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BOTANY AND PLANT PHYSIOLOGY

RESEARCH REGARDING THE PHYSIOLOGICAL AND BIOCHEMICAL PROCESSES ON *ORIGANUM* SP.

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Keywords: *Origanum* sp., photosynthesis, respiration, transpiration, minerals, dry matter, pigments

SUMMARY

Origanum vulgare is a species with a large extent in shrubberies, underwoods and forest glades, as far as the subalpine zone.

The world references emphasise the practical aspects, namely the active compounds and their composition depending on the tissues and variety, as well as their applicability. The *Origanum* volatiles, especially carvacrol, have an antimicrobial and antioxidant activity, which confers the plant' extracts useful proprieties as: antiseptic, antipyretic, antihelminthic, antioxidant, expectorant. The vegetal extracts enriched in β-cariophylene have the antiasmatic, antimicrobial, antiinflamator effects and those enriched in terpineol have important proprieties as antiasmatic, antimicrobial, diuretic and antiallergenic (1,2,3,4).

As a consequence, there is few data regarding the intensity of physiological processes, and this paper intends to characterise some aspects concerning the *Origanum* physiology.

MATERIAL AND METHODS

The research has performed on *Origanum vulgare* L., from Botanical Garden of USAMV Bucharest.

The photosynthesis, transpiration and respiration rates, as well as the photosynthetical active radiations and the leaf temperature were measured with automatical analyser ADC-LCA4, life in culture conditions. In laboratory conditions was determined the respiration rates of different plant organs, by measuring the CO_2 releasing with an IR analyser (Riken).

The leaf assimilatory pigments were measured spectrofotometrically at 470 nm, 646 nm and 663 nm, after extraction in acetone 80%. The dry matter and water contents were analysed by weighing the plant material after 24 h drying at 105°C.

The minerals were determined after dry matter calcination at 660˚C, solubilisation in nitric acid 2%, and 10 minerals (K, Ca, Mg, Na, Mn, Cu, Fe, Zn, Ba and B) were measured by a ICP spectrometer.

RESULTS AND DISCUTION

The intensity of physiological processes varied depending on the plant age, respectively the cell physiological stage.

The photosynthesis rate registered the lowest value at young plants (0.99 μmole $CO_2/m^2/s$) (Table 1). Before flowering, the photosynthesis rate increased to 2.50 μmole $CO_2/m^2/s$, than remained fast constant in flowering time (2.4μmoli $CO_2/m^2/s$). For senescent leaves, the photosynthesis rate decrease to 2.14 μmole $CO_2/m^2/s$.

Table 1

The physiological characteristics of *Origanum vulgare* L. plants

Plant age	Light intensity μmoli/m^2/s	Leaf temperature ^oC	Photosynthesis rate μmoli$CO_2/m^2/s$	Transpiration rate mmole $H_2O/m^2/s$	Respiration rate mg CO_2/kg/h
Young	334	25.1	0.99	1.23	490.5
Before flowering	229	24.8	2.50	1.60	204.05
Flowering	232	25.0	2.40	1.55	199.89
Senescent	237	25.1	2.14	0.33	148.00

The transpiration rate varied between 0.33 mmole $H_2O/m^2/s$ (senescent leaves) and 1.6 mmole $H_2O/m^2/s$ (before flowering plant leaves). The respiration rate of aerial parts varied in wide limits, depending on their age. In the plant intense growth, their respiration rate war 490.5 mg CO_2/kg/h, before flowering decreased to 204.05 mg CO_2/kg/h and at flowering time diminished at 199.84 mg CO_2/kg/h. The senescent plants registered the lowest respiration rate: 148.00 mg CO_2/kg/h.

It is remarkable that the *Origanum* sp. is a neclimacteric plant, which achieved the maximum intensity in the intense growth period and the lowest intensity in senescence.

The results of respiration rates of different plant organs are presented in table 2.

Table 2

The respiration rate of *Origanum* aerial parts

Aerial part	**Respiration rate** mg CO_2/kg/h
Bud and young shoots	627.42
Apical young leaves	539.43
Median leaves	234.41
Bottom leaves	209.06
Apical stem zone	315.04
Bottom stem zone	261.11

It is noticed that the highest respiration rate (over 500 mg CO_2/kg/h) was measured for buds and young shoots, as well as for young leaves from apical plant

part. The leaves from median and bottom plant stem registered an intensity rate between 209.06 mg CO_2/kg/h and 234.41 mg CO_2/kg/h. The average respiration intensity was, for these variants 2.63 times lower than measured for buds and young shoots.

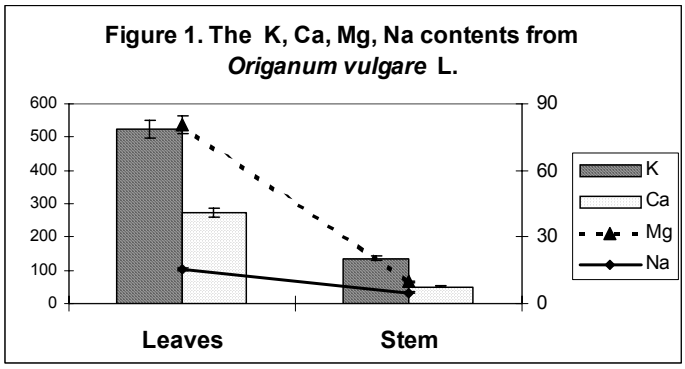
The bottom plant stem expressed a respiration rate value of 262.11 mg CO_2/kg/h, while the apical those 1.2 times higher. The water, dry matter and mineral contents are presented in table 3.

Table 3

The water, dry matter and mineral contents of *Origanum vulgare* L. organs

Organs	**Plant age**	**Dry matter** %	**Water** %	**Minerals** %
Stem	Young	33.22	66.58	1.75
	Before flowering	34.34	65.66	1.77
	Mature	34.75	65.25	2.56
Leaves	Young	26.32	73.86	1.6
	Before flowering	27.16	72.84	1.73
	Mature	28.08	71.92	2.55
Flowers	Mature	31.95	68.05	4.32
	Senescent	82.64	17.36	7.63

During plant growth and development it is noticed the dry matter and mineral content increase and the water content decrease in all organs. The most important changes were registered for flowers, for that the water content decreased from 68.05% (mature flowers) to 17.36% (senescent flowers), the dry matter increased from 31.95% to 82.64% and the minerals increased from 4.32% to 7.63%.



The leaf and stem mineral's contents (figure 1) varied largely from 523 ppm to 136 ppm (K), from 271.67 ppm to 49.89 ppm (Ca) and from 80.57 ppm to 9.85 ppm (Mg).

The microelement contents (table 4) were higher in leaves than in stem for Fe (10 times), Mn (20 times), Cu (6 times), Zn (35 times) and B (50 times), and lower 0.75 times for Ba (table 4).

Table 4

The microelement content in *Origanum vulgare* L. organs

	Fe	**Mn**	**Cu**	**Zn**	**B**	**Ba**
Leaves	8.09	1	0.83	0.75	0.99	0.15
Stem	0.88	0.05	0.12	0.02	0.02	0.2

The assimilatory pigment content (table 5) varied with the leaf age, the highest chlorophyll values were registered before flowering – 309.96 mg/100g (total chlorophyll), but the carotene content was the highest in mature leaves (6.96 mg/100 g).

Table 5

The assimilatory pigment content of *Origanum vulgare* L. leaves

Leaf stage	Chlorophyll a (mg/100g)	Chlorophyll b (mg/100 g)	Total chlorophyll (mg/100g)	Chlorophyll a/b	Carotenes (mg/100g)	Chlorophyll/ Carotenes
Young	93.78	36.31	130.09	2.58	5.23	24.88
Before flowering	255.13	54.83	309.96	4.65	5.65	54.87
Mature	233.58	38	261.57	5.88	6.96	37.59

CONCLUSIONS

1. The photosynthesis and transpiration rates are the highest values in plants before or during flowering.
2. The *Origanum* are neclimacteric plants, which achieved the maximum intensity in the intense growth period and the lowest intensity in senescence.
3. The flower transition from maturity to senescence induces the highest changes of dry matter, water and minerals contents.
4. The leaves store the minerals (K, Ca, Mg, Na, Fe, Mn, Cu, Zn, B) higher than the stems.
5. The chlorophyll content is higher in leaves before flowering, while the carotene content is higher in mature leaves.

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ASPECTS REGARDING ORNAMENTAL POTENTIAL OF WILD FLORA SPECIES

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Key-words: Wild flora, *Anthyllis vulneraria* subsp. boissieri, *Aster oleifolius*, *Euphorbia glareosa* subsp. dobrogensis, *Hedysarum grandiflorum*, *Scutellaria orientalis* var. pinnatifida, *Agropyron brandzae*

SUMMARY

The paper presents ten species of the wild flora, with ornamental potential.

INTRODUCTION

In light of the new Global Strategy for plant conservation, the botanic gardens play a key role in the development of knowledge and protection for the spontaneous flora, either in situ or by cultivating and studying the plants outdoors.

A way of focusing attention on plants belonging to the Romanian flora, that we intend to put in practice in the Botanic Garden of the University of Agronomic Sciences and Veterinary Medicine (BUAG), is the attempt for cultivating and introducing wild species as ornamental plants. Such plants could be successfully placed in garden arrangements, as a means of diversifying the annual and perennial plants that are presently used in gardens or parks.

The plant species presented in this paper were harvested by members of the Botany and Physiology Department during some herborising excursions at Baltagesti village (Constantza County) and Tohani hill (Prahova County). The material is currently under observation in the botanic garden of U.S.A.M.V.B.

PLANT DESCRIPTION

Anthyllis vulneraria L. subsp. *boissieri* (Sag.) Bornm. – vatamatoare – Fam. *Fabaceae* (Leguminosae)

Annual to perennial, shortly strigosus haired, with 2-3 imparipinnately compound leaves, terminal leaflet longer than the lateral ones. Flowers in capitulum-like inflorescences and protected by hypsophylls shorter than the sepals. Calyx is redish-violaceous in the upper half, corolla entirely purple.

Grows on calcarous hills in the Baltagesti region.

Aster oleifolius (Lam.) Wagenitz. (A. villosus (L.) Schultz Bip.) – stelita – Fam. *Asteraceae* (Compositae)

Perennial, short rhizome, numerous fibrous roots. Stem branched in the upper third, densely grey-tomentous. Leaves oblanceolate strigosus haired on both

sides.Flowers in campanuled cylindered antodiums; yellow, tube-like corolla (ligulate flowers are absent) Achenes flatenned andhairy, accompanied by white-rusty coloured papus.

Grows in sunny, dry, sometimes salty lawns, sporadically found from the steppes to the evergreen oak area.

Euphorbia glareosa Pallas ex Bieb.subsp. *dobrogensis* (Prodan) Ciocârlan - fig.2– alior, laptele cucului, laptele cainelui – Fam. *Euphorbiaceae*

Short plants, 10-30 cm long, encountered in stony areas in Dobrogea and north-eastern Bulgaria. Perennial, rhizomed. Numerous redish stems, obovate-lanceolate leather-like leaves. Terminal inflorescence with 3-5 rays. Cyathiumglands are almost round or almost rhomboidal. Ovoid, smooth capsule.

Hedysarum grandiflorum Pallas – fig. 3 – dulcisor – Fam. *Fabaceae* (Leguminosae)

Rare species, encountered on stony sloped lawns around Baltagesti. Perennial, with scape and compound leaves with 2-3 pairs of grey, downy leaflets. Flowers in racemes, with light yellow corolla. Flowers in May, June and July. Pods are white villosus, with thorns glochidated at the tip.

Scutellaria orientalis L. var. *pinnatifida* Reichenb. – fig. 4 – Fam. *Lamiaceae*

Perennial, rarely encountered on calcareous pastures in Buzau County (Tohani hill) and in Dobrogea. Mentioned in certain papers as suitable for stone gardens. Stem fully branched starting from the base, with ascending branches covered with dense, short, downy trichomes. Leaves partite or sected-pinnately, green on the adaxial side and grey-tomentouse on the abaxial side. Flowers are shortly pedicelled, in compact inflorescens. Calyx is densely glandulously haired, corolla yellow with the lower lip and the middle lob of the upper lip violaceous. Flowering season is long, May to July.

Agropyron brandzae Panțu et Solac. – fig. 1 – Fam. *Poaceae* (Gramineae)
Endemic in Romania, encountered on sunny, calcareous hills around Batlagesti.

Perennial, with short rhizome. Stems intensely pruinous, green-bluish, glabrous, forms numerous short, sterile shoots with bundles of convolute, proeminently nerved, short, rigid leaves. Auricles are short. The compound spike is 2-4 cm long; spikelets pectinate-patent, borne on a hairy rachis, made up of 2-4 leaves.

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FRUIT DEVELOPMENT IN SOME *MALOIDEAE* SPECIES

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Key-words: pome, drupe, endocarp, floral tube-carpel ratio

SUMMARY

The paper briefly presents the results obtained from the research of some species of the *Maloideae* focused on the evolution of different inner parts of the fruit. It has been noticed that all the species have their receptacle grown together with the carpels. The *Cotoneaster* fruit is a pome, because the carpels are free on the adaxial side and united with the receptacle on the abaxial side. There is also the way the receptacle tissues and the carpel tissues develop during fruit formation that supports our idea. As for *Crataegus monogyna*, the existence of only one carpel and the larger development of the carpel parenchyma compared to the receptacle one proves the fact that the fruit is a drupe.

