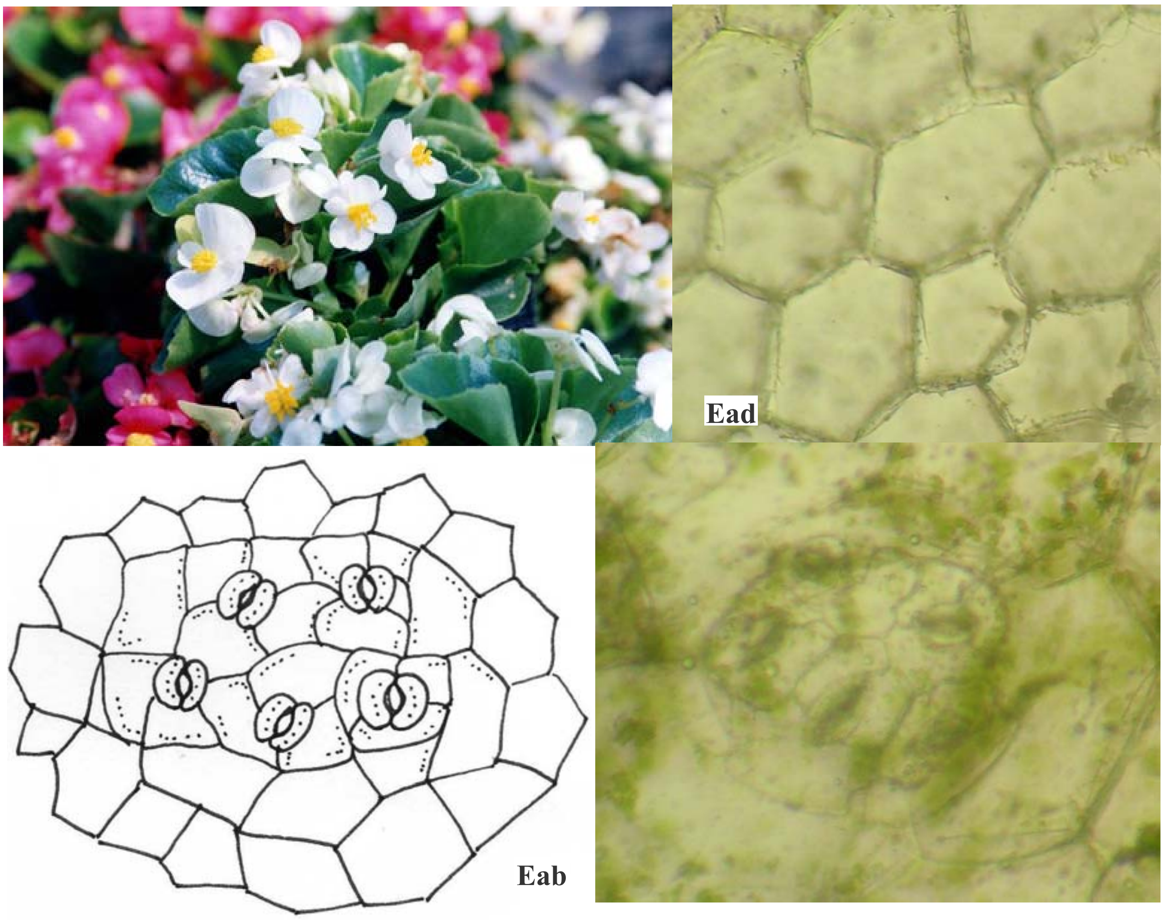

Fig. 4 *Begonia semperflorens* Link et Otto: habitus and leaf epidermis; group of stomata on adaxial epidermis [orig.]

Fig. 5 *Berberis vulgaris* L.: habitus and leaf epidermis [orig.]

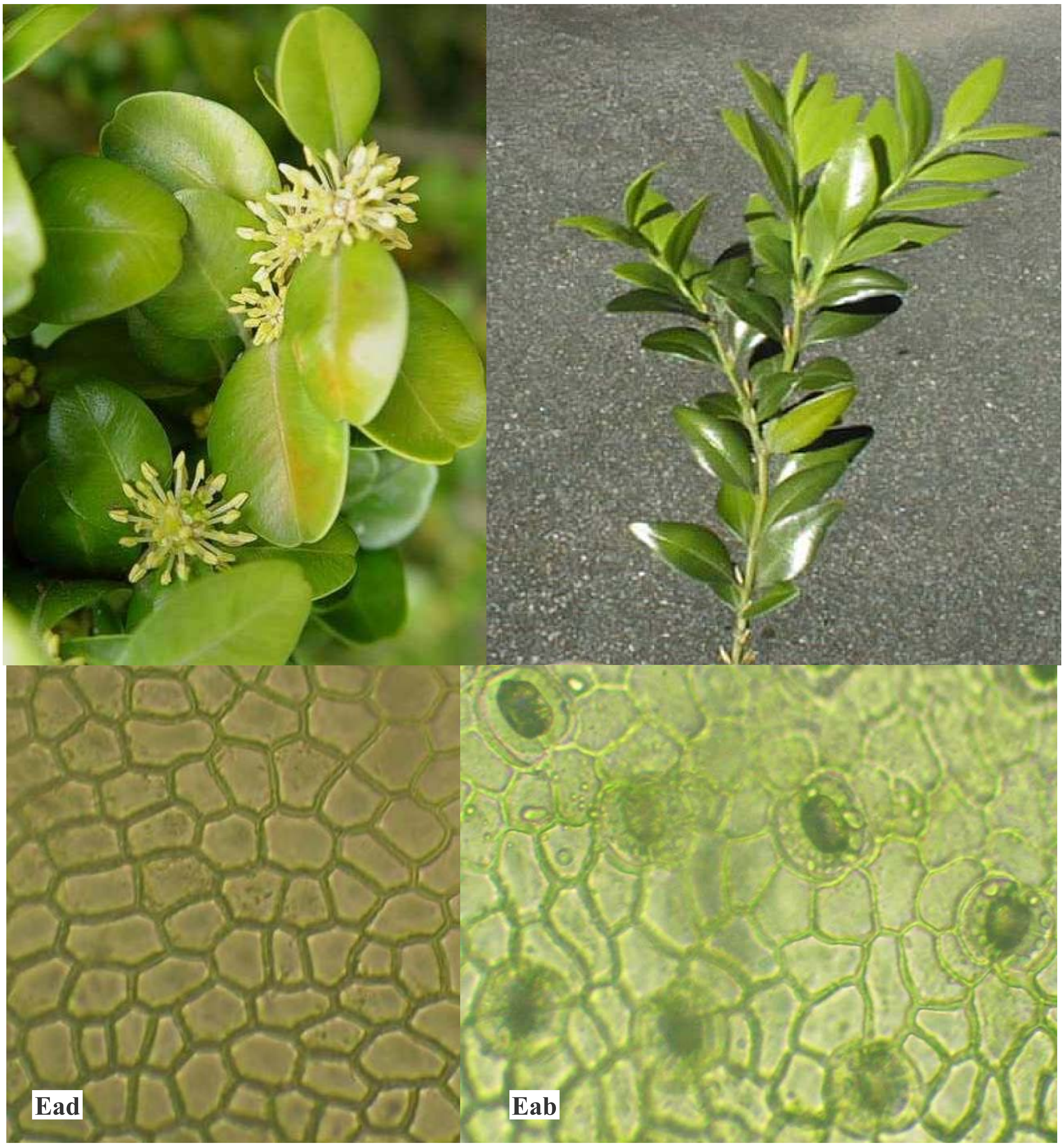

Fig. 6 *Buxus sempervirens* L.: habitus and leaf epidermis [orig.]

Fig. 7 *Cercis siliquastrum* L.: habitus and leaf epidermis [orig.]

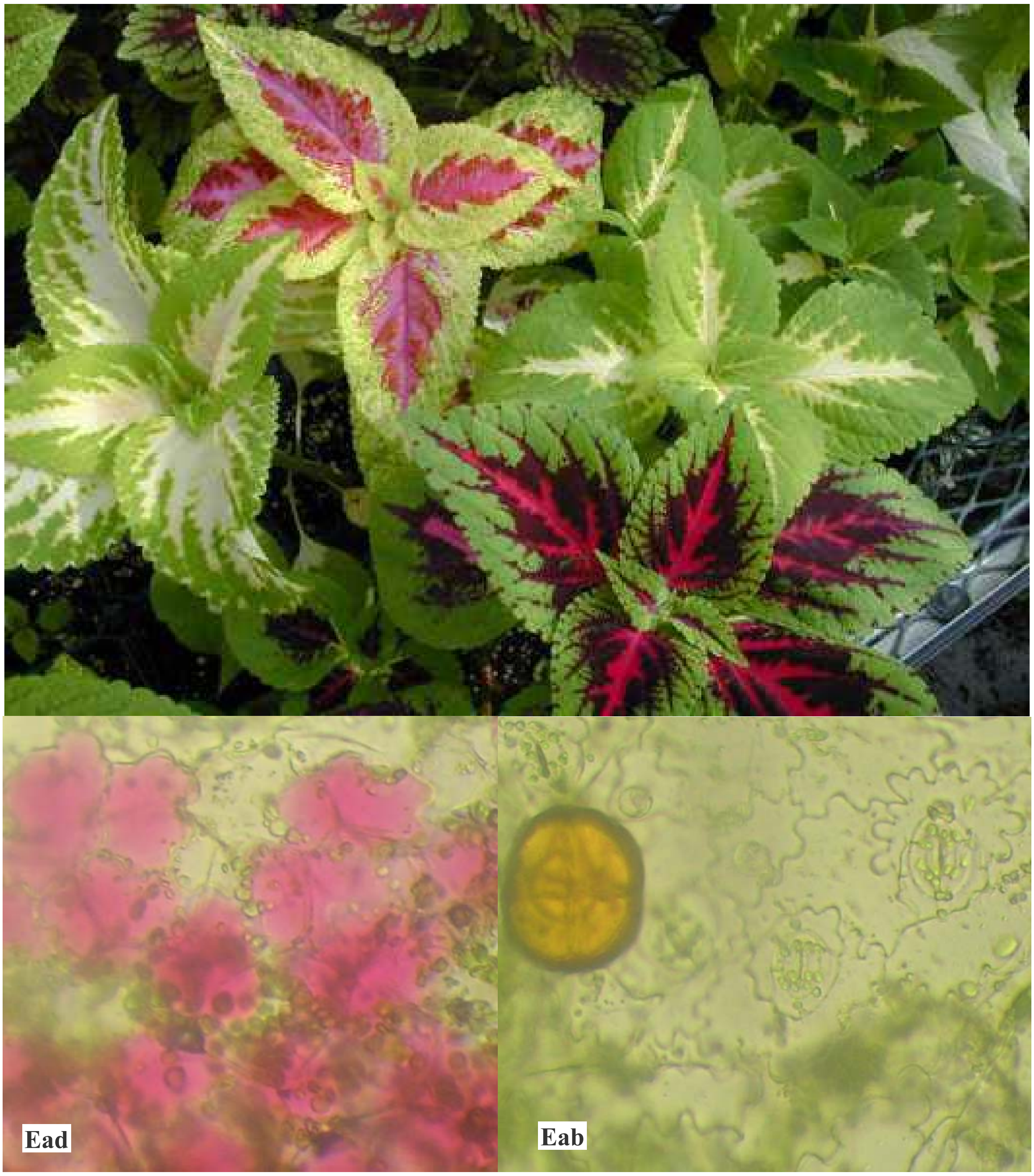

Fig. 8 *Coleus blumei* hort. ex Cobeau: habitus and leaf epidermis [orig.]