INTRODUCTION

The plants in *Maloideae* (Rosaceae) form a pome-type fruit. Most of it develops from the concave receptacle attached at least in the lower part to the inferior ovary which is part of the 5-carpellate, rarely fewer, gynoecium (Ciocârlan, 2000). During the development of the fruit, the inner part of the carpel may turn hard, stone-like (drupe-like fruit at *Cotoneaster*, *Crataegus*) or cartilaginous (*Malus*, *Pyrus*). Because of these different ways of evolution of the inner part of the fruit, in some papers, the fruit with stony endocarp is named drupe (C. Toma, R. Rugină, 1998).

Anatomically, the pome is described (K. Essau, 1965) as a mostly fresh fruit, derived from an inferior ovary, the flesh part being grown out of the floral tube (hypanthium named by other authors: Fahn, 1995; Andrei & al., 1994) and little of the carpellary tissue. A transection through the fruit shows the part originating in the floral tube tissue recognisable after the 10 vascular bundles placed alternatively on two concentric circles in an epidermis limited parenchyma. The bundles belong both to the sepals (5) and to the petals (5). The epidermis has one layer of cells and is covered by cuticle, trichomes and waxes. Under the epidermis there are a few layers of tangentially elongated cells, with their walls thickened. In the central part of the fruit (carpellareous region) the separate carpels are obvious. The vascular system is made up of middle and lateral bundles. The ovary wall is differentiated in a parenchymatous exocarpe and a cartillagenous endocarpe (the apple fruit) that surrounds the seed locule.

The drupe is a fruit derived only from the lower part of the ovary wall. On fructification, this wall splits in a pericarpe with a fleshy mesocarpe and a hard,

sclerified endocarpe. The exocarpe is made up of the epidermis and a few layers of collenchyma. The fleshy mesocarpe is made up of parenchymatous cells that rise in size from the outside to the inside. The sclereids that form the endocarpe are strongly united. In the canals existing between the endocarpe cells, bundles are noticed, that branch in the mesocarpe. The endocarpe, either in the drupe or in the pome, is the first part of the fruit that matures.

As in the literature there are contradictions regarded to the type of fruit for same genus or species, we studied a few stages of the fructification process in *Cotoneaster horizontalis*, *Cotoneaster simonsii* and *Crataegus monogyna*, compared to *Malus domestica* cv. Golden delicious.

RESULTS AND DISCUSSIONS

Cotoneaster horizontalis, C. simonsii

The first sections through the ovary enable us to notice the two carpels, for *Cotoneaster horizontalis*, respectively three for *C. simonsii*, which are on the adaxial part and grew together with the receptacle on the abaxial part. In the middle zone of each carpel, there is a vascular bundle. The inner part of the carpels that surrounds the locules is cartilagenous in an early stage, made up of cells with thickened walls that have inside prismatic crystals of calcium oxalate. To the exterior, the carpel wall is parenchymatous.

The receptacle tissues are found on the outside of the carpel and their inward succession is: one-layered epidermis, covered by a cuticular layer; under-epidermal parenchyma, made up of two layers of cells with their walls thickened and having no space between them; fundamental parenchyma, formed of cells that grow inwards, where sepal and petal bundles are noticed, placed alternatively on two concentric circles. In the outer-layer cells, chloroplasts are found. Under the last circle of petal bundles, there is an area with elongated, thick-walled cells that start from the lateral margins of the carpels and separate the carpelar tissue from the receptacle one.

After a fortnight, the thickness grows due to cell division in the receptacle-originated parenchyma become obvious. Druses are noticed in the cells. On the inner part of the carpel, the sclerification process continues.

The last determination showed that the tissue originating in the receptacle is dominant in the total thickness of the pericarp (the border line being close to the middle bundles of the carpels, because of the divisions of the parenchymatous cells); in the receptacle parenchyma, there are intercellular spaces. The sclerification process of the inner wall of the carpel is almost ended.

Crataegus monogyna

Transections through ovary during flowering show an ovarian locule in the center, with one ovule, but there are also sections with two ovules. The carpel wall is made up of three layers of cells having thickened cell walls towards the locule and a few layers of cells that form the parenchymatous part of the carpel. The

receptacle is rounded by a one-layered epidermis, covered by cuticle and by rare one-celled trichomes. The two layers of under-epidermal cells have no intercellular spaces and their walls are thickened. In the profound parenchymatous layers, druses are found. The border area between the carpel and the receptacle becomes obvious in sections made later and is also made up of elongated cells, having the walls thickened, as in *Cotoneaster*. During the next weeks, changes in the carpel tissues are noticed: hard sclerification of the inner area, the growing of the carpel parenchyma. Thus, on the last determination, the border area between the two components that make up the fruit is placed rather towards the outside, so that, unlike the Cotoneaster case, the pericarpe is formed mainly by carpel-originated tissue.

Malus domestica

The fruit development stages are as described in the literature. Five weeks after flowering, the endocarpe is strongly sclerified and the seeds appear formed in their locules. The epidermis has no trichomes, the stomata are replaced by lenticeles and six layers of thick-walled cells are found under the epidermis. The chloroplasts are degraded and starch grains start to take shape.

CONCLUSIONS

1. The growing together of the receptacle with the carpeles as well as the border area are obvious for all the species presented in this paper.
2. Because the carpels are free on the adaxial side and are grown together with the receptacle on the abaxial side and because of the receptacle and carpel tissue development during the fruit formation, we can admit that for the *Cotoneaster* species the fruit is a pome.
3. As for *Crataegus monogyna*, the existence of only one carpel and the larger development of the parenchyma of the carpel compared to that of the receptacle parenchyma can be taken as evidence for the fact that the fruit is a drupe; the final conclusion can only be drawn after an extended study on the other species of the *Cotoneaster* genus.

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COMPARATIVE DETERMINATION OF ORIGANUM VULGARE ESSENTIAL OIL COMPOSITION BY GC-MS AND GC-FT-IR

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Key words: *Origanum*, essential oils.

SUMMARY

Essential oil from *Origanum*, extracted in a Clevenger - type extractor by hydrodistilation, has been analyzed using GC-MS and GC-FT-IR techniques. Most application of *Origanum* essential oils are in the pharmacological field due to the high level of thymole and carvacrole – phenolic compounds with antibacterian properties. Qualitative analysis has been performed using identification of specific compounds by MS and IR spectra in conjunction with Kovats indexes for peak position confirmation. The quantification has been performed by FID detector coupled after FT-IR. Recent researches prove that *Origanum* essential oils have a various composition depending on species, altitude, geographic distribution, phenophase and others. Vogel (1996) established that the essential oil quantity from *Origanum* plant increases during its vegetative growth period and the extraction yield during florescence reach 4 ml/100g. Kokkini (1997) determined the *Origanum* plants essential oil composition from six different Greek localities. Plants coming from the north part of Greece had a larger timole content (30,3 – 42,8 %), comparing to the plants coming from the southern part which had a higher carvacrole content (57,4 %). The highest essential oil content was determined in low altitude locations with higher temperatures. Ravid and Putievsky (1986) established that the oils from *Origanum vulgare viride ssp*. have two chemotypes: one accumulates carvacrole and the other timole. Danin (1997) extracted the volatile oils using two methods: distillation followed by CH_2Cl_2 extraction and extractive distillation followed by separation and GC-MS identification. More than 132 compounds were extracted using these methods. Uses of *Origanum* oils are reported as spices, antimycothic, antibacterian, antihelminthic, antispasmodic, stimulant, analgesic, hemostatic and others.

MATERIAL AND METHODS

Essential oil extraction from dried *Origanum* plants was performed by a Clevenger hydrodistilation system. The analysis conditions were: FISIONS gas chromatograph with DB 5 column 25 m length and 0.25 mm internal diameter. Carrier gas was nitrogen, initial temperature 40^oC, isothermal for 5 minute, final temperature 280^oC and a 4^oC/min gradient.

Using the Nicolet GC-FT-IR transfer line with MCT high sensitive nitrogen cooled detector, all peaks from the GC system could be identified by infrared spectra using the specific infrared gas phase flavours library. The FT-IR parameters were: 4000 – 750 cm^{-1} spectral range, 8 cm^{-1} resolution and 7 scan/sec acquisition speed; transfer line and cell temperature 250^0C. Due to the non-destructive IR analysis, the sample was leaded in a classic FID detector for quantification after the IR transfer line.

Same samples were analyzed using GC-MS technique. The analysis conditions were: VARIAN 3400 gas chromatograph with DB 5 column 25 m

length and 0.25 mm internal diameter. Carrier gas was He, initial temperature 40^{o}C, isothermal for 5 minute, final temperature 280^{o}C and a 4^{o}C/min gradient. The mass spectrometer coupled with GC was a VARIAN Saturn II.

Compound identification was performed by library search (MS and FT-IR confirmed) and Kovats indices as confirmation for the chromatographic peak position.

RESULTS

The essential oil analysis chromatogram is presented in figure no.1 and shows that substances identified throw this method are:

- alyphatic nontherpenic alcohols as hexanole, 3-octanole;
- therpenic noncyclic alcohols as linaloole;
- aromatic hydrocarbons as p-cymene;
- therpenic hydrocarbons as α-pinene, β-pinene, camphene, γ-terpinene and β-cariophylene;
- therpenic cyclic alcohols as α-thrpineole, γ-terpineole, terpinen-4-ol, eucalyptole;
- heterocyclic ethers as 1.8-cyneole (eucalyptole);
- Phenoles as carvacrole and timole;

Timole and p-cymene are prevalent, in conformity with the literature, data that specify a higher content of timole in the north area.

Identification of the essential oil compounds was made using two different analytical methods: GC-MS and GC-FT-IR. Concerning the results of the two methods, the MS spectra allow precise determination of the molecular formula, molecular mass and specific fragmentation of the molecule. IR spectra allow determination of the specific atoms grouping of the molecule, using the specific absorbing bands. For example in fig. no 2 are presented the two types of spectra for timole. Using both spectra, structure of an unknown compound can be easily found.

The two methods are very useful in qualitative analysis, allowing the search of an unknown spectrum in specific libraries. Comparisons with the library spectra are automatically done for the two methods and the probability of according is usually expressed in rates. The obtaining of same compound using the two methods of searching indicates some information about the compound, but the final decision in identification is taken after spectral interpretation and calculation of Kovats indexes

For the mass spectra, interpretation is done by analysing the fragmentation reactions of the compound. For the IR spectra, the specific vibrations frequencies for the specific atoms groups must be analysed. In both steps the correlation to the presumed structure must be checked.

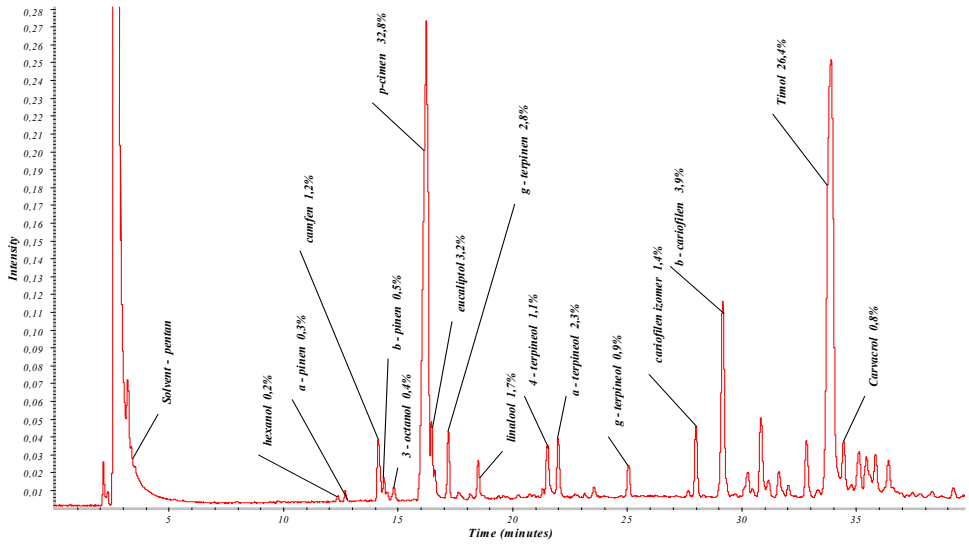

Figure no. 1. Origanum essential oil chromatogram

For the mass spectra, interpretation is done by analysing the fragmentation reactions of the compound. For the IR spectra, the specific vibrations frequencies for the specific atoms groups must be analysed. In both steps the correlation to the presumed structure must be checked.