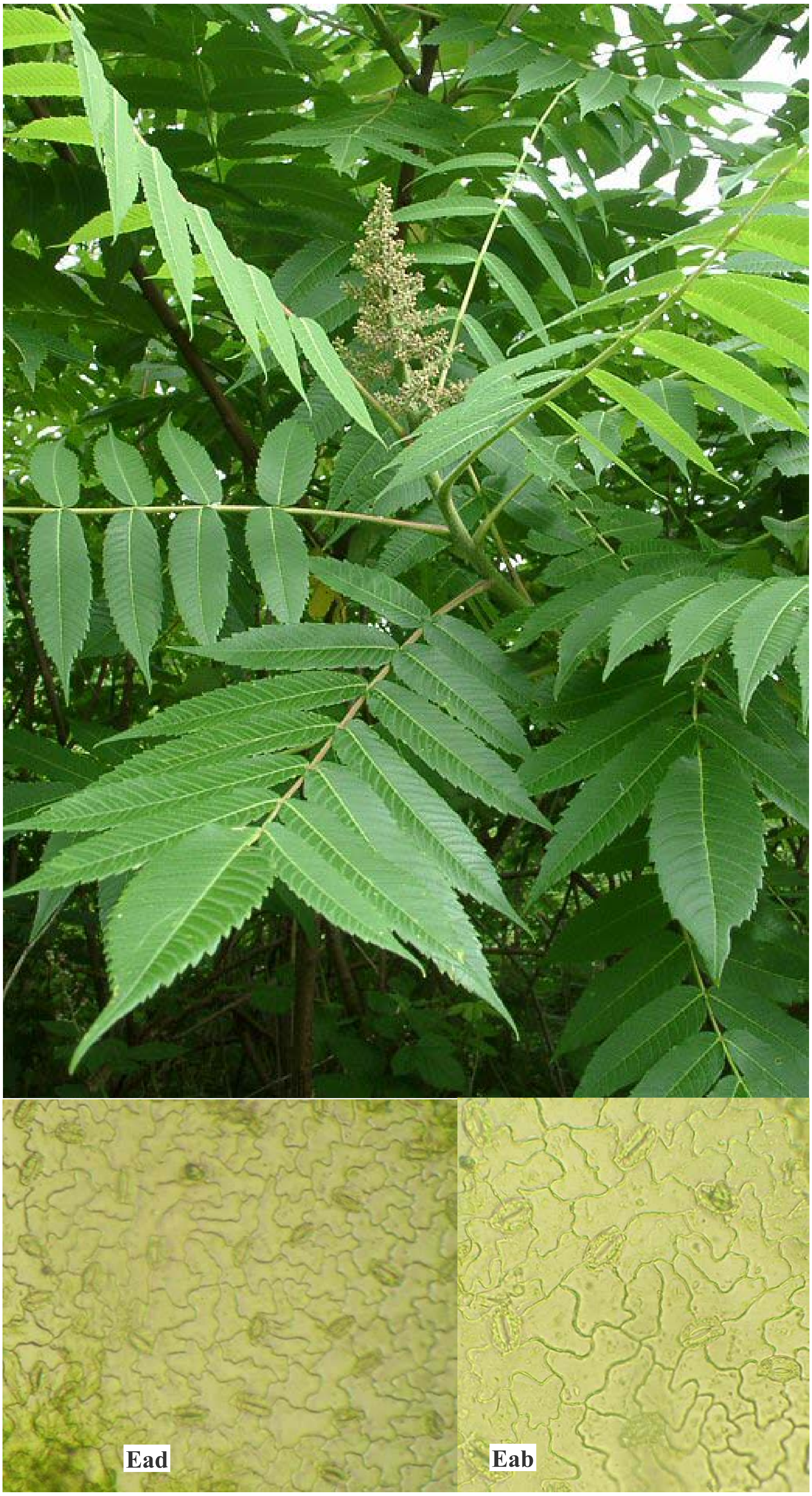

Fig. 9 *Ailanthus altissima* (Miller) Swingle: habitus and leaf epidermis [orig.]

Fig. 10 *Hepatica transsilvanica* L.: habitus and leaf epidermis [orig.]

Fig. 11 *Mahonia aquifolium (*Pursh) Nutt.: habitus and leaf epidermis [orig.]

Fig. 12 *Paliurus spina-christi* Miller: habitus and leaf epidermis [orig.]

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CONTRIBUTION TO KNOW THE ESSENTIAL OILS COMPOSITION FROM SOME CONIFERS SPECIES

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Keywords: essential oils, conifers

ABSTRACT

The essential oils from five conifers species have been extracted by water distillation, compounds have been separated by gas chromatography and their identification was performed with the aid of a mass spectrometric detector. Analytical data emphasized that the principal essential oils compounds, with a concentration higher than 10% are similarly in the case of *Abies alba and Picea pungens* species and are represented by limonene, kamfen, β-pinen and bornyl -acetate. The essential oils from *Pinus ponderosa* contain in principal bornyl - acetate and kamfen, those from *Juniperus communis* contains mirtenil - acetate and α-felandren, while that from *Tuja orientalis* contains α- pinene and cedrol.

INTRODUCTION

The essential oils are used in numerous industries, thanks to their content in medicinally, perfume and antimicrobial substances. The essential oil have been analyzed by many authors: those extracted from *Abies alba* has been analyzed by Tsankova and Ognianov (1968); those from *Picea excelsa* by Kabeczka and Schultze (1987); the extracted oil from *Pinus sylvestris* has been analyzed by Carmo and Frazao (1986); that extracted from *Juniperus communis* by Chatzopoulou and Katsiotis (1993), and that extracted from *Thuja* has been analyzed by Lawrence (1979). The obtained results have been emphasized a variation as regard as the essential oils composition, in relation with plant genus and species.

The aim of the present paper is to present the essential oils composition variation using as a biological material five conifers genus, originated from Romania.

MATERIALS AND METHODS

The essential oils have been extracted from leaves of: *Abies alba*, *Pinus excelsa*, *Picea pungens*, *Juniperus communis* and *Thuya orientalis*, by hydrodistillayion, using a Clevenger type apparatus.

Separation, identification and essential oils compounds amounts have been performed with the aid of a gas chromatograph equipped with a mass spectrometric detector. There was used a DB 5 chromatographic column, with a length of 25 m and an interior diameter of 0,25 mm.

RESULTS AND DISCUSSIONS

The obtained results are presented in the centralized table (Table 1) and the followings considerations can be taken in attention:

From the *Abies alba* leaves, in the extracted essential oil there were been separated 87 compounds, between that 30 have been determined quantitatively. The highest content was in the case of limonene (29,11%), kamfen (21,47 %), β-pinene (13,64 %), α- pinene (10,90 %) and bornyl-acetate (10,11 %). As compared with the results obtained by Tsankova and

Ognzanov (1968) it can be observed that in the analyzed samples α- pinene and β-pinene there were determined in smaller amounts, while kamfen has been determined in higher amounts.

In the essential oil extracted from *Picea pungens* leaves, there were separated 36 compounds, between that 23 have been quantitatively determined. The priority components have been similarly as in the case of *Abies alba*: α- pinene (28,89 %), kamfen (15,61 %), limonene (14,60 %) and bornyl-acetate (13,05 %). It can be noticed that in opposite with the oil extracted from *Abies alba*, the highest quantity was registered in the case of α- pinene, while the concentration of β-pinene was only 1,87 %.

Pinus excelsa leaves have been produced essential oils with 79 separated compounds, between that 29 compounds have been quantitatively determined. In this essential oil only two compounds have been majority: bornyl-acetate (25,30 %) and kamfen (20,77 %), as compared with data obtained by Carmo and Frazao (1986) that presents α- pinene as the principal volatile component.

In the case of *Juniperus communis* it has been noticed that from the leaves extracted essential oil, 78 compounds there were separated 23 from these being quantitatively determined. Higher amounts have been determined for mirtenil-acetate (32,02 %), α-felandren (10,31 %), limonene (9,42 %) and β-pinene (8,15 %). As compared with these data, Chatzopoulou and Katsiotis (1993) noticed that the essential oils extracted from this specie leaves has as principal compounds α-pinene and sabinen.

From essential oil extracted from *Thuya orientalis* leaves, there were separated 92 compounds and from these 26 have been quantitatively determined. A higher amount than 10% has been determined in the case of α-pinene (47,55%) and cedrol (14,20%).

CONCLUSIONS

1. The essential oils extracted from *Abies alba* and *Picea pungens* had the same majority compounds, with quantitatively differences as concerning a higher proportion for limonene, kamfen and β-pinene and smaller amounts of α-pinene.
2. The essential oil extracted from *Pinus excelsa* had only two majority compounds: kamfen and bornyl-acetate, that from *Juniperus* contained α- felandren and bornyl-acetate and that extracted from *Thuya* contained more than 10 % α- pinene and cedrol.

ACKNOWLEDGMENTS

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Table 1. The composition of the essential oil of five conifers species

Substance name	*Abies alba*	*Pinus excelsa*	*Picea pungens*	*Juniperus communis*	*Thuya orientalis*
santene	2,10	-	-	-	-
triciclene	2,35	1,31	1,54	2,39	0,23
α- thuyen	-	-	-	,58	-
α- pinene	**10,90**	4,78	**28,89**	2,50	**47,55**
kamfen	**21,47**	**20,77**	**15,61**	1,72	0,33
β- pinene	**13,64**	3,04	1,87	8,15	2,29
β- mircene	0,73	0,19	1,46	-	1,34
α-felandren	-	-	-	**10,31**	-
3-carene	-	-	0,96	-	0,27
L-β-pinene	1,17	2,51	1,25	-	-
p-cymene			-	1,77	-
limonene	**29,11**	7,99	**14,60**	9,42	1,36
eucaliptol		6,17	,75	-	-
terpinolene	0,07	0,30	-	0,18	0,38
L-fencone	-	-	0,34	0,17	-
linalool	0,28	-	-	0,09	0,22
pinocarveol	0,15	0,22	0,17	0,13	0,06
isothujone	0,34	0,39	-	0,36	-
cis linonene oxide	0,45	0,92	0,26	-	-
kamfolenol	0,07	0,7	0,53	-	0,05
camfor	0,12	,53	5,18	-	-
L- camfor	0,07	2,01	0,91	0,07	-
borneol	0,34	4,94	0,38	0,39	0,07
4-terpineol	0,06	0,22	0,75	2,00	0,56
α-terpineol	0,66	0,37	0,24	-	0,16
mirtenol	0,51	0,87	0,54	-	0,09
verbenone	0,06	0,33	0,66	-	0,11
trans carveol	0,24	0,41	0,43	-	0,04
carveone	0,33	0,76	0,75	-	-
bornyl acetate	**10,11**	**25,30**	**13,05**	-	-
mirtenil acetate	-		-	**31,02**	-
terpinil acetate	-	0,87	-	-	0,53
β-cubebene	-	-	-	-	1,22
caryophyllene	0,10	-	-	0,02	4,19
thuyopsene	-	-	-	-	6,41
cedrene	-	-	-	-	5,34
δ-cadinene	0,04	0,11	-	0,32	0,55
cubenole	0,06	-	-	1,26	-
elemol	-	-	-	3,64	-
caryophyllene oxide	0,32	0,70	-		0,73
cedrol	-	-	-	-	14,20
δ-cadinol	0,02	0,43	-	1,15	-
α-cadinol	-	0,86	-	2,24	0,30

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THE ESSENTIAL OILS COMPOSITION FROM SOME COMESTIBLE APIACEAE SPECIES LEAVES

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Keywords: essential oils, apiaceae plants

ABSTRACT

The characteristic aroma of apiaceae leaves has been determined by a number of 18 up to 46 compounds, in function with the plant species. From these compounds, the highest amount has been registered for miristicine (86,31%) in the case *of Pastinaca sativa*, α-felandren (60,07%) for *Anethum graveolens*, pseudopinene (43,78%) for *Daucus carota*, α-terpinil acetate (46,54%) for *Levisticum officinale*, p-mentatrien (41,04%) for *Petroselinum sativum*, α-limonene (41,54%) and mircene (28,78%) for *Apium graveolens*, also 2-decenal (33,61%) and decanal (25,76%) for *Coriandrum sativum*.

INTRODUCTION

Leaves and roots from a lot of apiaceae plants are frequently used for food aromatisation. Lawrence (1980) has been identified 19 substances in the essential oils extracted from leaves of *Anethum graveolens*, from these the highest amount was noticed for carveone (45,0%) and limonene (35,00%). In *Levisticum officinale*, Toulemonme and Noleau (1988) have been identified 40 compounds, the highest amount being registered for cis-3-butilidene-4, 5-dihidroftal (67,50%). Srinivas (1986) has been noticed that the essential oils extracted from *Petroselinum sativum* leaves had as major compound allil-2, 3,4,5-tetrametoxibenzee (30,05%) while Fehr (1979) noticed that in *Apium graveoles* leaves the major compounds were mircene (33,60%) and limonene (26,30%).

In this paper it is presented a synthesis of the research results obtained at the Research Center from USAMV Bucharest, as regard as the essential oils composition in the case of 7 comestible apiaceae species cultivated in Romania.

MATERIALS AND METHODS

The essential oils have been extracted from leaves of: *Anethum graveolens* L., *Apium graveolens* L., *Coriandrum sativum* L., *Daucus carota* L., *Levisticum officinale* Koch., *Pastinaca sativa* L.and *Petroselinum sativum* Hoffm. The essential oils have been extracted by hydrodistillayion, using a Clevenger type apparatus, from leaves harvested during plants flowering period.

Essential oils separation has been done using an Agilent gas chromatograph equipped with a DB 5 capillary column, with a length of 25 m and an interior diameter of 0,25 mm. The oven temperature increased with a gradient of 4^{O}C/minute, from 40^{O}C to 280^{O}C and as a carrier gas helium was used, with a flow of 1,2 ml/minute. Compounds identification was carried out with an Agilent mass spectrometric detector and a NIST spectra bank. To confirm the pick position in the chromatogram, there were used the Kovats retention indices.

RESULTS AND DISCUSSIONS

Analysis performed at *Anethum graveolens* leaves emphasized the existence of 28 compounds, from those the major were α-felandren (60,07%), dimetilhexahidroxibenzofuran (16,42%) and limonene (15,37%). Carveone which represent the main compounds (45,0%) from samples analyzed by Lawrence (1980) represented only 0,36%.

The essential oil extracted from *Apium graveolens* leaves contained 26 compounds. In the highest amount was α-limonene (41,54%), mircen (28,78%) and trans -β- ocymene (16,39%). These results are according with those obtained by Fehr (1979).

Coriandrum sativum leaves contained 24 compounds, mainly alchools and terpenoid aldehydes. From these, in the major amount there were 2-decenal (33,61%), decanal (25-76%), tetradecadien -1-ol (9,12%) and decanol (7,73 %).

In *Daucus carota* leaves there were identified 46 substances, the most abundant being pseudopinene (43,78%), sabinene (10,78%), germacren D (8,99%), β- caryophyllene (7,21%), α- limonene (5,87%), α- pinene (3,65%) and izoeugenol metileter (3,14%).

Levisticum officinale leaves as well as other apiaceae plants leaves have a characteristic aroma. The essential oil extracted from this specie contained 24 substances, mainly α- terpinil acetate (46,54%), β- felandrene (19,57%), tetrametil ftalid (13,84%), terpinolene (6,13%), β- pinene (4,64%) and β- ocymene (2,18%).

In the case of *Petroselinum sativum* the essential oil contained 18 compounds, grouped in two categories: with low and respectively high volatility. As high volatility compounds there were identified p-mentatriene (41,04%), β- felandren (10,89%), α- pinene (7,93%), β- pinene (5,65%), terpinolene (5,56%) and pseudopinene (4,19%). As low volatility compounds there were identified miristicine (12,20%), apiol (3,22%) and alliltetrametoxibenzene (3,09%).

Pastinaca sativa leaves essential oil contained 27 compounds. The major compound was miristicine with a proportion of 86,31% from total quantity of the identified compounds. In small quantity there were ocymene (3,50%), trans -β-ocymene (2,72%) and β- farnesene (2,27%).

CONCLUSIONS

1. The characteristic aroma of the apiaceae leaves has been done by the presence of a number of 18 up to 46 compounds, in relation with plant species.
2. Between the identified compounds the major were miristicine (86,31%) in the case of *Pastinaca sativa*, α- felandren (60,07%) at *Anethum graveolens*, pseudopinene (43,78%) for *Daucus carota*, α- terpinil acetate (46,4%) at *Levisticum officinale*, p- mentatriene (41,04%) at *Petroselinum sativum*, α- limonene (41,54%) and mircene (28,78%) at *Apium graveolens*, also 2-decenal (33,61%) and decenal (25,76%) at *Coriandrum sativum*.

ACKNOWLEDGMENTS

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Table 1. The principal compounds of the essential oils from some apiaceae leaves species (%)

Substance	Anethum graveolens	Apium graveolens	Coriandrum sativum	Daucus carota	Levisticum officinale	Pastinaca sativa	Petroselinum sativum
α-Thuyen	0,37			0,14		0,12	0,11
α-Pinene	1,62			3,65	0,66		7,93
Sabinene	0,12			10,78			0,38
β-Thuyene					0,83		
β-Pinene	0,07				4,69		5,65
Pseudopinene		0,32		**43,78**			4,19
Mircene	0,62	**28,78**					
α-Felandrene	**60,07**						1,02
p-Cymene	1,24						0,99
α-Limonene	15,37	**41,54**		5,87			
β-Terpinene	0,07				0,91		
β-Felandren					**19,57**		10,89
β-Ocimene					2,18		
α-Terpineol					1,63		
α-Terpinil acetate					**46,54**		
Trans-β-ocimene		16,39		0,61		2,72	
Cis-β-ocymen				2,35			
Ocymen						3,50	
γ-Terpinene	0,06	3,03		0,81	0,22	0,26	1,17
Terpinolene					6,13		5,56
p-Mentatriene							**41,04**
Dimetilhexahidrobenzofuran	16,42						
Decanal			8,85				
Trans2-Decenal			**29,74**				
2-Decen-1-ol			8,96				
Decanal			**9,16**				
2-Decenal			8,84				
13-Tetradecenal			4,16				
β-Burbonene						0,34	
β-Caryophyllene				7,21		0,23	
α-Bergamotene						1,58	
α-Caryophyllene				2,52			
β-Farnesane						2,27	
Germacrene D				8,90			
Izoeugenol metileter				3,14			
Carveone	0,36						
β-Selinene		1,26					
Miristicine						**86,31**	12,20
Tetrametil ftalid					13,84		
Apiol						0,63	

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OTHER FIELDS

POSSIBILITIES OF REDUCING THE ENERGY COSTS BY USING VIRGIN VEGETAL OILS TO TERMIC ENGINES

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Keywords: vegetable oils, viscosity, fuels, engine.

ABSTRACT

By using gross virgin vegetal oils as fuel to Diesel engines from agriculture and transport the energetic costs will reduce almost three times and the pollution will diminish significantly.

INTRODUCTION

The idea of using virgin vegetal oils as a replacement to classical fuels in Diesel engines is not a new one, being launched by the inventor of the engine, which bears his name, an idea which was abandoned until the last decades, when because of the energetic crisis on one side and because of the massive pollution on the other, began again the search for a new source of alternative energy, unpolluted or less polluted and at the same time cheaper and easy to regenerate.

This kind of alternative is represented by the use of rape and sunflower virgin vegetal oils as fuels, in Diesel engines, oils which provide both the energetic reduction and the pollution reduction. In order to achieve such a desideratum a correction of the viscosity of the oil is needed with the help of a device which assures the controlled heating of it till 70 C- to-80 C – the temperature to which the virgin oil gets at the parameters of Diesel oil (gas).

MATERIALS AND METHODS

In order to make the experiment, the aggregate made of the tractor U-650 M with the device of preheating of the set oil and the plough PP-3-30.

The preheating device was conceived and made by the group authors. All its pieces are to be found on the Romanian market and are quite cheap.

For each variant the size of the parcel was established and also the depth in ploughing, the consumption of fuel per hectare for both gas (Diesel oil) and sunflower virgin oil (a culture which grows very well at the pedoclimatic conditions of Romania).

The soil on which these results were seen was the brown-red soil.

RESULT AND DISCUSSION

The entire gas consumption in comparison with the whole surface (in ploughing) for every process of ploughing was of 26.5 litters per hectare, and in the case of virgin sunflower oil the entire consumption was of 24.6 litters per hectare, so with almost 2 litters per hectare lower than in the case of gas.

During the tests there were not noticed any abnormal noises at the engine, on the contrary, the engine seemed to “spin”.

The entire value of the device is not over 4 000 000 ROL for the one with the manual use and 7 000 000 ROL for the automatic one – the one to which the passing from gas (Diesel oil) to virgin vegetal oil is made automatic, when getting to the proper temperature (in a minute or two after starting the engine). For the manual use the preheating of the vegetal oil can be made in two ways: with the help of the cooling agent of the engine by using a device of changing heat or by using an electric resistance, which is actually preferred (though the device is more complicatedly constructed) controlling much better the temperature of the oil. It does not involve any changes of the supplying system of the engine, except the connection of the device, the engine functioning both on gas and virgin vegetal oil, depending on the option.

The general scheme of the supplying system in Diesel engines with the device for the option with virgin vegetal oil can be seen in fig 1. In fig. 2 the practical use of the device can be seen.

The price of one litter of gross oil (obtained by cool press without any chemical changes) is around 6 000 lei per litter if the extraction is made in the producing factory with its own resources (the oil pressing machine and the oil filter obtained preferably second hand). In establishing the price one must take into consideration the medium production of 2 000 kg per hectare sunflower seeds and the medium price of buying of 5 500lei per kg (the price in 2006). The groats obtained after the pressing of the seeds (50% of the quantity of the seeds) can be easily valued at a medium price of 6 500 lei per kg, being a very good protean fodder for animal growth. At the medium mentioned production and at an extraction percentage of 40 % the quantity of gross oil obtained is 8 000 kg per hectare. If the oil density is 0.88, the production will be 909 litters per hectare. Knowing that for one hectare of (stalky) cereals, starting with the main ploughing and ending with harvest, one might say that a quantity of gas of almost 75 litters per hectare is needed and that the caloric strength of gross vegetable oil is almost the same with the one of the gas, in conclusion, the same consumption per hectare, as a result, a hectare of oil-bearing plants provides the necessary fuel for an area of 12 hectares cultivated with (stalky) cereals. In a farm with a total surface of 1 000 hectares, in order to provide the necessary energetic independence, a total surface of 83 hectares cultivated with rape or sunflower (for the medium production taken into consideration) is needed, which is easy to accomplish and even recommended in order to obtain a proper rotation of crops.

The groats obtained after pressing can be valued properly in a live-stock micro farm, reducing even more the price of the obtained oil. Naturally that in the case of a superior production compared to the one already seen, the obtained oil quantity will be even better and consequently the price per litter cheaper, productions which can be easily achieved if the culture technology is respected.

Taken into consideration that for a hectare of normal ploughing 23 litters of oil are consumed and that the economy achieved by using the gross oil instead of gas is 667 000 lei per hectare- the ploughing, the expenses related to the buying of the device, the pressing machine for the oil and the oil filter valued around 42 000 000 ROL liquidate to pay off for an area of 63 hectares ploughing for tractor – adapted for the functioning with vegetable oil. But if devices are set up on more tractors, for example on five of them, the liquidation value per tractor lowers at 8 400 000, to which a surface of 12.6 hectares-ploughing per tractor is attributed in order to liquidate to pay off the acquisition expenses.

CONCLUSIONS

The using of the gross vegetable oil in the case of heat motor lighting by compression allows:

1. the assurance of energetic independence of production units;
2. the profitableness of production units by reducing the price per litre of fuel by a third
3. according to Norm 2003/30/EC of 8 may 2003, the pressed vegetable oil at cool is preferred as bio fuel in CE
4. the caloric power of gross vegetable oil is similar to the gas and its consumption is complete
5. the vegetable oil is placed in class "O" of danger just as water and the watery solutions and as a consequence can be deposit and transported without any special authorization.
6. the oiling of the supplying system of the engine (injection pomp and injectors) is made in better conditions.
7. allows obtaining a good rotation of the crops (the rape is a good forerunner and liberates the soil early)
8. is less polluting: the containing of SO_2 (which is the first responsible for the acid rain) and CO_2 (responsible for heating the earth atmosphere) of exhaust gas is much lower than in the case of Diesel gas.
9. is a regenerative fuel
10. by adding an insignificant quantity of Diesel gas to the obtained oil (11 gas/ 1001 oil) robbery is stopped (it cannot be used neither in alimentation nor in engines which do not have the presented device)

In consequence, as nature assures us a cheaper and much more accessible alternative compared to old fuels, we should take it into consideration, especially that it represents an ecological variant, which is an important aspect for an already much too polluted planet.

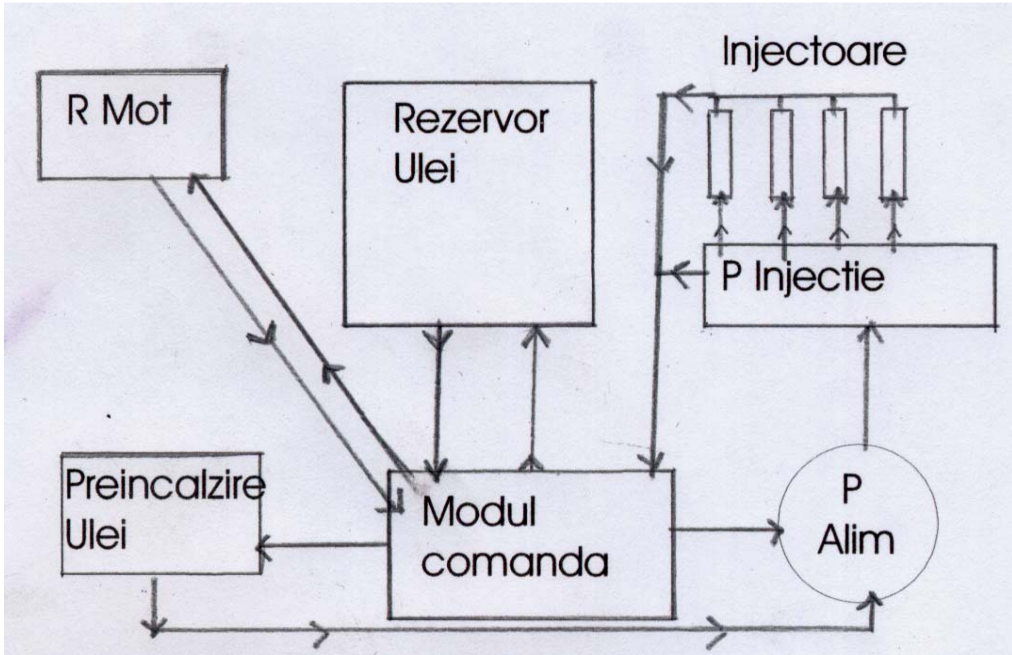

Fig. 1. General scheme of supplying system with gross vegetable oil of Diesel engines