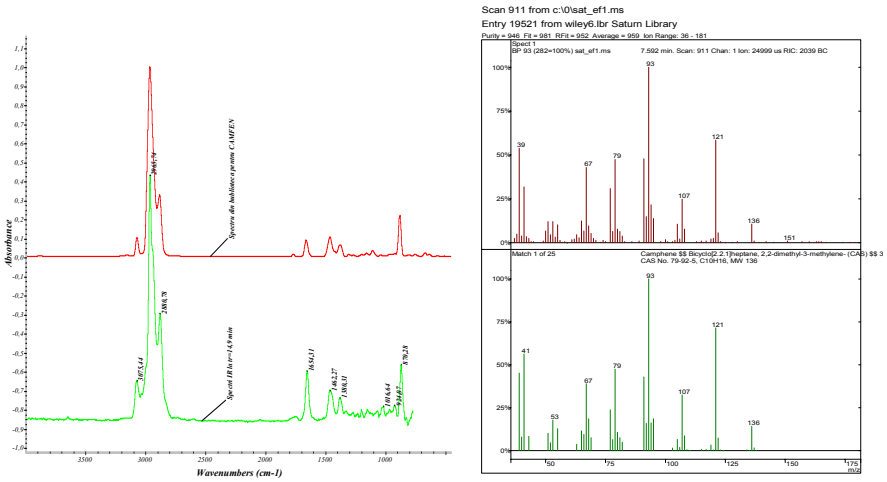

Figure no. 2. Comparation of the IR and MS library spectra for camphene

Calculation of the Kovats indexes using retention times of an n-alkanes series is followed by comparison with literature data. Another method (less practical) uses analysis of reference materials of the presumed compounds.

All this stages are necessary because of the complex composition of essential oils (more than 100 compounds) that could not be identified using gas chromatography.

To give an example, attributions for some compound from *Origanum* essential oil are presented in fig.no.2.

CONCLUSIONS

- Extraction of *Origanum* essential oil using a Clevenger system by hidrodistillation method, lead to a high quality oil, that preserve plant aroma, with a rate high yield.
- Identification of compounds using one of the MS or IR methods needs enough analytical effort. Using both methods in the same time can solve some difficulties in attributions. The confirmation of peak position using Kovats indexes could be a better supplementary verification of attributions.
- GC-FT-IR method has a lower sensitivity than MS.
- GC-FT-IR is a non-destructive method and allows retrieving of the sample after analysis, also a possible link with another chromatographic detector as FID (also an MS detector can be linked in this case).
- Both methods allow searching of unknown compounds in specific libraries.
- IR method is easier to use in the spectral interpretation process.
- MS method allows identification of isotopic peaks, using also advanced equipment as multi stages spectrometers can be a solution for complete solving of the fragmentation reactions.
- Study of essential oils using both methods makes identification of compounds easier.
- GC-FT-IR method is less expensive in maintenance and operation than GC-MS method.

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CHOROLOGICAL AND ECOLOGICAL ASPECTS OF *Nepeta cataria* L. (*Lamiaceae, Nepetoideae*) IN ROMANIA

IOANA MARCELA PĂDURE *

Key words: chorology, ecology, *Nepeta cataria*, *Lamiaceae*, distribution map.

SUMMARY

The paper presents chorological and ecological aspects concerning *Nepeta cataria* L. (*Lamiaceae*) in Romania. *N. cataria* is a common and widespread species throughout Romania, considered by different authors also as antrophophylus and nitrophylus. Chorological data regarding *N. cataria* distribution are presented using bibliographical information, numerous data from different Herbaria of Romania and data collected from fieldwork. An important revision of voucher specimens was performed. A chorological map using U.T.M. system is presented and commented in detail.

INTRODUCTION

N. cataria is an erect perennial herb with stems 40-100 cm, erect, branched, grey-pubescent to tomentous. It has leaves 5-15 cm, ovate, acute and cordate at base, crenate or serrate, grey-tomentous beneath. Inflorescence is spike-like, the lower verticillasters distant. Calyx ovoid, teeth linear-lanceolate, corolla 7-10 mm, shortly exerted from calyx, white with purple spots, nutlets dark brown, ellipsoid, usually smooth (Turner 1972). In Romania little is known about the distribution and viability of this species because no floristic inventories and demographic studies necessaries for the definition of the real status of species exists to date.

This taxa differs from the related species of the *Nepeta* genus (*Lamiaceae, Nepetoideae*) from Romania in the following respects:

1a Calyx-teeth shorter than the tube; flowers hermaphrodite; leaves subssesile or petiolate; nutlets smooth or tuberculate ….…….…… 2

1b Calyx-teeth longer than the tube; flowers unisexuate (rarely dioeciuos); central flowers of each cyme female, the stamens represent by staminodes; outer flowers male, with a rudimentary pistil; all leaves petiolate; nutlets tuberculate…..……...…… 3

2a Leaves ovate, cordate at the base, all petiolate; corolla white with small purple spots; nutlets smooth……..……..……..…… *N. cataria*

2b Leaves ovate-oblong, the middle and the upper ones sessile; corolla pale violet or white; nutlets tuberculate...……..…...……...…….....…… *N. nuda*

3a Plant glabrescent, leaves elongated ovate-lanceolate, crenate-serrate; cymes 3- to 5-flowered, lax…….……..…….....……..…….. *N. ucranica*

3b Plant with stem and leaves dense tomentose to lanate (at least below), leaves triangular ovate, serrate, with larger teeth; cymes dense……..…… *N. parviflora*

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Regarding the ecological growing conditions, the reported life zone of catnip is full sun to light shade, 7-19°C with an annual precipitation of 0.4-1.3 m and a soil pH tolerance range of 4.9-7.5. Dry sandy soil is recommended, but the plant also grows well (and brushier) on well-drained, moderately rich garden loam. It is commonly considered as antrophophilous and nitrophilous species (Ciocârlan, 2000). As a weed, it is found in hedges, fencerows, roadsides and waste places.

Fieldwork was carried out through the country in order to visit reported sites of the species occurrence. The chorological map of *N. cataria* included in this work was made by taking into account the principles of the Universal Mercator System (U.T.M.) that ensures an exact localization of villages, communes and towns where this species was found. Within U.T.M. system, the research territory is split in basical squares of 100x100 km through vertical (columns) and horizontal (series) lines. Each basic square is split, in its turn, in 100 other smallest elementary squares of 10x10 km, by vertical and horizontal lines (Chirilă et al., 2002). The main objective of the present study is to document the geographic distribution of the *N. cataria* L. species in Romania using U.T.M. system.

MATERIALS AND METHODS

The geographical distributions of the species are expressed in **Fig.1**. Descriptions and details of taxon distribution are based on collections from Herbaria: BNHM, BUAG, BUC, BUCA, BV_5, CL, CRAI, CRHM, FOHM, GLHM, I, IASI, ICAS_2, PLHM, SIB, TLHM and TMHM (according codes to P.K. Holmgren from *Index Herbariorum*). The chorological map of *N. cataria* is based on the cited sources above plus new personal records obtained during this study, or different databases / scientifically publications where this species was referred.

RESULTS AND DISCUSSIONS

N. cataria is a common and cosmopolitan species. In spite of these, some botanists made confusions between this one and *N. nuda* L. ssp. *nuda* (syn. *N. pannonica* L.). Numerous voucher specimens were wrong identified. The author has made important revision of *N. cataria* herbal specimens from different Herbaria to complete the ongoing monographic study on genus *Nepeta* L. in Romania.

The next session presents the most important localities (with U.T.M. code) with *N. cataria*. The data were gathered from many bibliographical resources where the species was cited in different botanical surveys: Baia Mare FT88/98, Dubova FQ04, Cernavodă NK80, Comana MJ39, Orşova FQ05/15, Tulcea PK37, Băile Herculane FQ17, Blaj GS22, Niculiţel L 10, 2 Mai J 24, Hagieni PJ14, Dumbrăveni NJ76, Deva FR48, Gheorgheni GS07, Bistriţa LN02, Cluj FS97, Turda GS10, Ciurea NN41, Bacău MM95, Buzău MK89, Adjud NM10, Piteşti LK26, Râmnicu Vâlcea KK99, Verseşti MM74, Caraclău MM72, Călimăneşti KL91, Căciulata KL81, Vişeul de Jos LN09, Cojocna GS18, Boj GS17, Năsăud LN03, Idiciu de Jos LM28, Brâncoveneşti LM29, Gurghiu LM38, Şoimuşu Mare LM33, Braşov LL85, Rupea LL69, Bazna

KM81, Sibiu KL77, Slimnic KL78, Nocrich KL78, Ighiel FS91, Orăştie FR78, Oradea ET61, Arăneag ES52, Moneasa ES97, Sebiş ES83, Gurahonţ FS02, Pâncota ES52, Tismana FQ58, Craiova GQ11, Corbeni LL11, Ploieşti MK27, Nişcov ML70, Seciu MK28, Beceni ML82, Chitila MK22, Ciocăneşti LK46, Bâcu MK12, Snagov MK35, Răcari MK04, Crivina LK04, Budeşti MJ58, Mangalia PJ25, Malcoci PK49, Racova MM77, Letea PL91, Fântânele NM33, Verseşti MN60, Piatra Neamţ MM49, Târgu Neamţ MN42, Băiceni MN93, Cotnari MN94, Suceava MN47, Liteni NN03, Botoşani MN78, Asău MM54, Aluniş ML52, Crasna FR90, Lieşti NM30, Călineşti KL2, Tulucești NL84, Dej GT12, Liman PJ24, Ocnele Mri KK89, Dobârca GR18, Agigea PJ28, Fălticeni MN45, Tutova NM40, Adamclisi J78, Breaza LL90, Ostrov NJ28, Slănic Prahova ML10, Secu MN20, Arefu LL12, Băile Tuşnad MM10, Feneş FS70, Ciumeşti FT07, Tulcea PL40, Liebling ER24, Urziceni MK75, Benesat FT75, Sebeş LM39, Câlnic ML08, Păuleşti MK18, Bucureşti MK21.

The chorological points were differentiated on the chorological map using several items (**Fig.1**):

- ✳ species gained by author from fieldwork
- ☐ species from bibliographical information (references)
- ● species from different Herbaria (reviewed by author)
- ▲ species from different Herbaria (still un-reviewed by author).

CONCLUSIONS

N. cataria (catnip, catmint) is a common species used as medicinal plant from history with a widely and antrophophilous distribution.

There are lots of references from different scientific publications and un-reviewed voucher specimens that will be study in the future. In conclusion, the presented study is partial. We are going to add new and interesting information about *N. cataria* chorology in Romania.

Acknowledgments: The author warmly thanks to *Prof. Dr. V. Ciocârlan* for all suggestions and for supervising the scientific work, also to all curators from the mentioned herbaria for the use of *N. cataria* specimens used to complete the study.

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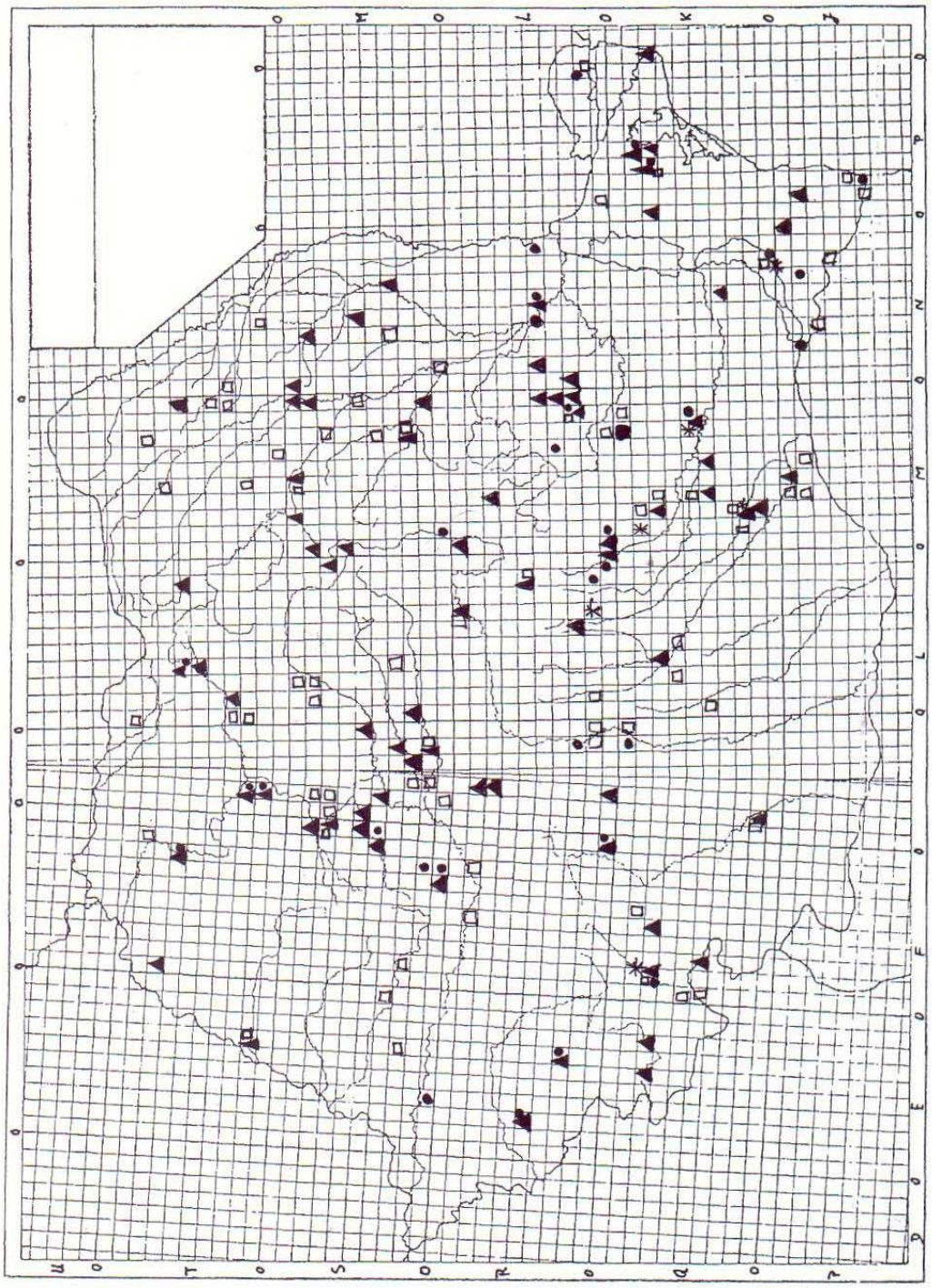
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CHOROLOGICAL AND ECOLOGICAL ASPECTS ON *CONYZA CANADENSIS* (L.) CRONQ. (*ASTERACEAE, ASTEROIDEAE*) IN ROMANIA

NICOLETA SĂNDULESCU, IOANA MARCELA PĂDURE

Key words: chorology, ecology, *Conyza canadensis*, *Asteraceae*, distribution map.