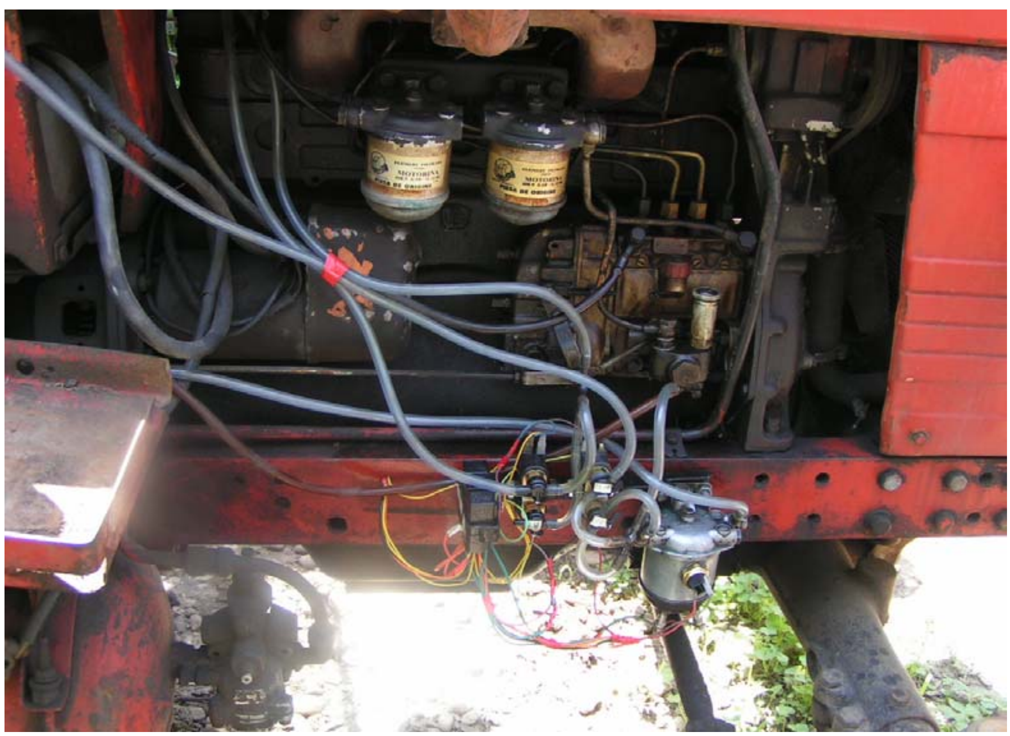

Fig. 2. Before heating device of gross vegetable oil-Practice achievement

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THE NATURAL FRAMEWORK OF SOILS FORMATION AND EVOLUTION IN BIHOR COUNTY

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ABSTRACT

The studied territory presents a multitude of units of relief, as field, hill and meadow with the aspect of large alluvial areas of subsidence, on which numerous deserted river beds parasites, representing the oldest river courses and their affluents. The influence and the action in time of pedogenetic factors (relief, rock, climate, hydrology) as well as human being intervention through important hydro-amelioration works initiated about 200 years ago, determined the existence of a layer of soils with a pronounced complexity and diversity.

METHODS AND RESEARCH MATERIAL

This paper aims at the presentation of a global image of the soil cover in Bihor County and the presentation of the natural frame work of formation and evolution of soils in the studied territory.

The data interpretation, the characterization of the natural framework was elaborated according to the "Methodology for the Elaboration of the Pedologic Studies"(volume I, II, III) and "The Romanian System of Soils Taxonomy" worked up by I.C.P.A. Bucharest in 2003.

RESULTS AND DISCUSSIONS

Geomorphology

In the Western part altitudes of more than 1000 m are registered the most important being Bihor Peak 1849m and Buteasa Peak 1790 m.

The Western part of the county is characterized by low altitudes (Crisurilor Field)

Crisurilor low field is a field towards which converge *Crisurile* and *Barcaul.* Their convergence is clear and pleads in favour of subsidence movements, proved by soil logs.

Salontei Field corresponds to the variety of ancient layers between the present meadows of Crisul Repede and Crisul Negru.It is separated by the High fields, subcollinary of Miersig and the humid depression Cefa and its prolongation, a little bit higher which goes into Crisul Negru, at Gurbediu.

Ieriului Field is only a drained lane, which joined Somesului field to Crisurilor and separates Nirului Field of hills region.

High, subcolinnary fields appear all along the contact with the Western Hills, sometimes with glacisers character, sometimes with low premountaineous plateaux, namely fluvial terraces which does not exceed the relative altitude of inferior and average terraces (10-40 m). Thus, the 20 m terrace, on the left side of Crisul Repede, South of Oradea, continues with *Miersigului Field*

*Miersigului Subcollinary Field (*named after the village situated in the middle of it) is also a piemotan field, with plain interfluvials which go down, enlarging, through divergent valleys, Nojoridului Valley, which starts at the margin of the field near Apateu; Lupului Valley which crosses Apateu and turns to South -West, slipping on one of the agestrels of the subcollinary field; Valea Mierlaului, one of the longest and the largest, in the Southern part of the field, from where exits at Gurbediu.

All these valleys are a little bit deep in the Piedmontain surface and have low slopes, on which they are grouped, in amphitheatre form.

Susagului Subcollinary field (after the village situated in the middle of it) is less developed than the first and takes place at a lower absolute altitude (from 150—160 till 115 m), passing softly towards the low field along a line: Crişul Negru, Berechiu, Cermei, Lunca Teuzului, Beliu, and from there the hilly region comes in direct contact with Crişului Alb Meadow.

Subcollinary Fields on the left bank of Crisul Alb, between Sebiş and Ineu, in „golful" Zărandului "Gulf", lies, between 180-112 m, a field of terraces, cut by concordant valleys, relatively deep, almost entirely deforested and cultivated.

Nirului Field (or Cărei Field) comprises the area from Carei to the South of Valea-lui-Mihai on Bihor County administrative territory.It is field higher than the field around, well shaped as compared to Ecedului and Crişurilor

Câmpia Barcăului or Nirului High Field goes down slowly towards Barcăului Valley where its layer of loesses and sands get lost.

Oradiei Collinary Piedmont, Barcăului Valley, a true Quaternnary field, intercalated between Sălăjene Hills, and large of more than 12 km (at the level of the highest terrace) at its exit towards Tisei Field, limits to the North - namely towards the marginal Salajan plateau a collinary peak, quite large which ends at the near vicinity of the town, at more than 200 m, and falls quickly upon the adjoining field through a subsidence of almost 100 m.

Pădurea Craiului Hilly Piemont-The Piedmontan origin of Dealurile Tăşadului, cut here and there by calciferous hummocks which remained from the mountainous relief (with structure), drawned, seems evident not only in the structure of the hydrographic network of the crest, but also from the levantine gravel cover which can be seen on valleys, and, in some cases, even on crests, till their Western margin (line of the villagessatelor: Apateu-Sîntelec-Osand-Fonău-Tînca, situated on the morphologic contact area -and springs- with subcollinary field

Dobreştilor Coşlenilor Hills, between Topa-Holod-Criş and Roşia Valley make the transition towards the intercalated hills in Beiuşului Depression. They form two collinary peaks: a little one, Dobreştilor Piedmontan peak, between Topei Meadow at the North and upper Holod to the South, with the enlargement of the basin from upper epigenetic piers (calciferous) from Spinuş, and Goila-Forău peak, more extended and complex as structure and relief, limited to the South by Valea Roșia, also large, at the level of the meadow, at about 1-2 km.

The intercalated collinary Piedmonts of Crisul Negru

The entrance in Beius tectonic Depression, axed on Crişului Negru Valley, is made through the a large gate, of more than 16 km which opens in the South of Rosia Valley.From here, the depression in the shape of a net walkway between the mountains hall situated between the Codru-Moma peak and Biharea Massif is getting narrow to the South, where, after passing Criştior, gets into the Upper Crişul Alb Depression.

Crisurilor Meadows or flood hill follows, among the less high factors from the unfloated field, the present-day Crisuri flows.

It is a ramified field, formed by convergent corridors, close to Gyula in Hungary. In the Crisurilor confluence area from where it continues, large, humid or fenny on Crişului Valley. The most advanced towards the subcollinary fields is the one along Crişul Alb, which cools stay in touch with the local area under Zarandului Mountains. This mountainous meadow corridor runs through Zarandului and Codru-Moma mountains to Crisul Alb exit from the volcanic conglomerates defile from the upper Gura Hont. The alluvial hill is interrupted by the higher saddles of the agestre of old alluvians.

Climate

The average temperature varies between 4-10 -11°C. The highest value was registered in 2000, August (Oradea 40 °C, 37, 2°C, Dumbravita de Codru, 30, 6 °C Stana de Vale).The absolute minimal values :-21,2 °C Oradea in 2001, -23,4 °C- Stana de Vale, -17, 8 °C in 1991 at Dumbravita de Codru.

The relative humidity oscillates between 65-85%, higher in the mountainous area. The evolution during the year of the relative humidity is strictly dependant on the variation in temperature. Thus, one can see that the average monthly temperature rise a lot during winter and they are reduced during hot season. Humidity rises in June, due to the large quantity of precipitations (table 1.1 and table 1.2)

Table 1.1

Monthly and Yearly average air temperature (^{0}C) at the main metrological stations in Bihor County (interval 1986-1995)

Month/ Station	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	- X
Oradea	-1,5	0,1	5,7	10.9	16,1	19,3	21,2	20,6	16.5	11,1	5,3	0.9	10,5
Salonta	-0,1	3,6	5,9	12,0	16,9	18,6	21,4	20,5	14,5	13,1	7,7	2,6	11,1
Holod	-1.4	1.2	5,5	10.3	15.7	18.3	20,0	19.4	15.6	10.2	5.0	0.8	10.1
Beiuş	-1,8	0,4	5,1	10,1	16,2	18,9	20,4	20,8	15,9	11,2	5,4	0,6	10,1

During the year the monthly quantity of precipitations changes considerably according to the frequency and direction of the air mass, of the fronts as well as the degree of development of local processes and thermo convection. The highest quantity of precipitation is registered in June, when the Cyclonic activity is thermically intense from the inside of the unstable air masses, arrives at high values.

In the field area quantities of about 500-700 l, in the hill area till 900 l, and in the mountainous area of more than 1500-1600 l during rainy year's quantities of more than 2000 l (2084 in 2001 at Stana de Vale) were registered.

Table 1.2.

Monthly and annual average temperatures (l/m^2) at the main meteorological stations in Bihor (interval 1986-1955)

Month / Station	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	- X
Oradea	33,6	35,2	42,6	52,0	68,3	82,8	58,8	58,4	51,7	55,5	48,5	47,5	635
Salonta	32,6	43,4	48,4	54,9	53,2	94,2	41,3	37,2	45,2	37,8	21,6	64,5	579
Holod	47,2	39,2	41,3	55,4	76,8	101,7	79,2	66,6	50,3	46,4	47,7	50,3	702,1
Beiuş	38,2	41,4	40,2	56,7	74,2	97,3	61,5	60,2	47,8	42,6	49,1	64,7	676,9

Determined by the baric contrast created within the general circulation of the atmosphere, the wind is an element characterized by a large variability in time, regarding direction and speed. .Despite the fact that it is a temperate area, the Western circulation is weak with a minimal frequency in December, January and February and higher in June.

From the climate types map on the Romanian territory, results that the studied space can be framed within the continental moderate climate at the interference between the province sector with oceanic influence and the climatic province sector with submediterranian influences.

According to Koppen, the climate of the space taken into consideration is framed within the climateric province C.f.b.x, characterized by temperate climate with precipitations during the whole year, but with a humidity deficit during the summer months. The annual average of "De Martonne" aridity coefficient is about 29, 0-30, 5 which situates the considered space at the interference of the semi-humid silvosteppe with humid-silvosteppe (Ia=precipitations/ t°c +10).

After the value of the aridity coefficient (29, 0-35, 5) and hydro-climateric coefficient (Ih=precipitations/evapotranspiration x 100) which presents values of about 87-89, the studied spaces is framed within the average annually balance deficit (with an aridization tendency).

Regarding the facts mentioned, it is necessary to consider the fact that during some years, exceptions from the multiannual temperature and precipitations average appear, especially regarding their repartition during the vegetation period (reflected also by the level of the crops during those years)

Also, some exceptions from the average multiannual levels of precipitations appear, due to some local conditions: mezo and micro relief forms, granulometric composition, the existence in the area of some pedomeliorative systems.

Hidrography

The hydrographic network -the main river flows crossing Bihor County are Crişul Repede, Crişul Negru and Barcăul, *natural lakes* Garpilar Lake, Tăul Mare and anthropic lakes – barrier lake Roşu on Valea Iadului.

The physio-geographical and human factors have a powerful influence upon surface and subterraneous waters imprinting its own characteristics.

The water network which drains the surface of the studies area is made up of rivers which have their origin in the mountainous area of Apuseni and Western Piemond, rivers belonging to the glacis generation.

The whole hydrographic system is oriented towards the Crisurilor subsidence, crosses the studied area from East to West, forming consequent valleys, and on Hungarian territory they join in a common flow which runs into Tisa (figure 2.1)

The density of the hidrographic network coincides, generally, with the density of the relief fragmentation. In the low field, the hidroameliorative works created an artificial channel network with a high density.

The construction of these channels led to important changes in the areal hidrography, namely they supply in a great measure the collector function of the waters to the reception basins.

From a hidrographic point of view, the studied territory is part of Crisul Repede basin, Crisul Negru basin, Crisul Alb and Barcau basin being formed by a lot of sub-basins.

The hidrographic network confluent to Crisul Repede is composed by a majority of secondary valleys with water almost all year long like Valea Balaii, Vlea Uileaculu, Valea Tilecusului.

These valleys have a permanent debit, with large oscillations according to the precipitations fallen in their retention basin. For the debit regularization and flood prevention barriers were built: on Canalis, West side of Les, and on Gepiului Valley, at East of Gepiu.

The influence of the freatique and surface waters upon the solidification processes through:

- the intensification of the oxido-reduction processes, concretized in gleization, stagnogleization or amfigleization of the soil
- the emergence of the soil podzolization and subsidence phenomena, which leads to the reduction of its permeability
- conditioning of a specific vegetation development, adapted to the conditions of humidity excess.

From a qualitative point of view, the freatique water in the piedmontan area is low mineralized, and in the divagation area is moderately or strongly mineralized.

Vegetation

The human intervention upon the vegetal strata (and natural ecosystems, generally) appeared since the beginning of his economic activities, thus the present state of the soils and vegetation is a result of the intervention between natural and anthropic factors.

From a phitogeographical point of view, the studied space belongs to the Central European geobotanical province, strongly influenced by the proximity of the Southern European geobotanical province *Thus, the natural floral elements with different geographical roots: European, Euro-Asian, boreal, Balkanic, Mediteranean, Illiric to which a series of endemisms can be added.*

The vegetal layer of the field represents one of the elements of the geographic landscape, a constituent of the field geosystem, strongly influenced by the human activity. Today the natural vegetation, although restricted as surface, represents a concretization of the pedo-climateric and relief factors, modified by the field humanization process, imposing them many times in the region landscape.

In the flora of Crisurilor lowland, one can distinguish the following characteristic species: *Rumex domesticus, Spergularia salonta, Cardamine perviflora, Rorippa kerneri, Elatine irandra, Sedum caespitosum, Saxifraga bulbifera, Cirsium brachy-cephalum, Asparagus tenuifolius, Pholiurus pannonicus* etc.

According to the humidity level to which plants adapt, one can see that the mezophytes are the best represented (62%), indicating a region with moderate and permanent humidity , followed by xerophytes(21, 5 %) which vegetate in hot and dry sun climate. Then hidrophytes and higrophytes come and finally halophytes.

The areal ponderosity of the forest in the field occupies only 4,5% of the total surface of this unity, in some forests the initial species have been replaced by alohtone species, and as a shape, the forests have geometrical aspect, being crossed by transportation networks.

In some forests, as Chişirid, Păuşa, Gepiu, Miersig, Căuaşd or Beliu, the predominant species *(Q. cerris)* represents up to 80%. In their composition enter: *Q. frainetto, Q. petraea, Acer campestre, Ulmus foliacea, Carpenus betulus and as little tree Acer campestre, Crataegus monogyna, Rosa canina, Ligustrum vulgare* etc.

The woody meadow vegetation of soft essences along some of the river fields some small pieces of parks can be met, generally reduced. On Crisuri, the parks populate the spaces comprised between dam and river course, contributing to the increase of raggednedd, illuvium of this space.

In the low field, these parks follow, here and there, the intermittent river course

This vegetation is represented by weak shrubbery of Salix alba, Alnus glutinosa, Populus alba, Alnus glutinosa etc. The scrub strata are composed by blackthorn, wild rose, vergar etc.

Due to the fact that, in a large part, these parks are weeded out and pastured, grassy vegetation is destroyed in a large quantity, more frequently appearing the reed, cat tail and rush.

CONCLUSIONS

After studying the natural framework and soils in the area, the following conclusions can be drawn:

1. from a geomorphologic point of view, the studied perimeter is framed within the big unity of Panoniei Field, Campia de Vest (Campia Crisurilor) subdivision and Piemonturile Vestice(Piemonturile or Dealurile Crisene)
2. geologically, piedmontain or hilly area is constituted by shale's and Sarmatian conglomerates covered in a large quantity by Pleistocene clay, new quaternary deposits

3. according Koppen climatic maps the largest interfluvial area belongs to province "C" (temperate wet Climate), subprovince "F"(with sufficient rains and snows, during the whole year), the region "b"(the hottest month temperatures lower than 22° C) and subregion "x" (at least 4 months, average temperatures of more than 10 °C)
4. the main water flows which cross Bihor county are Crisul Repede, Crisul Negru and Barcaul, natural lakes Garpilar, Taul Mare and anthropic lakes-Rosu barrier lake, on Valea Iadului
5. the studied area is covered by a silvo steppe vegetation, changed significantly through culturalization. The field area suffers intensive steppization processes due to the lowering of the phreatic water after intense activities of territorial improvements

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RESEARCH RESULTS REGARDING SOME ESSENTIAL TECHNOLOGICAL LINKS FOR PROMOTING ECOLOGICAL AGRICULTURE

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ABSTRACT

By the research undertaken, one can highlight a few technological links among which planting a larger number of trees per hectares, fertilizing with organic fertilizers, trenching the land before planting and irrigation-all these can constitute the complex of measures to stay at the basis of biological agriculture promotion. Regarding the maintenance of trees health an important measure is the production of resistant species and soils and where these are missing the maintenance of the production under the damaging level will be done by using the substances allowed for destroy, completed by the physical and biological combat of the damaging factors (pheromones catchers, the use of plunderers).

Fruits production using unpolluted technological links knows a process of extension in the countries with developed economy and agriculture.

This process has in view the achievement of performance production without using inputs (fertilizers, herbicides) which can influence negatively the environment protecting at the same time the fruits from the accumulation in their componence of the substances considered dangerous for the consumers.

This concept of pomiculture does not lead to the accentuated decrease of the level and quality of the crop and must respect strictly the unpolluting technological conditions and constantly promote technical measures which favour the growth and fruiting of the trees.

Researches in this field are not sufficient to render evident and put at their disposal links and measures for the stimulation of production, we present some results obtained in experiences which took place in Oradea area, which can constitute a good start for those deciding to promote agriculture closer to nature.

NATURAL CONDITIONS, BIOLOGIC MATERIAL AND METHODS OF WORK

The trees plantation which are the object of this work were placed in the tree basin Oradea-Valea lui Mihai, where the climateric conditions are characterized by average annual temperature of 10,1 - 10, 3 and precipitations of 600-635 mm, resulting a favourable climate for the development of the tree species of the temperate climate.

The characteristic soils were the dark luvic and sandy soils, naturally well- drained.

As a biologic material used for all species (sour trees, peach trees, apples and almonds) all varieties and stocks adapted to the conditions of that area.

The criteria for evaluation was the fruit production and the growth in grossness of the trunk presented in the following tables

THE RESULTS OBTAINED AND REMARKS

Regarding choosing the field for the new plantations in Table 1 are given some forms of relief (plateau, hill, terraced slope) on which some or more species were planted. By analysing the data in this table one can see that apple and pear develop better when the trees are planted on the field as compared to those where the diameter of the crown is less than 17-24%.

The same thing happens to the other species in the sense that trees planted on the plateau or on versants have the trunk grossness bigger with differences statistically represented as compared to the other terraced forms of relief

Preparing the field for planting is another important measure which influences the growth and fruiting of the trees. Table 2 presents the behaviour of the apple tree under the aspect of depth and natural manure(manure and green fertilizers).

Thus, one can see that the best results expressed in production increase had the trees on trenched soil at 60 and 80 cm which exceeded the tillage factor with 30-42% with differences statistically represented.

A good behaviour had the trees fertilized with 20 t/ha manure, which exceeded those on the unfertilized plot.

One has to mention that trenching the land and fertilizing it with manure before planting are agrotechnical unpolluting links which have to be compulsory in ecological plantations.

Another way of achieving high production is planting an increased number of trees on hectare. As one can see from Table 3, fruit production for sour cherry and peach can double by planting up to 2500 trees/ha.

The increase of the number of trees on hectare should be joined by an increase of the organic fertilizers and applying the irrigation, which as one can see from table 4 can bring increase of the crop of 45-61% at which one can add the improvement in quality with 15-30% being joined by a better turning into account of fresh fruits for consume.

Considering that the chemical elements can be replaced with the organic elements (manure, green fats), in order to respond to the ecological agriculture, it is compulsory to give up to some chemical treatments against diseases and pests.

The present achievements in this field allow the substitution of treatments with a high degree of pollution by promoting for cultivation immune species or species resistant to diseases by diminishing the pests' attack by using pheromones catchers as well as physical methods and biological combat by multiplying and launching in the orchard the species of predatory insects.

CONCLUSIONS

The research results presented bring convincing arguments that these can be brought by the adepts of the ecological agriculture without this new technology leading to the quantitative and qualitative diminishing of the fruit crop.

Ecological pomiculture will be placed in areas favourable to the culture of trees on fields with elevated natural fertility on plateaux and slopes. It is not recommended to cultivate trees in the concept of ecologic orchard (biologic) on poor lands on high slopes which necessitate terracing:

1. Choosing the species and varieties according to productivity and quality criteria but also considering the resistance and immunity to diseases and pests.
2. Fertilizing with natural manure (manure, green fertilizers a.s.o.) substitutes the chemical fertilizers maintaining the orchard at a normal production potential.
3. Planting a large number of trees per hectare (1200-2000) makes that the intensity degree of the ecologic orchard to be increased.
4. The success of the ecologic plantations is guaranteed especially if irrigation takes place in the areas where precipitations are unde 650 mm annually.
5. The problem of the health of plantation can be achieved besides the promotion of resistant species by applying the biological methods in case of the insects (pheromones catchers, the use of plunderers).

During the next period, as the request for ecological fruits is in growth the intensifying of research for improving the technological parameters specific to the trees culture especially for enlarging the combat of diseases and damaging effects.

Table 1

Influence of some forms of relief upon trees growing in Oradea conditions

Species	Form of relief , the position of the tree in the field	Trunk Circumference cm.	%	DL 5%
Apple	Slope	19,7	100	3,1
	Surety Terrace	14,8	74	0
	Up Terrace	16,3	83	0
Peach	Slope Base	22,4	100	
	Surety Terrace	23,1	103	1,9
	Up Terrace	18,9	84	
Pear	Plane	43,2	100	5,5
	Terraced forms in time	37,8	87	0
Apricot	Plane	48,9	100	7,1
	Terrace realized by works in time	48,2	98	-
	Up Terrace Trees	41,8	85	0
Almond	Slope base	9,1	100	1,6
	Trees terrace in surety	7,6	84	0
	Up tree terrace	6,0	66	0

Table 2

Possibilities of preparing the land for the set up of the tree plantations with a high degree of productivity

No.	The factor studied, variant	Fruit Production		%	DL 5%
		kg/tree	T/ha		
1	Mobilized at 20 cm	20,8	11,5	100	3,6
2	Mobilized at 40 cm	22,0	12,2	106	
3	Mobilized at 60 cm	26,8	14,9	130	*
4	Mobilized at 80 cm	29,5	16,4	142	*
	Cultures for green manure				
1	Without manure	-	4,4	100	0,5
2	Manure 20 t/ha once in 2 years	-	5,2	119	*
3	Vetch	-	4,9	112	*
4	Autumn Vetch	-	4,3	99	-
5	Summer Cole	-	4,3	99	-

Table 3

Planting distances and their influence upon fruit production

Species	Distance trees/ha		Production		Signification
			T/ha	%	
Sour-Cherry	4 x 3m	833	4,4	100	
	4 x 2m	1.250	7,2	164	+
	4 x 1m	2.500	12,2	226	++
Peach	4 x 3m	833	3,8	100	
	4 x 2m	1.250	7,3	190	+
	4 x 1m	2.500	7,7	202	++

Table 4

Irrigation of apple orchard and fruit production during the first 5 years

	Variant	T/ha	Diff.	%	DL 5%
V_1	**Unirrigated witness**	**17,0**	**-**	**100**	**6,9**
V_2	**Irrigated at 30% I.U.A.**	**24,7**	**7,7**	**145**	*
V_3	**Irrigated at 50% I.U.A.**	**25,1**	**8,1**	**147**	
V_4	**Irrigated at 70% I.U.A.**	**27,5**	**10,5**	**161**	*

Active Humidity Interval I.U.A.

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THE ESTIMATION OF DROUGHT PROCESS IN ROMANIA'S SOUTH-EAST IN CONNECTION WITH PEDOCLIMATIC RELATION - REFERENCE TO BARAGAN AGRARIAN REGION OF IALOMITA

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ABSTRACT

Located in Romania's south east, the Baragan plain of Ialomita is a characteristic unit for the country, that due to the increased process of drought.
The hydric deficit of the region has increased in latest years because of the global climate changes. As a result of this situation, the drought phenomenon is getting aridity or climatic catastrophes shades (Facaeni locality, for instance, where in august 2002, the first tornado on Romania territory took place).
The present work-paper objective was the interpretation of climatic data, as well as the soil analytic data. As a result of this interpretation, a better and more correct estimation of the drought periods was obtained.
We have to mention that the drought process is also a consequence of the irrigation systems absence.
Anyway, the lack of the hydric component in soils case has leaded to the increasing of the organic matter mineralization, a high risk for decreasing soils fertility and agrarian yields, in the end.