SUMMARY

Conyza canadensis (L.) Cronq. (syn. *Erigeron canadensis* L.) is a common species which is widespread as weed in Romania. The species has not very specific ecological requirements being well known that is growing in ruderal places or wood margins. This work is based on partial results provided by bibliographical papers, Herbaria information, and data collected from fieldwork. A chorological map using U.T.M. system is presented and commented in detail.

INTRODUCTION

Conyza canadensis (L.) Cronq. (*Asteraceae*, *Asteroideae*) is an annual herb, reproducing by seeds. Stem erect, 10-120 cm, patent-hirsute. Leaves numerous, narrow, the lower up to 10 x 1 cm, lanceolate to oblanceolate, alternate, simple, petiolate, often deciduous, the others linear, at least the upper sessile. Capitula less than 1 cm wide, generally numerous, in a long, paniculate inflorescence with a single axis. Involucre 3-4 mm, glabrous or nearly so. Female florets usually 25-45; ligules 0.5-1 mm, equalling or slightly exceeding the style and pappus. Achenes flattened and glabrous (Cronquist 1976).

C. canadensis is wide range spread in steppe zone to spruce flat, also an anthropophylus and nitrophylus species. Regarding the ecological growing conditions the reported life zone of horseweed is full sun to light shade, 8-20° and an acidoplylous soil. Dry sandy soil is recommended, but the plant also grows well on well-drained soils. It is commonly considered as antrophophylus and nitrophylus species (Ciocârlan, 2000). As a weed, it is found in roadsides, farmstead and waste places.

In Romania little is known about the geographical distribution and viability of this American adventive species because no phytocoenological inventories and demographic studies necessaries for the definition of the real status of species exists to date. The species was introduced in Europe in 1655. *C. canadensis* was reported for the first time in Romania in 1814, in the Carpathian Mountains (Săvulescu et al. 1964).

The main objective of this study is to document and complete the geographic distribution of the genus *Conyza* Less. in Romania.

MATERIAL AND METHODS

The distribution of *C. canadensis* (horseweed) in Romania was determined by examination of the voucher specimens from the following Herbaria: **BUAG**, **BUC**, **BUCA** or consulting literature resources and living specimens from fieldwork were studied. This is an ongoing project regarding chorological and ecological aspects of *C. canadensis*. Voucher specimens from different ecotypes are gathered and planted in Botanical Garden of University of Agronomic Sciences or deposited in BUAG herbarium (sheet no. 23780).

Fieldwork was carried out through the country, in different counties in order to visit the reported sites of *Conyza* occurrence. The chorological map of *C. canadensis* included in this work was made by taking in account the principles of the Universal Mercator System (the U.T.M. kilometrical cut), which ensures an exact localization of village, communes and towns where the species was found. Within the U.T.M. system, the research territory is split in basic squares of 100 x 100 km through vertical lines (columns) and horizontal lines (series). Each basic square is split, in its turn in 100 another smaller elementary squares of 10 x 10 km, by vertical and horizontal lines (Chirilă et al. 2002).

RESULTS AND DISCUSSION

The geographical distribution of the species is expressed in *Figure 1*. The present study indicates that the taxon is relatively common, occurring in the most Romanian counties. It will be considered as synantropic species with a high resistance to pollution (Chirilă et al. 2002).

The chorological map (**Fig. 1**) is based on the sources cited above plus new records obtained by authors during this study. The new sites discovered by authors are listed below with the U.T.M. coordinates (Lehrer & Lehrer 1990):

Feteşti MN 95, Lehliu MK 82, Cernavodă NK 80, Medgidia PJ 09, Basarabi PJ 19, Negru Vodă NJ 95, Constanţa PJ 28, Giurgiu MJ 15, Tohani MK 58, Bucureşti MK 21, Iaşi NN 41, Câmpulung LL 41, Piteşti LK 26, Sibiu KL 77, Oradea ET 61, Baia Mare FT 88, Cluj Napoca FS 97, Ploieşti MK 27, Craiova GQ 11, Băile Herculane FQ 17, Slatina KK 82, Râmnicu Vâlcea KK 99.

The Herbaria reviewed data are listed bellow. For each herbarium sheet is indicate the number, the locality, data and the name of harvester.

BUAG 5403- Brăila (NL 70), 1962, Oprea C.; *BUAG 5402*- Cluj, 1937, Bujor G.; *BUAG 5401*- Craiova, Fântâna Obedeanu (GQ 11), 1960, Cârţu D., Maloş C & Olaru M.; *BUAG 18203*- Beriu (FR 77), 1969, Simtea; *BUAG 21854*- Prahova, 1906, undesciphrabile; *BUAG 5405*- Cojocna (GS 18), ?, Prodan I.; *BUAG 5406*- Piteşti, 1955, Ionescu & Dumitru; *BUAG 23780*- Bucureşti, 2003, Săndulescu N. & Pădure I.; *BUC 272259*- Râioasa, 1971, Simion D.; *BUC 261864*- Găuleşti, 1967, Popescu D. ; *BUC 182065*- Someş (FT 74), 1937, Bujoran G.; *BUC 361708*- Piteşti, Colibaşi, 1970, Busuioc S.; *BUC 361498*- Murfatlar (PJ 19), 1971, Voinescu A.; *BUC 360800*- Satu Mare (FT 39), ?, Tîrnoveanu V.; *BUC 321151*- Aluniş (ML 52), ?, Rusea V.; *BUC 176421*- Deva (FR 48), 1980, Calgiu M.; *BUC 275260*- Pantelimon (MK 32), 1904, Enculescu P.; *BUC 275259*- Bârlad (NM 51), 1952, Borza A.; *BUC 275258*- Tulucești (NL 84), 1952, ?; *BUCA 81102*- ?, 1904, Prodan I; *BUCA 93407*- Giurgiu (MJ 15), 1948, Grinţescu I.; *BUCA 93407*- Chitorani, ?, 1928; *BUCA 122845, 42020*- Cluj (FS 97), 1937, Bujorean G.; *BUCA 93512*- Răcătău (FR 79), 1948, Arvat A.; *BUCA ?*- Cojocna

(GS 18), 1937, Arvat A.; *BUCA 135506*- Stănceşti (MK 99), 1971, Zileru ?; *BUCA 93403-04*- Timişoara, Bega (ER 16), 1947, Arvat A.; *BUCA 1775*- Bucureşti (MK 21), 1960, Sandală V. ; *BUCA 122846*- Cluj (FS 97), 1937, Bujorean G; *BUCA 93787*- Pitaru (LK 83), 1948, Zahariadi C.; *BUCA 93065*- Bogata (GS 15), 1949, Nyarady A. ; *BUCA 93788*- Pietroşani, Vlaşca (NK 61), 1944, Bontaş V.; *BUCA 126500*- Craiova (GQ 11), 1960, Cîrţu D., Maloş C., Olaru M. & Păun M.; *BUCA 21720*- Cluj (FS 97), 1937, Bujorean G.; *BUCA 93814*- Ianca (ET 73), 1911, Grinţescu I.; *BUCA 147949, 147921*- Siriu (ML 43), 1957, Dihoru G.; *BUCA 93813*- Cozia (FR 48), 1911, Grinţescu I.; *BUCA 93962*- Craiova, 1949, Buia A.

The chorological points were wrote down on the chorological map using several symbols for an easier differentiation (**Fig.1**):

- ∗ species gained by author from fieldwork;
- ● species from references;
- ▲ species from different Herbaria

CONCLUSIONS

Conyza canadensis is a widely distributed species that is common in our country in pastures, road sides, cultivate fields and gardens, mostly on rather dry soil. It is a semicosmopolitan weed, adventive from United States and North America. It is a weed resistant to pollution in great town considered as a synantropic species. The data presented above is partial, a complete study will be plan in future for species's areal delimitation in Romanian territory.

Acknoledgement: The authors are grateful to Professor dr. *Ioan Burzo* and to Professor dr. *Vasile Ciocârlan* for critical reading of the manuscript and supervising the scientific work, also to all curators of mentioned Herbaria for the use of the horseweed specimens used to complete this study.

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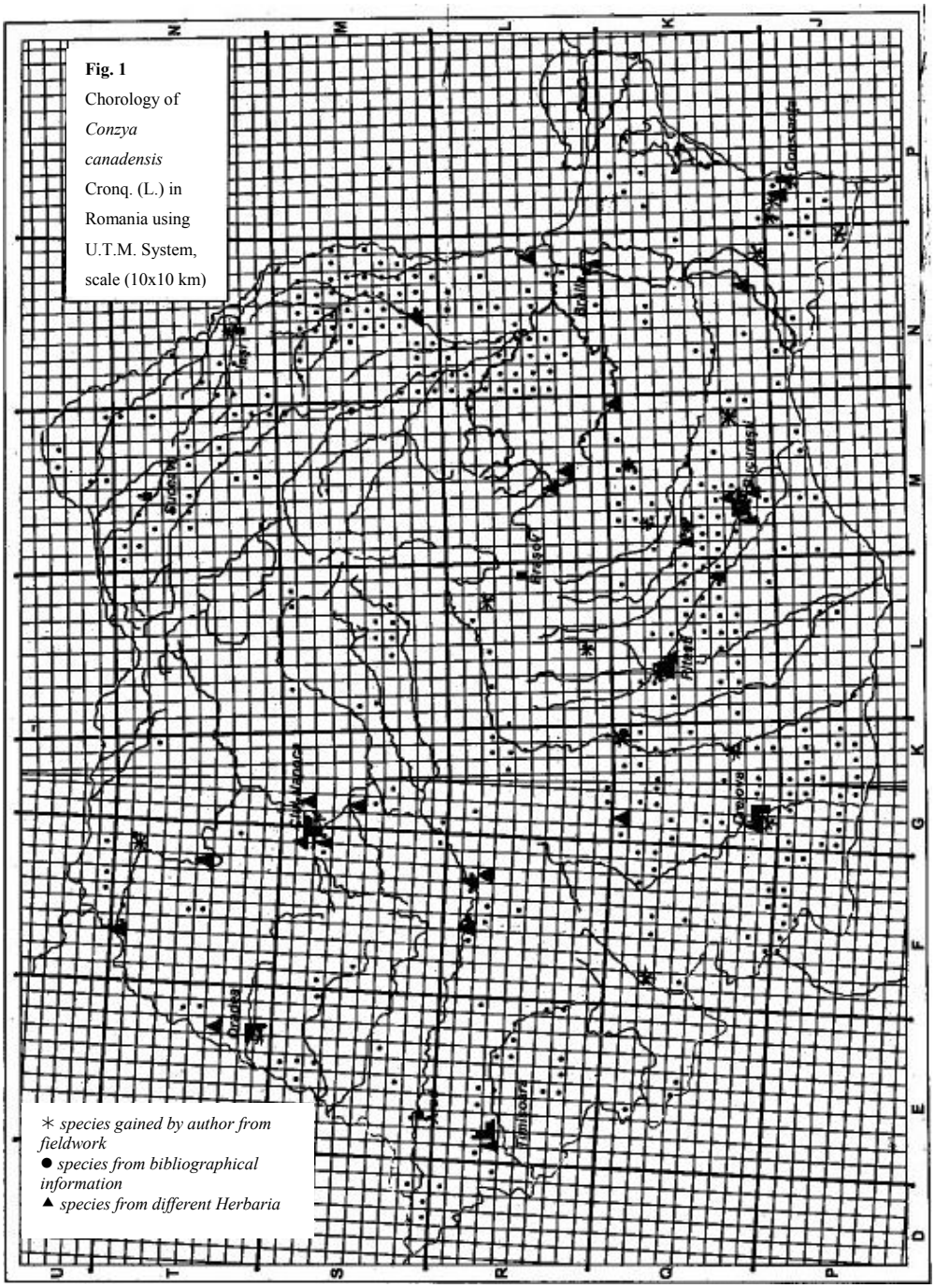

Fig. 1
Chorology of *Conzya canadensis* Cronq. (L.) in Romania using U.T.M. System, scale (10x10 km)

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RESEARCHES ON FITPOL INFLUENCE FROM VARIOUS AGROFOUNDS ON ENGRAFTED GRAPE VINE PHYSIOLOGICAL PROCESSES

STANCU R., MONICA FLEANCU, DUMITRIU I., EUGENIA DRĂGHIA, ALINA ENACHE

Key words: Fitpol, grape vine, agrofound

SUMMARY

The aim of this paper consists in optimal Fitpol doze identification. Fitpol is a super absorbance aqueous substance that has to be added in the nutrient soup for *Victoria*, and *Muscat Ottonel* grape vine brackens. The product Fitpol C is a reticulated polyacrylamide (PAA) and it is considered to be the most indicated support the produce an aqueous material for engrafting fertilizing elements. World wide and national scale conducted researches have proved that Plastic made super absorbance aqueous substances are fit to use in agriculture and horticulture, due to their capabilities to retain water. Experimental sample have been produced in Stefanesti Vine Research and Production Station Phytotronic Complex. Those two grape vine brackens mentioned above were planted in plastic bags, in which rooting promoter soil mixtures were enriched with Fitpol C polymer. During the researches conducted in Pitesti University Plants Physiology Laboratory, there were observed photosynthesis intensity, respiration and transpiration intensity, the number of shoots and the foliated surface.