INTRODUCTION

The global climatic changes where we are witness, are limit oneself to restricted areas becoming a problem with major impact on the geographic environment, affecting the various domains including the social –economical activities.

The last 5-6 years are characterized by the high frequencies of phenomena bringing out material damages and changes of natural environment components and sometime with human lives lost.

Beginning with 1985 entire Europe crossed a serious climatic unbalanced period which had repercussions on the soils layer too.

In the present moment we are in the climatic changes period displaying on background global heating.

The drought, the desertification is defined like a natural risk phenomena close depending with others natural perturbations, but with those which are inducing by the humans. The process couldn't be separated by the climatic factors which generate it and control its evolution but it couldn't be separated by the impact resultant on the soil through the mineralization and organic substance destruction.

MATERIAL AND METHOD

The increasing values of I ar (index dryness) in the last two-three decades, drive to territorial extending regarding the drought phenomena.

For our country are included the geographic units as south part of Moldavia, Dobrogea, Baragan field and river extremity of Oltenia.

Regarding the soils layer the drought phenomena concurred to erosion draw out on the slope lands, salt increasing due to intensification of evapo-perspiration process and slowing down some geo-chemical which have repercussion on the biological activity from soil.

After a pronounced decreased of productivity that was a signal which leaded to limiting the crops and in the future couldn't be applied an intensive agriculture. The criteria which leaded us to the estimating drought process were the soils factors and their relationship with some climatic components (temperature, falls, evapo-perspiration).

We based, in the same time, on the past data recording by the IMNH network and phonological observations.

RESULTS AND DISCUSSIONS

The researches was done to the very important location for agriculture from Romania – Baragan field agrarian region from Ialomita

The region is well known like a dryness pole with the falls which not exceed by 400 mm. This fact which had imposed in not far away past the building the irrigation systems, today they are partial or total damaged.

For the researching phenomena we had the meteorological records during by longer period then 100 years from weather Station Fetesti. The conclusion was the desertification tendency on the 3 000 000 ha surface from the Romania's south-east area where 28 000 000 ha are arable lands

The observed agriculture crops, wheat and maize are related by the humidity from soil. During their vegetation are critical periods for water (heading stage, blooming stage and filling the wheat krenel, blooming stage, reproductive period and milk stage for maize) when the soil humidity must to exceed 65% from CAU (useful water capacity), and relatively humidity from air must to be between 60-80%, the temperature must to be moderate (16-20°C for wheat and 20-28°C for maize.

The pedological factors and meteorological too have a permanent, decisive and generally action regarding the easy of access humidity reserve from soil. This is a consequence of the penetration, storage and consumption water from control section. Atmospheric drought is due to the falls missing or their insufficiency through the extending the manifestation period lead to pedological dryness when the soils become dried.

Studying for our country the droughty year's period comparatively with rainy years resulted a diminishing water reserve from soil for the Baragan area between 250-1000 l/m^3

The most extend drought period was in 1945-1953. The rest of periods till 2004 were by 1-3 years. The longest periods and biggest intensity with serious repercussions for agriculture crops is the crop which is seeding in the autumn in the first and second decade of September and continue in the next month. This fact indicates a high degree extend probability in the cold season and continue to the vegetation period from next year. Then, the water easy of access reserve from soil on the 0-100 cm depth to the winter crops (wheat, rye, barley) and perennial forage, decrease during the spring time till the 400 m^3/ha. For plough horizon (Ap) is meaning the CO limit (withering coefficient)

The 1998-2002-2003 years were one of the recent drought period and for Baragan – agrarian Ialomita region too. Then, in the second decade of July an extremely high termic regime was maintained then the normal one, with temperatures between 37- 42°C for air and 65-68°C at the soil surface.

Air saturation deficit lasted 3 weeks then and corresponded with a relative humidity <30%. Hot days were followed by tropical nights (temperatures <25°C), a thing which increased breath process of plants and disintegration of carbon hydrates, in the damage of dry substance accumulation.

High temperatures from Romania's south – east (in July/August) increased the vegetation development for maize crop with 30-40 days, so the vegetation stages become shorter, forcing the premature raping, a small size for fruits organs, dryness grains and, of course, diminished harvest.

The crops were damaged with 40-60% and even all of them in some agriculture units (Stelnica, Facaieni, Movila etc.)

The water disposal from soil was obtained in the base of aridity agrarian meteorological index (Si) adapted to the clime and soil conditions from Romania, particularly for Baragan – Ialomita region.

This includes three elements which get out to the normal situation: the temperatures, falls, and easy to access humidity reserve for the plants from the 0-100 cm soil layer.

Beginning to the 1985 recorded a persistence a strong drought (Si>3), the highest was in 1992-1998, 2002-2003 when the Si =5.5. The August was considered the most persistence drought month from the last 20 years.

The soils where was observed the dryness effects was Chernozems which are dominated in the Baragan area represented by various subtype and varieties separated by texture, humus reserve, salt process etc.

Regularly they have a good and very good physical-chemical features, the degradation process observed being related more by the physical causes (hardpan, crust) destructive which most frequent meet is.

The hydro physical index was researched by purpose to follow their role for water access to plant. We are interested by the values of (pF, CT, CC, CO, EU, CN, CH).

Strictly from pedological point of view these indicators are not risk factors. They have a restrictive role just in the climatic stress and in the pressure of drought phenomena. Middle texture, clay are the support of earth pedological safety of these soils.

Season observations of falls in the Baragan/agrarian region Ialomita, around railway station Fetesti (25-30 years) on the Chernozems soils had given us the possibilities to observed the drought periods like follow: April has a probability phenomena by 52.4%-66.7% over 60% are observed the September-October in the increasing soil dryness situation.

Easy to access water reserve for wheat and maize was calculated for no irrigated crop and was observed on intervals: 0-20, 0-50, 0-100 cm.

The useful water capacity (CAU) was calculated for dominant soil, calcaric Chernozems.

This one has following limits:

- 0-20 % from CAU / extremely dryness (SE)
- 20-35% from CAU –strong dryness (SP)
- 35-50% from CAU –moderate dryness (SM)
- 50-70% from CAU –well supplied with water (AS)

The sum of humidity deficit from calcaric Chernoyems soils from Baragan, agrary region Ialomita calculate the frequencies easy to access water reserves for plants too, under the 50% level from CAU on the specified depths.

WE considered that, this reserve is not sufficiently to assure the normal development of agriculture crops in normal limits till the maturity.

It was the criteria to establish of lasting frequencies, intensity and distribution of probabilities producing of pedological drought phenomena.

These criteria permitted the draw out the drought periods with the few months lasting according to xeric climate signed on the world climate map (FAO 1990) for the Romania's south –east area when the control section of soils is dried on the many months period from agriculture year.

CONCLUSIONS

The characterized drought phenomena, in generally, and particularly that one which affect the Baragan area had need by the many discipline researches, grouping the past researches and observation regarding the fertility stage of soils.

The tendency of last decades with big climatic fluctuation was desiderated regarding the water reserves from the soils of Baragan field - agrarian region from Ialomita.

Hydro decompressing can have an atrophic cause through the stopping the functionality of irrigation systems which can bring in the soil in the established intervals the needed water from normal development of agriculture crops.

The falls regime which can ensue the needful water in soil following the cyclic periodicity of atmospheric phenomena where add the perturbation from the last 2-3 decades. The soils is stopper factor for storage a good part from falls but for that it must to have middle texture and loess storage of Cherokees soils from area is not a condition by storage rock for falls water and the presence of carbonates from surfaces is the surest indicator of hydric deficit.

The drought phenomena are completed by the accent of organic substance mineralization. This fact, lead to decreasing the soil fertility and like a consequence of agriculture productivity.

Table 1. The frequencies falls deficits in the agriculture crops vegetation period (April-October) on the 35 years interval in the Baragan - agrarian region Ialomita area on the calcaric Chernozems soils (K1) and epicalcaric Chernozems (K2)

Months - vegetation period of agrarian culture	**Frequency and intensity of producing phenomena**							
	Small		**Middle**		**Big**		**Very big**	
	(<20% from multiyear average)		**(21-30% from multiyear average)**		**(31-50% from multiyear average)**		**(>50% from multiyear average)**	
	Nr. of cases	**%**	**Nr. of cases**	**%**	**Nr. of cases**	**%**	**Nr. of cases**	**%**
April	11	52,4	0	0	1	4,8	9	42,9
May	10	47,6	1	4,8	1	4,8	9	42,9
June	7	33,3	3	14,3	2	9,5	9	42,9
July	11	52,4	3	14,3	3	14,3	4	19,1
August	12	57,1	1	4,8	1	4,8	7	33,3
September	10	47,6	2	9,5	1	4,8	8	38,1
October	8	38,1	3	14,3	3	14,3	7	33,3

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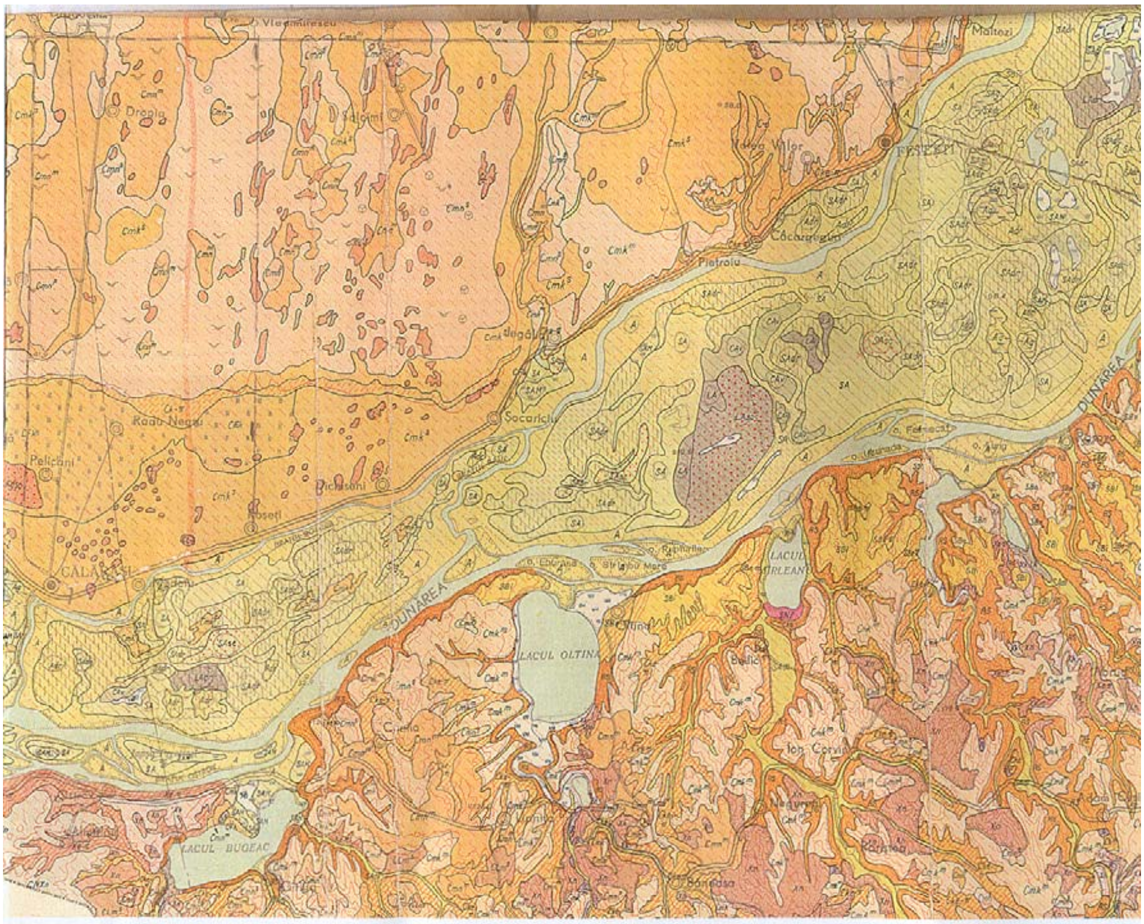

Figure 1

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THE CHERNOZEMS "ISLAND" LOCATED IN SOCOL-BAZIAS, CARAS-SEVERIN COUNTY

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ABSTRACT

The researches location was the Danube Gorge tight valley, nearby Socol locality.
Here, it was identified an area very much like an island with limestone chernozems subtype; these soils genesis represents the ″substance″ of this work-paper.
Socol plain, the way it is nominated on Resita soil sheet, the 1/500 000 model, appears to be an unique plain because of its geographic position and the presence of chernozems type soils.
Surrounded by Locvei Mountains, by Danube and Nera River, this plain is absolute unique compared to all neighbourhood relief units; it has a crystallite geological base, but the fluvial accumulation brought numerous materials, especially loess, which has represented the parental material for Socol chernozems.
The presence of carbonates at the surface ″underlines″ the freshness of the material, meaning that material had not enough time to be washed on the soil profile.

INTRODUCTION

The location of presentation was chosen in order to respond to a theme regarding the behaviour of some cultivated plants varieties, in the specific ecological conditions of Caraş-Severin County.