INTRODUCTION

The cultivated brackens gain, generally speaking, 50 to 70 % from their mineral substances optimal needs. The remaining amount it is possible to be obtained from chemical fertilizers treatments. The use of chemical fertilizers by the plants is more efficient whether the mineral salts are evenly dispersed in super absorbance aqueous substances from which water is slowly and long time eliminated along with mineral salts. This process gives a constant enhanced anabolism to the growing plant, a feature that offers future vigorous adult plants and increased corps on any given unit of surface.

MATERIALS AND METHODS

The *Victoria* and *Muscat Ottonel* grape vine brackens were supposed to tests. Test samples were planted using large or small polyethylene bags. The bags were filled up with various nutrient mixtures such as:

1. Earth 1/3, Compost 1/3, Sand 1/3 (E 1/3, C 1/3, S 1/3);
2. Earth 1/3, Sand 2/3;
3. Earth 2/3, Sand 1/3;
4. Earth 2/3, Compost 1/3;
5. Sand 3/3.

The following Fitpol doses were used for treatment: 0g, 0.5 g, 1 g, 1.5 g. In case of three years old grape vines, these had been tested in normal watering conditions after being submitted to water stress as long as three weeks time. We noted test data about: shoot number, foliated surface, transpiration intensity (fast weigh in method) and photosynthesis intensity (manometric method). In the same time, during water stress, we compute the correlation between the intensity of transpiration processes, photosynthesis and Fitpol quantities from each nutrient mixture.

RESULTS AND DISCUSSIONS

It is been observed there is not definite dependence among the number of shoots and the Fitpol quantity from agrofound and this fact is a result data from conducted tests on growing grapes vines treated with various doses of Fitpol. In contrast, *Victoria* grape vine bracken treated with 0,5 g Fitpol and cultivated in soil mixtures E 1/3, C 1/3, S 1/3; E 1/3, S 2/3; E 2/3, C 1/3; S 3/3 lead to maximum shoot length and foliated surface noticed. In case of S 3/3 soil mixture, large doses of Fitpol cause the most intense transpiration process in both grape vine brackens tested (Table 1).

In *Victoria* Grape Vine Bracken the highest photosynthesis intensities were obtained on plants breed in agrofounds E 1/3, C 1/3, S 1/3; E 1/3, S 2/3 and E 2/3, S 1/3, and treated with 0.5 g Fitpol. The *Muscat Ottonel* one had the most intense photosynthesis activity on agrofound E2/3, C1/3 and it was treated with 1.5 g Fitpol.

The intensity of respiration was influenced by Fitpol quantities and by the type of nutrient soil mixture, therefore, the *Victoria* Grape Vine Bracken planted in E 1/3, S 2/3 and treated with 0.5 g Fitpol showed au increased respiration, as well as *Muscat Ottonel* one planted in E 2/3, C 1/3, treated with 1g and 1.5 g Fitpol.

The water stress time for both grape vine bracken studied make us notice the presence of a positive enhanced correlation between the transpiration and photosynthesis intensity processes and the Fitpol quantity in most tested samples. (Figure 1, Figure 2).

CONCLUSIONS

The flower pots soil prepared with Fitpol gives increased values to observed physiological processes for both grape vine brackens, *Muscat Ottonel* and *Victoria***,** as well as in normal watering conditions. In water stress time, Fitpol induce a better water supply activity of plants and, therefore, a more intensive development of physiological processes.

Table 1

The Fluctuation of *Victoria* and *Muscat Ottonel* Grape Vines Physiological Processes, planted in various Agrofounds and treated with various Fitpol doses

Soil MixtureVariant	No. shoots		Shoot length(cm)		Leaf Surface (dm^2)		Transpiration (gapă/dm^2/h)		Photosynthesis (cm^3O_2/dm^2/h)		Respiration (mm^3O_2/g/h)	
	G	g	G	g	G	g	G	g	G	g	G	g
Victoria Grape Vine Bracken												
1. E1/3,S1/3,C1/3, 0 g F	2	1	15	12	0.315	0.285	0.038	0.042	1.266	0.982	55.857	46.055
2. E1/3,S1/3,C1/3, 0.5 g F	1	3	33	10.5	0.345	0.356	0.034	0.067	1.617	1.304	64.431	56.88
3. E1/3,S1/3,M1/3, 1 g F	2	1	12.5	15	0.327	0.192	0.073	0.125	1.181	0.952	38.162	29.173
4. E1/3,S1/3,M1/3, 1.5 g F	2	2	16	7.5	0.28	0.25	0.042	0.048	0.549	0.426	14.378	10.655
5. E1/3,S2/3, 0 g F	2	1	15	18	0.29	0.311	0.082	0.038	1.095	0.771	35.591	31.207
6. E1/3,S2/3, 0.5 g F	2	1	22.5	16	0.32	0.311	0.187	0.077	1.285	1.252	36.6	35.24
7. E1/3,S2/3, 1 g F	3	1	12.3	16	0.302	0.299	0.08	0.04	1.008	1.012	21.235	20.075
8. E1/3,S2/3, 1.5 g F	2	2	11.5	7	0.226	0.258	0.05	0.046	1.006	0.801	33.431	25.124
9. E2/3,S1/3, 0 g F	3	2	14.6	13.5	0.361	0.302	0.033	0.08	1.092	0.753	42.135	32.39
10. E2/3,S1/3, 0.5 g F	3	2	18.6	12	0.311	0.213	0.077	0.056	1.355	0.82	69.491	37.521
11. E 2/3,S1/3, 1 g F	2	3	24	8.6	0.343	0.32	0.14	0.11	0.809	0.582	20.563	18.34
12. E2/3,S1/3, 1.5 g F	2	4	11	12.5	0.231	0.276	0.155	0.087	0.80	0.571	18.53	18.022
13. E2/3,C1/3, 0 g F	1	1	14.5	36	0.356	0.311	0.033	0.077	0.193	0.153	6.895	4.716
14. E2/3,C1/3, 0.5 g F	2	3	38	21.6	0.4	0.325	0.06	0.036	0.363	0.221	10.133	6.526
15. E2/3,C1/3, 1 g F	2	2	11	19.5	0.388	0.38	0.061	0.094	0.347	0.258	8.791	5.45
16. E2/3,C1/3, 1.5 g F	3	1	15.6	18	0.3	0.361	0.04	0.133	0.301	0.219	7.82	5.033
17. S3/3, 0 g F	2	2	9.5	6	0.307	0.238	0.078	0.05	0.331	0.259	7.992	7.95
18. S3/3, 0.5 g F	2	2	6	8	0.26	0.41	0.046	0.03	0.615	0.441	12.46	11.56
19. S3/3, 1 g F	2	2	7.5	8	0.32	0.233	0.075	0.154	0.793	0.524	15.92	14.921
20. S3/3, 1.5 g F	1	1	11	5.6	0.286	0.267	0.083	0.045	0.30	0.287	5.103	5.007
Muscat Ottonel Grape Vine Bracken												
1. E1/3,S1/3,C1/3, 0 g F	2	1	7.5	8	0.172	0.338	0.121	0.106	0.811	0.8	26.83	25.132
2. E1/3,S1/3,C1/3, 0.5 g F	2	2	12.5	14	0.284	0.323	0.084	0.037	0.892	0.742	32.166	30.432
3. E1/3,S1/3,C1/3, 1 g F	1	2	12	9	0.26	0.286	0.138	0.126	0.899	0.701	35.088	30.986
4. E1/3,S1/3,C1/3, 1.5 g F	1	2	5	3.5	0.233	0.2	0.154	0.12	1.012	0.783	36.6	33.54
5. E1/3,S2/3, 0 g F	3	2	12.6	13.5	0.35	0.178	0.105	0.035	0.299	0.281	5.134	4.121
6. E1/3,S2/3, 0.5 g F	2	2	16	12	0.311	0.315	0.115	0.076	0.353	0.303	8.14	7.098
7. E1/3,S2/3, 1 g F	2	2	30	9	0.307	0.226	0.04	0.106	0.409	0.311	10.091	9.072
8. E1/3,S2/3, 1.5 g F	1	2	22	7.5	0.336	0.137	0.035	0.087	0.186	0.102	9.61	8.501
9. E2/3,S1/3, 0 g F	3	1	15.3	20	0.334	0.25	0.071	0.048	0.14	0.101	4.955	3.849
10. E2/3,S1/3, 0.5 g F	3	2	17.6	5	0.284	0.178	0.042	0.135	0.343	0.303	8.081	6.76
11. E2/3,S1/3, 1 g F	1	2	28	15	0.311	0.223	0.077	0.054	0.242	0.201	5.109	5.102
12. E2/3,S1/3, 1.5 g F	2	1	37.5	35	0.243	0.311	0.2	0.077	0.406	0.252	9.269	5.832
13. E2/3,C1/3, 0 g F	2	1	1	18	0.2	0.275	0.06	0.13	0.647	0.523	15.41	10.238
14. E2/3,C1/3, 0.5 g F	1	3	27	8.3	0.252	0.23	0.047	0.052	1.414	1.404	60.542	50.255
15. E2/3,C1/3, 1 g F	2	2	11	15	0.288	0.267	0.041	0.09	1.391	1.204	61.2	60.109
16. E2/3,C1/3, 1.5 g F	3	2	11	12.5	0.34	0.274	0.07	0.087	1.89	1.803	58.99	55.751
17. S3/3, 0 g F	3	3	3.6	3	0.242	0.2	0.15	0.12	0.772	0.642	25.32	20.927
18. S3/3, 0.5 g F	2	2	6	2	0.243	0.147	0.05	0.08	0.94	0.75	50.132	46.41
19. S3/3, 1 g F	2	1	6	7	0.226	0.215	0.16	0.111	0.75	0.619	20.932	17.165
20. S3/3, 1.5 g F	1	1	7	6	0.178	0.155	0.16	0.155	0.495	0.513	15.583	15.425

Figure 1

The Water Stress Influence on *Victoria* Grape Vine Photosynthesis Intensity due to various Fitpol quantities

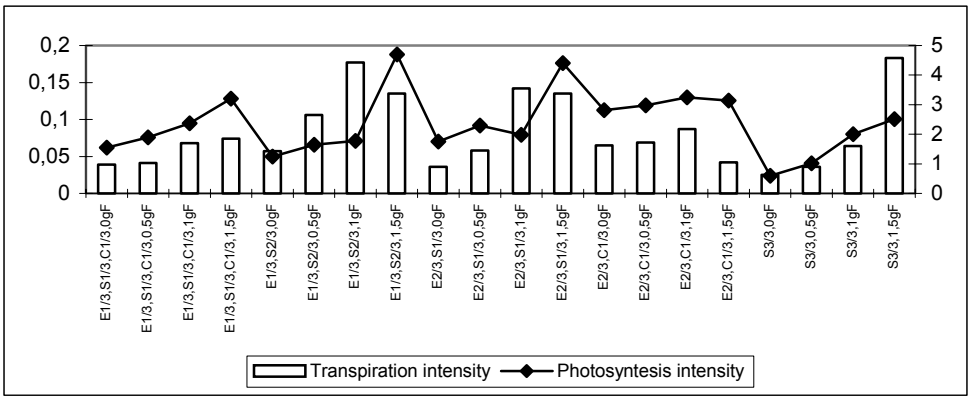
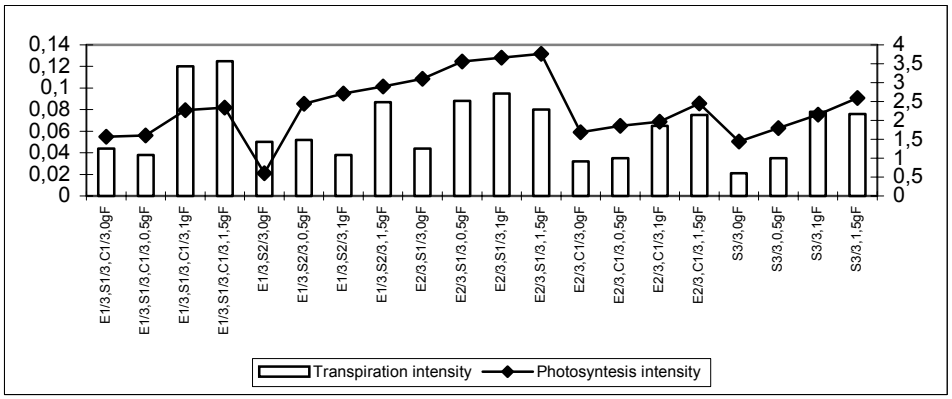


Figure 2

The Water Stress Influence on *Muscat Ottonel* Grape Vine Photosynthesis Intensity due to various Fitpol quantities



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FLORAL MORPHOGENESIS OF *SALVIA OFFICINALIS* L. (*LAMIACEAE*)

TOMA I., TOMA C., ZAMFIRACHE M. M.

Key words: *Salvia*, development, stamen, ovary, petal, sepal

SUMMARY

Salvia officinalis is a medicinal and aromatic plant witch contain volatile oils (1,5 – 2,5 %). The main chemical components of sage oil are: borneol, camphor, thujone, phellandrene, salviol and cineole. The therapeutic properties of sage oil are: anti-inflammatory, antiseptic, astringent, digestive, diuretic, emmenagogue, insecticide, laxative and tonic. The volatile oils are produced by secretory hairs, frequents on the leaves and the floral pieces.

In this paper we investigated the floral morphogenesis stages. First, on the external part of the vegetative apex bract primordial – which will protect the flower - arise. Subsequently, the sepals, petals and the ovary primordia are initiated. The stamens are inserted from the beginning on the corolla tube. Because the ovary arises before the stamens, the flower is protogyne. When the stamen growth the filament is extended and the connective is bifurcated: his longer branch has a fertile anther, with two pollinic sacs; the shorter branch has also a little fertile anther. This is a rare case in *Salvia* genre because, usually, the anther form the posterior part of the filament branch is sterile. The ovary has two carpels and four locules, each with one campylotropous ovule.

INTRODUCTION

The *Labiatae* is a large angiosperm's family, with about 220 genera and 4000 species. Of all the genera in *Labiatae*, *Salvia* is one of the largest, with its approximately 900 species and subcosmopolitan distribution (Hedge, 1992).

The floral morphogenesis in *Salvia officinalis* was not reported until now, though a lot of aspects, some related of the floral sphere, was approached by some authors. The megagametophyte in *Labiatae* was investigated by Rudall and Clark (1992); they realised a critical review of data from new research and a survey on literature and mentioned in this study some aspects related of *Salvia uliginosa*. In 1971, Buyukly investigate the floral morphogenesis, micro – and macrosporogenesis in *Lavandula vera*. Emboden (1964) realised a comprehensive study about the pollen morphology on the genus *Salvia.*

MATERIALS AND METHODS

The vegetal material (*Salvia officinalis* floral buds) was fixed in a FAA mixture (ethylic alcohol: acetic acid: formol - 1:1:1). The method used for obtaining permanent samples (sections) was classical: fixed material was sectioned along a transversal and longitudinal line on Minot microtome, after a paraplast including. The obtained sections were coloured either with red-ruthen and methyl-blue. After that, the sections were fixed in Canada balsam. The photos were made on microscope NOVEX with a photo camera Minolta.

RESULTS AND DISCUSSIONS

After 4 month of vegetative period, when from the caulinar apex activity results only leaves, the cessation of the vegetative stage and the initiation of the reproductive stage could be observed. Flower arises at the apex of the main shoot and on lateral branches.

The flower parts arise in continuous acropetal sequences. First, on the external part of the vegetative apex appear the bract primordia, which will protect the flower. After that, the sepals' primordia are formed. The rest of the sporogenous meristem has a plane form.

In another stage the primordia of the petals, ovary and finally of the stamens arise. The stamens are congenitally inserted on the corolla tube. They are initially formed from a short and thick filament and an anther with homogenous meristematic tissue (fig. 2.A). When the stamen growth the filament is extended and the connective is bifurcated: his longer branch has a fertile anther, with two pollinic sacs; the shorter branch has also a little fertile anther. This is a rare case in *Salvia* genre (*S. ringens*), because usually the anther form the posterior part of the filament branch is sterile (*S. sclarea, S. pratensis, S. nemorosa*).

From the first four external layers of cells the anther wall will be formed. In the anther' middle the sporogenous tissue is differentiated (fig. 2.B).

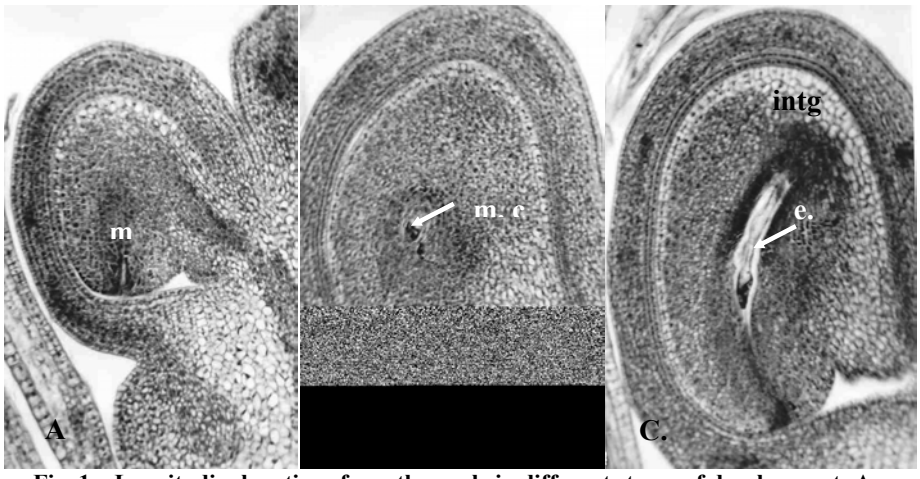

Fig. 1 – Longitudinal sections from the ovule in different stages of development: A – young ovule with nucellus – the mycropile (m) could be observed; B – ovule with mother cell of the embryo sac (m.c); C – ovule with embryo sac (e.s) completely developed (orig.)

The mature anther has two locules delimited from a wall consist from two layers of cells: the outermost is the epidermis, with flattened cells and the innermost layer is the endothecium. These cells develop secondary thickness as the

stamen approach of maturity, which occur in the anticlinal and the inner tangential walls. In the anticlinal walls the secondary thickness frequently has the form of strips or ridges oriented perpendicularly to the epidermal layer (fig. 2.C).

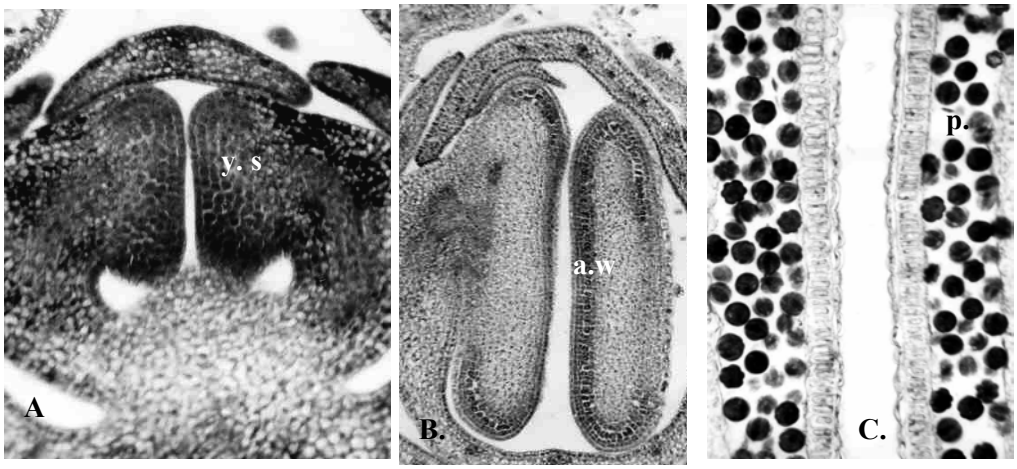

Fig. 2 – Longitudinal sections from the stamen in different stages of development: A – young stamen (y.s) inserted on the corolla tube; B – the anther wall (a.w) become visible; C / mature anther with pollen grains (p) (orig.)

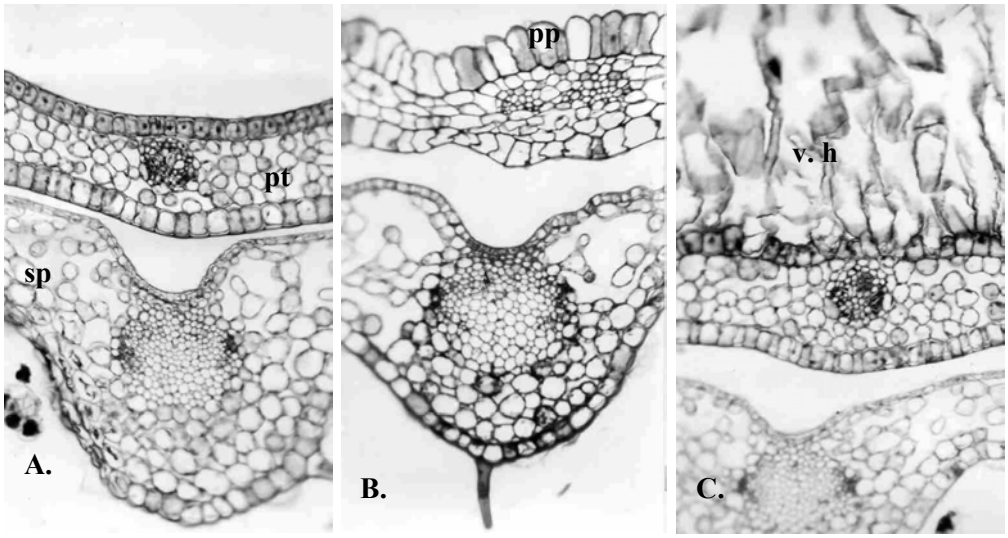

Fig. 3 – Transections from the petals (pt) and sepals (sp): A – petal with meristematic epidermic cells; B – petal with papills – the superior third part; C - petal with long vacuolated hairs (v.h) – the inferior third part (orig.)

The ovary has two carpels and four locules, each with one campylotropous ovule (fig. 1). In ontogenesis, the ovule appears like a prominence in the

sporogenous tissue. The ovule has a single, relatively thick integument. The integument is initiated at the arhesporial stage, develops during the megaspore mother cell stage and is fully developed in the tetrad stage.

The ovary wall presents two epidermises (external one – lower and internal one – upper) and a homogenous mesophyll with numerousness vascular bundler, represented in the early stages by the procambium girdle.

Sepals and petals differentiation (fig. 3): in ontogenesis the sepals develop first and have a similar structure with a foliar lamina (with homogenous, spongy parenchyma). The petals consist from two epidermis and spongy parenchyma. From the upper epidermis cells in the third inferior part arise some long vacuolised hairs. In the third superior part the epidermic cells are transformed in secretory papills.

CONCLUSIONS

The floral morphogenesis in *Salvia officinalis* has some distinct features: the stamens are initiated before the gynoecium; the ovule has only one integument; the petals present long vacuolated hairs in the inferior third part and secretory papills in the superior one.

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RESEARCH REGARDING FRUIT QUALITY OF NEW CREATED TOMATO EARLY HYBRIDS FOR GREENHOUSE AND FIELD

C. VÂNĂTORU, LILIANA BĂDULESCU, C. PETRESCU, I. BURZO

Keywords: tomato, F1 hybrid, fruit, quality

The increasing interest for preferable utilisation of early tomato F1 hybrids for protected areas and field lead to the predominant utilisation of imported seeds, special adapted for greenhouses and advanced technologies.

Because of the high level of seed cost price, the growers prefer F1 hybrids created before 1989 or tomato cultivars for summer growing.

We studied at the Experimental Station for Vegetables Buzău (SCDL Buzău) 4 F1 early hybrids adapted for greenhouses and open field. The amelioration aims were: earliness, environment extreme condition adaptability, storage capacity, disease tolerance, optimum qualities as aspect, taste and a good balance concerning the acidity and dry matter content (1, 2, 3, 4).

The trials with the best F1 hybrids conducted between 1996 and 2001 emphasised the new F1 hybrid superiority by comparison with the local cultivars and F1 hybrids concerning the earliness, productivity and ecological adaptability.

MATERIAL AND METHODS

The F1 early tomato hybrids (H1-Bz, H2-Bz, H3-Bz, H4-Bz) were grown in cold greenhouse and open field at SCDL Buzău.

The dark respiration rate was determined by measuring the CO_2 releasing with an IR analyser (Riken).