Entering in tight valley of Danube from Moldova Nouă, close to the upstream, we see a „plain bay" after 30 km of rood and once we're aut of Baziaş. Guarded by Locvei Mountains in the cast and south and limited by Nerei Valley. Wear the borderline, Socol plain captures our attention, both from geomorphologicallyand pedologically poin of view. As a consequence, our observations werw rwlated to the region genesis, to the chernozems presence in an area occupied by Brown Forest soil, Luvic Forest soil, Acid Brown soil and Litosols.

MATERIAL AND METHOD

This research study was based on territory mappings and maps which have been elaborated before (1/200 000 scale). All areas with chernozems from Socol perimeter were studied; it was studied, as well, the relation between culture plants and the condition of soils, as part of some specific plants.

Other aspects which have been included in the present study refer to relief, parental lithology and underground water.

RESULTS AND DISCUSSION

The topography of Socol area means accurate limits with the river zone from Baziaş, the contact with crystalline rock of Locvei Montains, through an erosion piedmont and finally, the meadow of Nera River.

The total opening from Socol – once Danube enters on Romania's territory and the plain is formed – is due to successive accumulation of materials from common meadow and Caraş and Nera Rivers. The existence of a crystalline high from Banatska Polanska-Rom (ex-iugoslavic territory) has „forced” the Danube to change its cross to E-SE. This way, the conditions to deposit alluviums were created for both rivers which were swallowed by the Danube (Caraş, from Serbia's territory and Nera from Romania).

As a consequence, an accumulative relief resulted, with terraces and meadows of erosion.

The evolution of relief influenced the genesis of local chernozems: they are calcaric chernozems (Czka) which „talks” about the presence of alluvial deposits.

On the old terrace „shoulders” from the common meadow of Nera and Danube, cambic chernozems appear. This type of soils was also identified in Danube's tight valley, at Divici, Belobreşca, Pojejena and Old Moldova, on the loess deposits which cover parts of crystalline base of Locva Mountains.

The name of localities is no strange to the relief forms (in the area, the village Câmpia from E Socol expresses best the field configurance).

The real plain lies between Danube and Nera River, on one side, and Locvei piedmont, on the other side, where calcaric chernozems were identified. Between mountains high of Locva area and the centre of the plain, an altitudine difference exists (about 350-300 m).

The plain is crossed by two rivulets which spring from Locvei Mountains and are captured by Nera. On the valley sides, eroded chernozems and eroded soils were identified.

The meadow of Nera River is occupied by Brown Forest soils (Entricambosols).

A characteristic of Socol plain is the very good drainage of soils, a fact which shows the presence of loess material in the control section of chernozems, and the very good permeability and aeration for these soils. A large variety of agrarian cultures can be cultivated, because major risk factors are small. Calcaric chernozems from Socol have the following profile: AmKa–A/Cca– Cka – C, the first two horizons being structured (granular structure). The loamy medium texture gives this type of soil good physical and chemical features, especially humus reserve (over 250 t/ha) and good hydrophisical and mechanic indicators.

Calcium carbonate appears both at the surface of soil and on the profile. Crotovines, as a sign of soil fauna activity, appear. Regarding the reserve of nutrients for Socol chernozems (N, P, K), we can only appreciate it to good and very good, as well as for microelements.

CONCLUSIONS

The studying of chernozems perimeter from Socol in the mounts Banat area has represented in the first place a curiosity in terms of research. Knowing the area and the soil cover, the only question we asked ourselves was how these soils appeared in the zone, how they evaluated and which is their agrarian potential.

The Socol plain is unique through its genesis, its evolution and its pedological configuracy. We can only say that this type of chernozems, especially the calcaric subtype, was never identified somewhere else in the whole V-SV of Caraş-Severin area. A contribution to this is due to the relief, in the first place, followed by common sedimentation from Danube, Nera and Caraş meadows.

The solidification of the alluvial deposits and the loess accumulation represented the parental material of these chernozems.

So, the region evolution, as well as the evolution of soils cover, is closely related to the hydrological configure of Danube basin. The river fitting out from the last four decades has leaded to the modification of some geographic components and to the soils evolution itself. All the changes from the surface of the field were highly felt by the soil.

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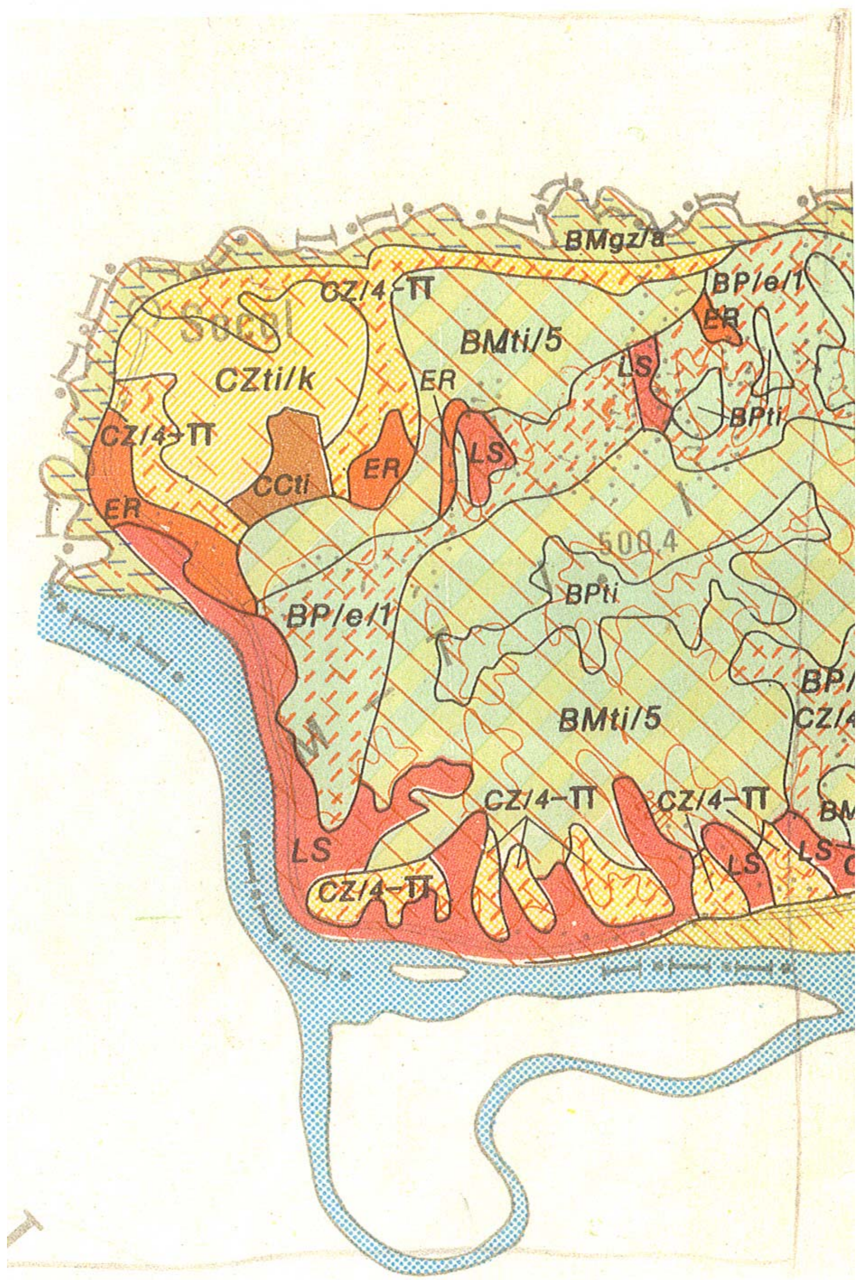

Figure 1

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THE INFLUENCE OF THE SOVIETIC INHABITATION MODEL ON THE EASTERN EUROPEAN COUNTRIES

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Keywords: *Kommunalka*, communal apartment, social houses, redistribution, Communist Party

ABSTRACT

All the countries in the Eastern block and under the influence of the Soviet Union were forced to apply the same inhabitation policies (especially in the first years) then they managed to go a more original way.
As a consequence of the damages caused during World War II, of the lack of funds, of the natural calamities (drought, fires etc.) after the war and of the new communist regime, in these states flats, houses, lands and goods (including industrial) were seized.
Russia was a special country in the history of social housing from this point of view and from the point of view of the mentalities and of the communist regime, which was very strict in all fields of activity and especially in housing matters.
The seized flats were redistributed to more families, so that each family received one room and all families had to share kitchens, bathrooms, hallways and even the telephone line.
In the other Eastern countries, flats and houses were first redistributed, but after the natural economic recovery new housing projects have been constructed, at first on the Stalinist model and then in ever higher blocks that allowed that a large part of the population be concentrated in 'standard' flats and controlled from all points of view (political, sanitary etc.).
This work is designed as a study of this phenomenon, of the forced used to bring it about in the other countries from the Eastern block and especially of its consequences.

INTRODUCTION

The communal apartment (Kommunalka) was an important feature of everyday life in the Soviet Union as well as being a place that has attracted the attention of foreign scholars interested in the unique forms of Soviet society.

Kommunalki were created in apartments that had belonged to middle-class and aristocratic families in pre-revolutionary Russia. Generally, they were situated in city centres in tenement constructed to individual blueprints.

This type of housing, where several unrelated families were forced to live together sharing the bathroom, toilet, kitchen, hallways and telephone, has been the domestic habitat of several generations of Soviet citizens. The most important change imposed on the family apartment when remoulded into the kommunalka was the division of space into two kinds: places of common use and rooms for families or individuals.

It might seem that the inhabitants of communal apartments were unaware that they lacked privacy, but the concept of privacy has never been a feature of Russian and Soviet culture and, in fact, the term itself is hard to translate into Russian.

Nevertheless, in recollecting their experiences, the inhabitants of communal apartments often talk of feelings of humiliation, discomfort and tension similar to those felt by people in the West when their privacy is violated. The phenomenon of the communal apartment presents an important opportunity to explore the idea, experience and legacy of a Soviet version of privacy.

The communal apartment hardly belongs to the social sphere. Life in this kind of apartments cannot be described as purely domestic or simply personal as it includes social relation with those who are neither members of the household nor of the family, and everyday life is regulated from outside.

MATERIALS AND METHODS

This work is designed as a study of this phenomenon, which has had consequences not only in its country of origin, but also in the neighbouring countries. A comparative analysis of the manner in which this pattern has been imposed and its consequences has been made according to the following criteria: architectural (spatial and compositional), equipment (plans, historical documentation), psychosocial (sociologic and impact studies), economic and in the first place political.

Leningrad was infamous for having the highest percentage of communal housing among the Soviet cities. In 1951, an average of 3.3 families lived in each apartment in the city. In 1989, the percentage of communal apartment inhabitants in St. Petersburg was still 23.8% of the city population and was 4.8 times higher than average in Russia and 2.6 times higher than in Moscow.

The communal apartment emerged during the period of housing redistribution (1917 – 1921). After the Revolution, all housing was expropriated by the State. The newly privileged were given the opportunity to improve their living conditions by occupying high-quality housing. Some of the former householders were evicted from their apartments, while others were allowed to remain by sharing their former homes with less wealthy families resettled from poorer outskirts. As a considerable part of the housing stock in the centres of big cities consisted of spacious apartments, the Bolshevik authorities decided to solve the housing problem by reducing the living space through the 'condensation' of apartments that belonged to the formerly well-to-do. As a rule, each family was allocated one room, with the living space determined by sanitary norms. In 1919, the sanitary norm was established at 8.25 m^2 per person but real figures were considerably lower. By 1931, the average living per capita in Leningrad equalled 6.7 m^2.

Immediately after the Second World War, the official sanitary norm was expanded by 3 mp, gradually increasing to 12 m^2 by the 1990s. A family whose living space exceeded this norm was not permitted to enrol on the waiting list for state housing.

In the 1920s the communal apartment was envisaged as a temporary phenomenon that would be overcome in the near future. However, a constellation of different factors and circumstances allowed this type of housing to spread, becoming the typical form of housing in large cities.

These factors included the failure of the ideological project of collective housing (house-commune), underinvestment in new housing construction, the rapid growth of the urban population, as well as the general adaptation of the population to the Kommunalki.

In the late 1920s and early 1930s the communal apartment became established as a social institution with its own rules, arrangements and hierarchical system of power. For instance, the figure of the senior plenipotentiary in the apartment was established. This official was responsible for maintaining the rules of registration and the sanitary rules necessary to maintain the apartment. NKVD-approved 'Rules for the internal order in houses and apartments' regulated relations in the apartments.

RESULTS AND DISCUSSIONS

The comparison methods have shown what the weaknesses of this inhabitation type are and especially what psychosocial consequences it has had on the inhabitants.

The State and Communist Party intruded into the domestic life of citizens by the imposition of rules as well as by inspections by their representatives and by neighbours. In such ways, the communal apartment fitted perfectly into a system of social and political control. Further, in outward appearance this kind of housing seemed to realize ideas of collectivism and the much-wanted 'withering away' of the private property.

In a 'homelike place', all family members have the right to use all or almost all of the rooms. The private space of the home is relatively free from public controls.

The regular and symmetrically placed rooms off long corridors occupied by isolated and separate inhabitants are characteristic of institution-like places.

The spatial principle underlying such places seeks to partition and to effect control over their users.

CONCLUSIONS

The population has accustomed to this system imposed through 'proletarian fight and pride'. It continues to be preferred by most people in spite of the numerous alternatives. Housing privatization in Russia since 1991 has meant that the sanitary norms and other restrictions associated with the old housing system no longer apply. The opportunity to revive communal apartments as family housing presents itself. Since 1998, tenants have only been allowed to privatize the entire apartments rather than the separate rooms within it. Today, only a tiny number of communal apartments have been privatized.

Most countries from the Eastern European block (excepting Russia) had five-year development plans that included house building and these plans had to be over fulfilled at least in the papers.

Extremely many buildings (named out of ideological pride only collective, although most of them were actually social housings) were erected exclusively with state money without observing quality standards and in all these states housing construction stagnated, then after a long period inhabitation policy have been reformed.

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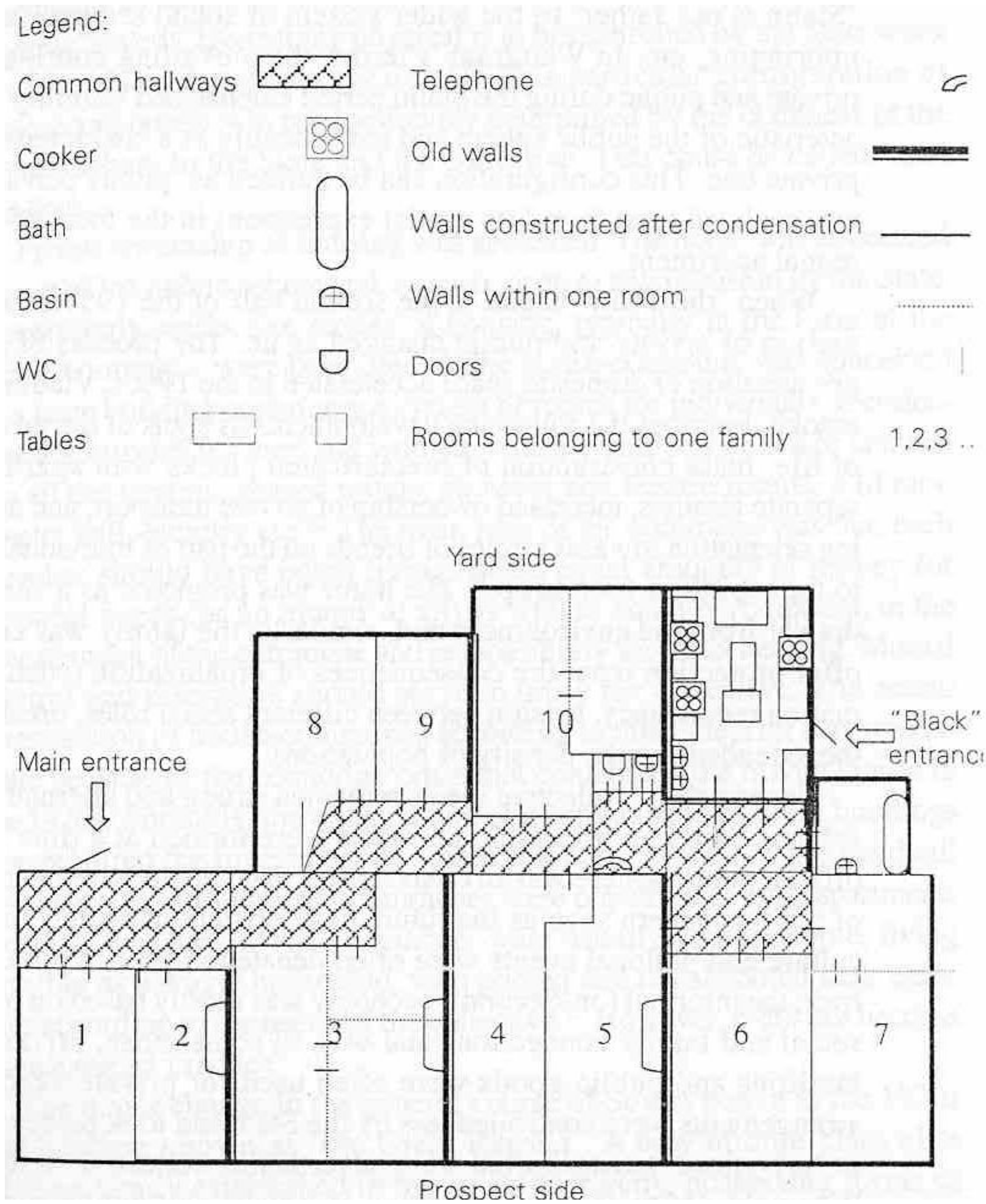
Photos



Kommunalka apartment
Source: Katerina Gerasimova, 2002, Sites of Everyday Life in the Eastern Block

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PARADIGMS OF SOCIAL YOUTH HOUSING

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Keywords: *evolutional*, hostels, diversification, *inhabitation policies*, structuring, equipment

ABSTRACT

Social youth housing is a special category because it addresses youth only for a set period (between 15 and 35 years); it must be studied and constructed according to the inhabitants' ages, interests, inclinations, social and economic status and especially *evolution*. Most young people leave from their home villages and towns to cities for valued schools (high-schools and universities), (better paid) jobs or even to change their marital status (marry or divorce) etc. Social youth housing is a very difficult problem for Romania and even for the Western countries, which have a tradition of social youth housing. This work has the purpose to indicate the types and trends of social youth housing (in Romania and in the main developed countries).

INTRODUCTION

Such housing has become necessary while traditional large families (with a "closed economy") disintegrated due to the migration from villages and towns to cities for new jobs, better schools etc.

These way families began to diversify. The new types of family usually had fewer members. Alvin Tofler lists various types of families frequent in the countries with advanced technology: singles, couples with or without children, one-parent families etc.

MATERIALS AND METHODS

This work is designed as a comparative study of the social youth housing from Romania and from the Western countries according to the following criteria: architectural (plans, historical documentation), psychosocial (sociologic and impact studies) and economic.

According to several studies published by a team of French sociologists, youth part with their families before or after their studies (in high-school or university).

Once in the city and having modest budgets, they need housing adapted to the structure of each member and family, to their physiologic needs (basic needs: sleep, rest - relaxation, food (cooking and serving), storage, body care (food and body hygiene, pest control), physical comfort (breath, warmth, visibility, mobility etc.) and psychosocial needs (development, intimacy, sexual relationships, sociability, knowledge, creativity, recreation). D. Abraham – „Sociologic research perspective of housing", page 92.

Youth do not always return to their native places when they finish their studies. The important differences between villages and towns and the cities, the unemployment, the missing housing for the various generations and the missing possibilities of development and relaxation are all causes of the alienation and of the increasing number of persons in need of such housing. 70% of the students have at least one job to help them finance their (university) studies.

Irrespective of the youth marrying or not and deciding to have children or not, it is normal that they live in houses that allow them to develop (evolutional housing).

Another category is the city youth. Most of them choose the less expensive living together with their parents even after finishing their studies. Buying their own house in the city is extremely expensive and impossible without a large support from their families.

While the youth from smaller places may live in the high-school or student hostels during their studies, this is out of the question for the others. Social youth housing is a very difficult problem for Romania today.

RESULTS AND DISCUSSIONS

The comparison methods have shown what the main types of youth housing from Romania are: hostels (for families, singles, workers, clerks, students, post-orphanages and disabled) and 1- or 2-room flats.

Hostels inhabitants have specific means and ways to satisfy their material and spiritual needs, extraproductive activities, daily life (spare time management) and interpersonal relationships. The life conditions of those coming from villages are structured and restructured in hostels.

The first Romanian hostels were created in buildings erected before 1945 and nationalised in 1947, which were usually inappropriate, e.g. the girl hostel of the *Ion Mincu* University of Architecture and Urbanism of Bucureşti, a former hotel with small and very tall rooms, which are usually furnished with bunk beds. Bathrooms are on different storeys, off the common hallways. There are no kitchens.

During the communist years after 1945, the first worker hostels were erected. They were standard buildings with 5 storeys, double tract and 10 or 20 rooms on each storey, in two variants.

In the first variant, common use is made of bathrooms and in each room there is only a sink (e.g. the hostels for singles, later student hostels, in the Energeticienilor Blvd. and the hostels in 13 Vasile Stolnicul st.); in the second variant, there is a bathroom (sink, shower and WC) in each room (e.g. the hostels from Tei and Regie). Some of the Regie hostels have been considered best because each room has a kitchenette, shower, storage and even a small balcony.

Kitchens, canteens, own thermal power stations and much later and very rarely drycleaners for the hostel administrations and the students completed the hostel services.

They were meant to meet the urban requirements for comfort, hygiene and housekeeping. The hostel inhabitants did the housekeeping themselves and integrated by changing their lifestyle.

Once urbanised, the needs diversify, so expectations rise. Youth adapt to the hostel life inasmuch as the decision-makers to the age group, sex, interests, period of lodgement etc.

Designed and built 30 years ago, the hostels need capital repairs (the sewerage is outdated, basements are full of water and rats, the furniture is as old as the buildings).

The building design has not been adapted to the different youth categories (families/singles, students/workers, married/not married) and the evolutional aspects and consumption and civilisation standards have been disregarded.

The current standards related to disabled persons are outdated, but have been applied to the extant buildings in the form of repairs or small adaptations; there are far too few buildings for this category of persons.

These and the state gymnasium and student hostels are in a poor state and offer accommodation for too few persons. They try to improve the hostels every year, but the funds allotted by the authorities are too small. No funds are available now for building new hostels.

In Western countries, which have a long tradition of social policies for social housing in general and for youth in particular and strong economies that can finance the maintenance of the extant hostels and the building of new hostels, there are a very clear legal frame and specially trained clerks, so the hostel users can live in optimal conditions without feeling stigmatised in any way.

There are several hostel types: new or relatively new (refurbished) small blocks or villas, but attics and industrial buildings are preferred (factories, water towers etc.). Such buildings and old hotels have been obviously transformed into hostels especially for this age group. The classic hostels of the great universities have rooms refurbished according to the newest standards, so that the old is interweaved harmoniously.

Hostels are surrounded by (new or old) buildings with functions complementary to study and rest: secretariat and student lounge, reception halls, clubs, sidewalk bars, cafeterias, libraries, sport halls and fields and even laundries (or launderettes).

The basic principle is self-management, as these spaces are refurbished generally by young people who have completed specialised courses and are able to maintain them.

Rules of use are very strict; any damage caused by inappropriate use is remedied by the damager.

Social programs have been created so that the youth can have part-time jobs in the university or in the city that finance their studies.

Tower blocks have been constructed for the youth who finish their studies and look for jobs, but they are not deemed as a solution anymore because of the arisen problems: alienation, social segregation, fires, and inundations. (Only emigrants inhabit a small part of them.) Alternative solutions are sought.

Special care is given to disabled youth. After 1960 specific hostels were erected. But in the last 20-30 years the youth with slight walking difficulties were integrated in normal hostels and these were adapted to their needs. Design standards (ramps with certain slopes, lifts, special bathrooms) for this category are very strict and their inobservance results in the refusal to authorise the erection or use of the building.

1-room flats or *studios* are destined for young or elderly persons.

There are two comfort classes:

I surface between 30 and 35 sq.m.: room of approx. 20 sq.m., kitchen, hall, bathroom, balcony and small storages

II surface between 12 and 15 sq.m.: kitchenette, WC and shower

Large groups of blocks of studios for youth and singles without children were constructed in Romania in the 1960s. The youth married, had children and were unable to move to better houses, so the inhabitation became improper (e.g. the Moise Nicoară group of blocks from Bucureşti).

CONCLUSIONS

The successful experience of the Western countries has shown that certain measures must be taken to have important results in this field.

Social policies adapted to the present state of things and to the needs and lifestyle of the target groups are necessary. To apply such policies, important funds are necessary for buildings resistant to normal physical (earthquakes, climatic and physical factors) and psychical use.

Specially licensed companies must manage such buildings, be responsible for them and solve all arising problems lest they become unsolvable.

A major investment in such buildings will result in their safer and longer use.

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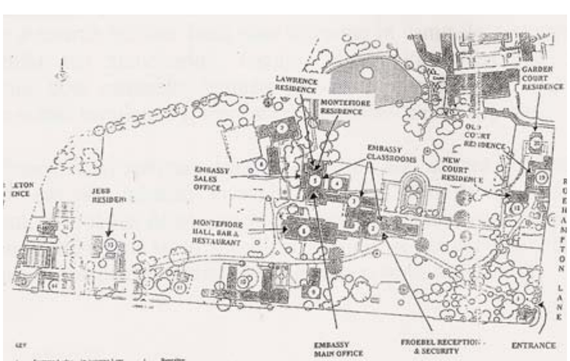
Romania, Bucureşti, student hostels

Fig.1 Carol I Blvd. University of Architecture

Fig. 2 Regie the Polytechnic Institute

Fig. 3 Iuliu Maniu Blvd. School of Journalism

Fig. 4, 5 France, Paris, youth hostels



England, student hostels

Fig. 6 Froebel Institute College, Roehampton

Fig. 7 Clacton Institute, Edinburgh