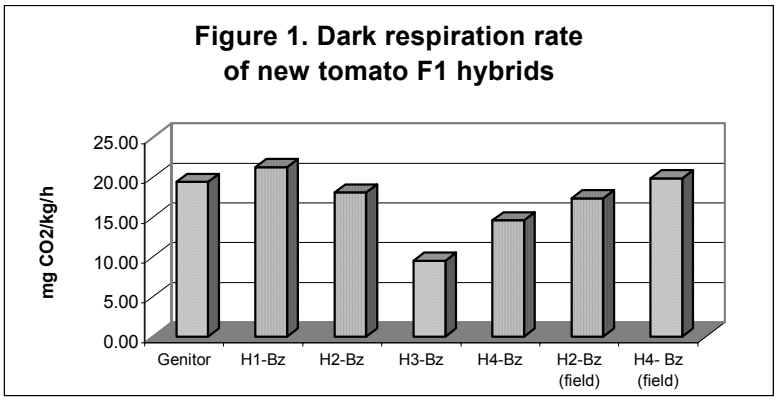
The colour pigments content, consisting in carotene and lycopene, were measured spectrofotometrically at 452 nm and 471 nm, after extraction in petroleum ether. The dry matter was analysed by weighing the plant material after 24 h drying at 105 °C. The soluble dry matter was measured refractometrically. The titratable acidity was analysed by titration the extractive solution with 0,1N KOH, in the presence of phenolephtaleine as indicator.

RESULTS AND DISCUTION

The tomato yield was determined by the fruit number and their size, too, and could be increased by different growing techniques or by the new cultivar utilisation. But, the productivity increase can affect the fruit quality, considering that the reverse proportional ratio between dry matter and yield (Ho and Hewitt, 1994). The plant metabolic control and the assimilates distribution in the tomato

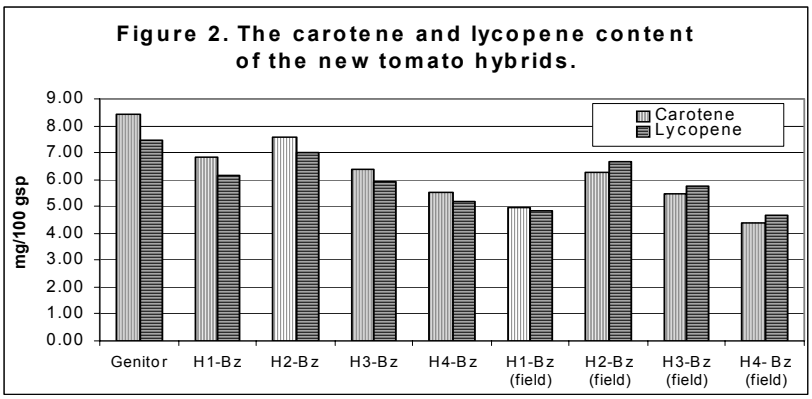
fruits can induce their quality increase, a well-balanced ratio of sugars, dry matter and acidity, vitamins, volatiles, as well as aspect, colour and firmness.

The **dark respiration rate** of tomato – climacteric fruits – could represent a measure of their maturation degree (figure 1).



The respiration rate of the new tomato F1 hybrids varied between 9.51 mg CO_2/kg/h (H3-Bz cultivated in greenhouse) and 21.33 mg CO_2/kg/h (H1-Bz cultivated in greenhouse). The respiration rate of the fruits cultivated in open field had higher values (17.39-19.9 mg CO_2/kg/h), comparable with those of genitor. The hybrid H2-Bz presents a similar respiration rate, both in greenhouse conditions and field, too.

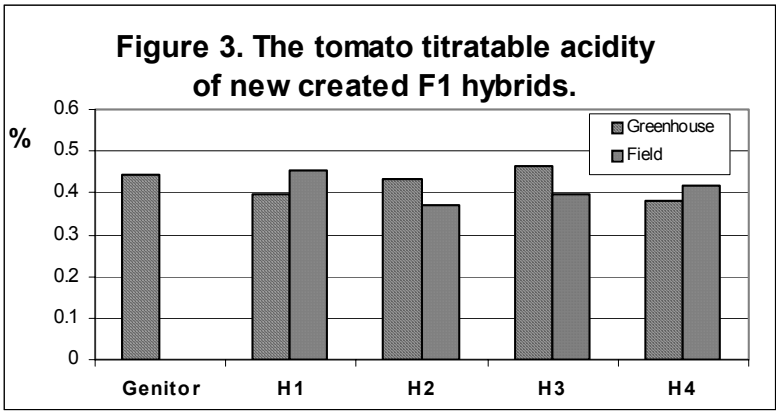
The **carotene and lycopene contents** – the main constitutive pigments – represent a valuable qualitative feature for the tomato fruit characterisation (figure 2).



The carotene content varied between 4.41 mg/100 g m.v. (H4-Bz cultivated in field) and 8.42 mg/100 g m.v. (genitor), while the lycopene content

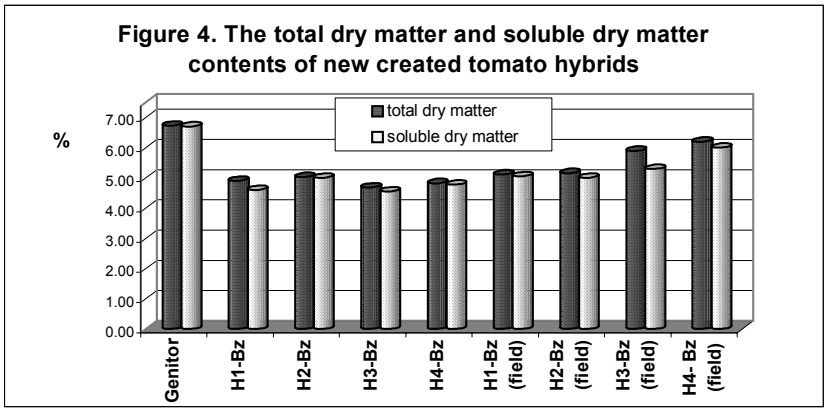
varied between 4.65 mg/100 g m.v. (H4-Bz cultivated in field) and 7.36 mg/100 g m.v. (genitor). The hybrids cultivated in cold greenhouse have higher carotene content, as the same variants cultivated in field. The best values of these biochemical parameters were registered for genitor.

The titratable acidity represents an important qualitative indicator for tomato fruits, which offer valuable indications concerning the fruit taste and the cultivar usefulness.



The titratable acidity varied between 0.371% (H2-Bz cultivated in field) and 0.476% (H2-Bz cultivated in greenhouse). The hybrids cultivated in greenhouse – H2-Bz and H3-Bz – are the highest titratable acidity content, as well as those cultivate in field.

The total dry matter content varied between 4.68 % (H3-Bz cultivated in greenhouse) and 6.2 % (H4-Bz cultivated in field).



The soluble dry matter content is in direct relation with the total dry matter content. It is situated between 4.55%-6%, values determined at the same variants.

Table 1

Morphological characters of the tomato fruits of F1 new developed hybrids, grown in greenhouse.

Hybrid	Seed locules	Maximum weight (g)	Pericarp width (mm)	Density	Colour
H1-Bz	4	155	6-7	1.062	Red-carmine
H2-Bz	5	162	7-8	1.17	Red-carmine
H3-Bz	5	150	5-6	1.07	Red-carmine
H4-Bz	4	155	6-7	1.07	Red-carmine

The new created tomato hybrids have 4-5 locules, and their maximum weight was situated between 150g (H3-Bz) and 162g (H2-Bz). The pericarp width varied between 5-6 mm (H3-Bz) and 7-8 mm (H2-Bz) and their density between 1.062 (H1-Bz) and 1.17 (H2-Bz). The H1-Bz and H4-Bz presented a very close resemblance concerning the morphological characters. The H2-Bz hybrid has a high productive potential in greenhouse conditions, by comparison with the others.

CONCLUSIONS

The fruit dark respiration varied significantly between the hybrids, but also with respect to the crop place (in the field or in the protected area).

The hybrids grown in the greenhouse have higher carotene content than those grown in the open field; it is remarkably the H2-Bz with the high values in open field conditions, as well as in greenhouse conditions.

The H2-Bz and H3-Bz hybrids have a remarkable high content of titratable acidity grown in the greenhouse conditions, as well as in field conditions.

The H2-Bz (cultivated in greenhouse) and H4-Bz (cultivated in field) have a higher and well-balanced accumulation of total dry matter and soluble dry matter.

The H2-Bz expresses a productive potential higher in the greenhouse conditions than the other variants.

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THE EFECT OF AIR POLLUTANTS FROM BORZESTI INDUSTRIAL CENTER (BACAU DISTRICT) UPON PHISIOLOGICAL PROCESSES AND MORPHO-ANATOMICAL CHARACTERS OF WOODEN ANGYOSPERMES (NOTE IV)

ZAMFIRACHE M.M., IVĂNESCU L., APETREI R.

Key words: angiosperms, chlorosis, histological modifications, physiological modifications

SUMMARY

The negative influence of air pollutants typical for the studied site (the industrial centre of Borzesti, Bacau district) is evidenced, first of all, by total or partial defoliation phenomenon, foliar chlorosis and necrosis, various teratological cases, notable especially at the species found on the limitrophe areas of the polluting source. The foliar chlorosis and necrosis represent the clear manifestation of profound physiological modifications, as well as severe structural alterations, which affect the average content of water, dry substance and assimilating pigments. Under the influence of both solid and gas pollutants, in the angiosperms' leaves, the average content of chlorophyll a, chlorophyll b and carotene pigments drops significantly, comparing with the standard values. The phenomenon is most often connected with the distance from the polluting source.

INTRODUCTION

The negative influence of air pollutants upon vegetation has been notable, first of all, through total or partial defoliation, leaf chlorosis and necrosis, various teratological cases, found especially at the species from within limitrophe areas of the polluting source (Yunus et all. 1966; Ivănescu et all. 2001). In our country, the vegetation's pollution with solid pollutants, originating in the cement, lime or superphosphatic fertilizer factories has been studied at Bicaz, Medgidia, Barzesti. The physical and geographical conditions of each industrial area are favourable to the spreading and fall out of the polluting factors, an important role upon their site and quantitative distribution being played by site configuration, atmospheric currents and, to some extent, the very vegetation layer (Ionescu et all., 1972) .The present study continues the series of investigations concerning the ill-fated effects of air pollutants from the industrialized areas of Moldavia upon the protective vegetation, hoping to make the proper authorities well aware of the importance of keeping, in the investigated area, the normal natural life conditions.

MATERIALS AND METHODS

Leaves belonging to three species have represented the investigated material: *Acer pseudoplatanus* L., *Acer negundo* L., *Aesculus hippocastanum* L., found within the surrounding area of the Borzesti, Bacau District. The vegetal

material has been collected throughout the period of 1997 – 2000, each year from the month of May, up until the end of the month of September, making at the same time site observations, in order to monitor the vegetation state around the polluting source. The experiments have been carried out in the Vegetal Morphology and Anatomy Laboratory and in the Vegetal Physiology Laboratory within the Biology Faculty from "Al. I. Cuza" University of Iasi, in accordance with the classical methodology.

RESULTS AND DISCUSSIONS

The individuals of *Acer pseudoplatanus* found near the synthetic rubber plant of Borzesti (approximately 150 – 600 m) attract attention by defoliations up to 60% of their leaf and by the fact that some of the individuals have the lower part of the leaf completely dried, while very young leaves emerge from a few branches towards the top of the leaf (phenomenon observed at the end of August). The leaves present brownish-orange burns gathered especially at the edge of the incisions, in which case they are not displayed in continuous stripes, as it is the case of *Acer negundo*. As for *Aesculus hippocastanum*, the individuals studied in Borzesti area, whether they are very close to the polluting source or as far as 1000 – 15000 m, they present the same leaf symptoms, fact, which comes to show that this specie has a strong reaction to pollutants. Without showing significant defoliations, trees have sometimes up to 60% of their leaves affected, as leaflets are attacked sideway or along the median nerve by brownish – red necrosis, sometimes very close to their surface. The points of the leaves are often contorted or rolled towards the inferior side. The symptoms presented are especially characteristic to the fluorine action, but fluorine is not found among the main pollutants in the area. In some cases, the leaves' symptoms betray the presence of a new pollutant, which means that the polluting sources must be very well known, as to what specific pollutants they emit (*Aesculus hippocastanum*, regardless of the distance from the polluting source, presents "suffering" signs as defoliations, leaf burns, dryings).

The influence of both air as well as solid pollutants significantly decreases the average content of *chlorophyll a,* in the leaves of the affected individuals, comparing with standard values the phenomenon being most often connected with the distance from the polluting source. The most "spectacular" such decreases registered during our investigations, at the species from the Borzesti industrial area, prove that the air pollutants are the most destructive ones, comparing to the solid pollutants. The average content of *chlorophyll b* is, in most cases, lower than the standard value; as for the carotene pigments, the species investigated at Borzesti respond to the encountered pollutants by low leaf values.

Not always the high content of dry substance from leaves is connected to the distance from the polluting source; also, not always can this content be directly connected with the necrosis macroscopically visible, which leads us to the idea that in certain cases the perturbation of some physiological functions is followed

directly by defoliations and dryings, while in other situations the defoliations occur consequently to the large phenotypical leaf surface necrosis (Table no 1).

Table no. 1
The variation of the water and dry matter in leaves of some angyospermes from Borzesti industrial centre (g% fresh matter)

1 =Water content
2 =Dry matter at 105°C

Month	Species	Leaves control		Distance from the polluting source	Leaves affected			
		1	12		1	%M	2	%M
May	Acer negundo	62.07	37.93	~100m	56.21	90.55	43.79	115.44
				~900m	57.73	93.00	42.27	111.44
	Acer pseudoplatanus	63.88	36.12	~250m	61.17	95.75	38.83	107.50
				~1200m	60.43	94.59	39.57	109.55
	Aesculus hippocastanum	61.40	38.60	~200m	46.87	76.33	53.13	137.64
				~800m	51.72	84.23	48.28	125.07
August	Acer negundo	61.81	38.73	~100m	52.46	84.87	47.54	122.74
				~900m	56.14	90.82	43.86	113.24
	Acer pseudoplatanus	63.87	36.13	~250m	59.23	92.73	40.77	112.84
				~1200m	60.07	94.05	39.93	110.51
	Aesculus hippocastanum	58.38	41.62	~200m	40.11	68.70	59.89	143.89
				~800m	38.87	66.58	61.13	146.87
September	Acer negundo	63.79	36.21	~100m	50.61	79.33	49.39	136.39
				~900m	55.96	87.72	44.04	121.62
	Acer pseudoplatanus	65.22	34.78	~250m	56.66	86.87	43.34	124.61
				~1200m	59.11	90.63	40.89	117.56
	Aesculus hippocastanum	55.11	44.89	~200m	32.78	59.48	67.22	149.74
				~800m	31.15	56.52	68.85	153.37

Among the histological modifications, which might be placed on the account of the air pollutants, we mention: *Acer negundo* (leaflet limb): exfoliation in certain parts, as well as the modification of the mesophyll, in which some of the layers have much taller cells, with thick walls and tannin content at the upper side of the limb, while at the opposite side the cells are isodiametric; tannin accumulation in some cells of the periphloemic cells. *Acer pseudoplatanus* (leaf limb): the medium nerve at the basis of the limb has the inferior epidermis exfoliated, due to a thick area of suber; thus the schlerenchyma ring is

discontinuous subsequently to contact with the suber; in the liber area as well as in the area of the discontinuous schlerenchyma ring, there are a few very large cells, with a greenish content, which are *crystalline disorganized mass cells*. *Aesculul hippocastanum* (leaflet limb) - the structure is notably perturbed, the modifications concerning: most of the cases the inferior side of the limb is strongly affected, its cells having very thick walls and the deformed, with incomplete structure stomata, being hardly different from the other epidermis cells; the lacunose tissue contains disorganized cells; the inferior epidermis is, in places, completely destroyed, the lacunose mesophylle being in process of disorganization.

CONCLUSIONS

The response of each individual to the aggression of industrial pollutants, regardless of their chemical nature, is conditioned by a series of genetic factors, pedological and climatic conditions, natural habitat, acclimatization degree, distance and position from the polluting source, etc. and it cannot be generalized for the representatives of the same family, nor for the species of the same genus

The negative impact of the air pollutants upon the vegetation has been evidenced, above all, through total or partial defoliations, leaf chlorosis and necrosis, as well as through the appearance of various visible teratological cases, frequently noted at the individuals from the limitrophe areas of the polluting source. The leaf chlorosis and necrosis represent the clear materialization of profound physiological modifications, which affect the average content of water, dry substance and assimilating pigments, as well as the normal carrying out of the physiological processes (especially photosynthesis and respiration).

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FLORICULTURE AND DENDROLOGY

PERFUME COMPOSITION ON SOME FLOWERING BULB SPECIES

BURZO, I., MIHĂIESCU, D., DIANA ZAMFIR VÂŞCĂ, CONSTANŢA ALEXE, NICOLETA SĂNDULESCU

Key words: bulb species, perfume

SUMARRY

Empirical studies about flowers perfume exist thousand years ago. These substances called perfume were the base of many synthetic essences developing a very rich industry.

Many cut flowers have characteristic fragrance owned to some chemical substances (terpenes, esters, and eters) synthesized on intense metabolic activities.

Mookherjee (1986, 1988) identified in *freesia* flower linalool, ethyl trimethyl pirazine, α-terpineol, β-ionone, and on *lilies* flower indol, methyl benzoat, benzyl benzoat, eugenol; *Lingfeng Zu (1983*) identified 16 substances in tuberoses flower perfume (methyl benzoate, 1,8 cineol, methyl salicilate); Garnero and Joulain (1984) discovered 99 components on some flowering bulb species (tetradecanoic acid and cis-α-irona on *iris* flower) and Brunke (1993) found benzyl acetate and phenyl ethanol in *hyachints* flower.

MATHERIAL AND METHOD

In our studies, we determined the perfume constituents on some freesia cultivars (Golden Melody, Rosalinde, and Moya), on hyacinths and tuberoses flower.

There were two ways for extraction of specific fragrance substances on freesia flower. Distillation in Clevenger and capture them in pentane for the substances with small volatility (terpenes); and the substances with high volatility kept in a column containing tenax, than extract by washing with hexane.

Separation of extract substances is possible on a gaschromatograph, using a capillary column DB 5 with 25 mm diameter and 25 m length. The carrier was nitrogen; the initial oven temperature was 40˚C, for 5 minutes, than it grew to 280°C, with 4°C gradient /minute.

For the components identification the gaschromatograph is connect with an infrared Fourier transform spectrometer (FT-IR) NICOLET, and quantified with a flame ionization detector. For the FT-IR spectrometer, the spectral region was 4000-750 cm^{-1} by 8 cm^{-1} resolution and acquisition speed - 7 scans / second, the transfer line heated at 250°C, MCT detector cooled with liquid nitrogen.

The analyzed components by FT-IR detector pass through the column into the gaschromatograph where a new analyze takes place, with the flame ionization detector, and the results are registered on the integrator.

RESULTS AND DISCUTIONS

Analyzing the freesia flower extracts on a gaschromatograph coupled with an FT infrared spectrometer showed differences between the chromatogram of the components retained by fixing in tenax and the hydro distillate in the Clevenger ones.

In the tenax, captured extract chromatogram can be remarked small quantity of some components with high volatility, which appears in the first 8 minutes.

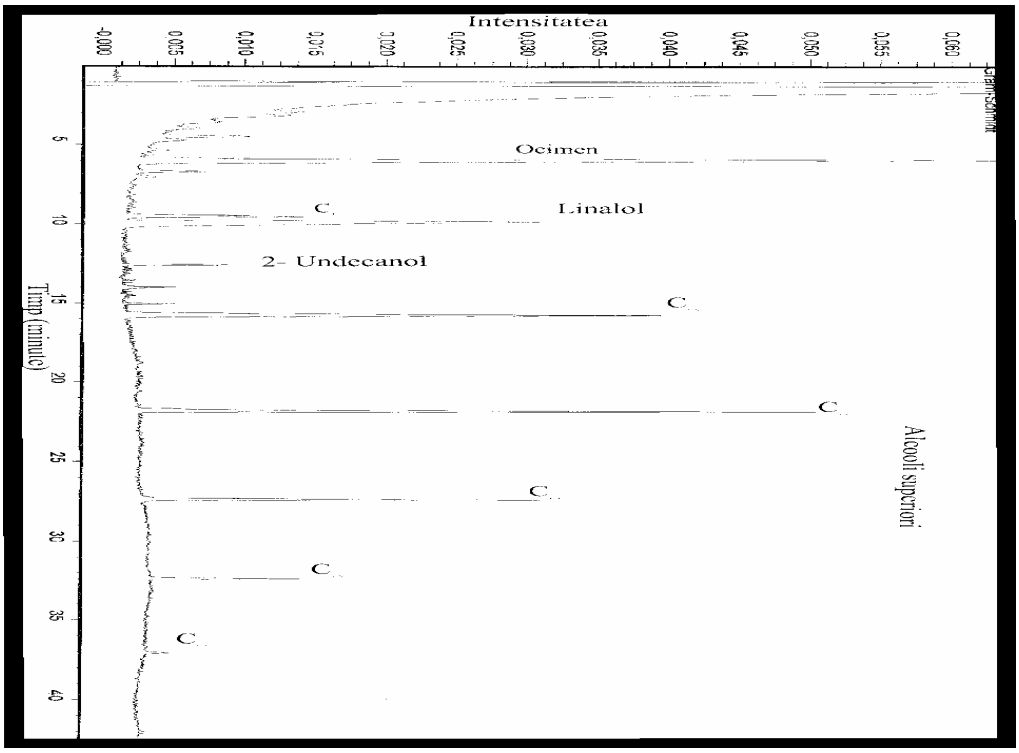

Figure 1. Freesia flower fragrance chromatogram, extracted by fixing in Tenax filter

The extract obtained by fixing in tenax showed that the main components of the essential oils on Freesia flower (the Golden Melody cultivar) are the ocimene and the linaloole (**figure 1**), on a 2,16 : 1 ratio. Other superior alcohols with 9 to 14 carbon atoms appear too.

The Clevenger extract chromatogram contains some drops of less volatile substances, recorded after 14 minutes. Extract analyses showed some differences between the Freesia cultivars (**figure 2**).

On Golden Melody cultivar (yellow flower), four components were identified: linaloole, terpineole, geraniole and β-ionone. The remark is that using this extraction method ocimene was not able to be identified. Besides the enumerated substances there are some others like: tetramethyl hexanale and 2-octanone.

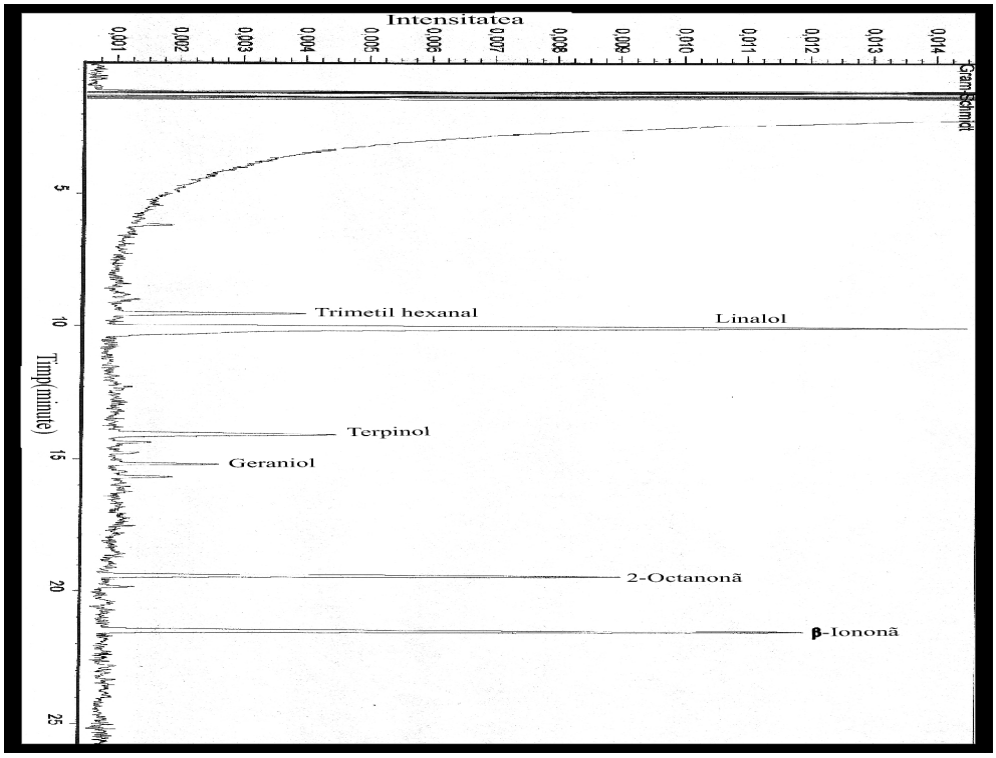

Figure 2. Freesia flower fragrance chromatogram, extracted by hydro distillation in Clevenger extraction system

On Rosalinde cultivar (double dark rose flower) the extract contained high level of linaloole, undecanone and β-ionone, and a smaller level of nonanone, mentone, α-terpineole, 4- terpineole, nerole and geraniole.

On Moya cultivar (cream coloured flower) only the linalool is in higher quantity, compared with the others substances (α-terpineole, 4-terpineole, geraniole, undecanone and β-ionone).

The Clevenger hydro distilled extract analysis for the Hyachint blue flower showed that the higher concentrate substance is benzyl benzoate. Lower concentration substances were 1-octen-3-ol, benzyl acetate, citronelale, eugenole, cetilic alcohol, phenyl-ethyl-benzoate, palmitic acid, dioctilftalate and oleic acid.

In the tuberose perfume composition, we identify couples of substances in significant quantity such as methyl antranilate, methyl eugenate benzyl benzoate, and methyl benzoate. Other components registered smaller quantity: methyl salicilate, trimethylhexanole, α-terpineole, geraniole, eugenole, farnesole and ethyl oleat.

CONCLUSIONS

1. For the flower perfume analyses it is necessary to capture the high volatility substances in tenax and the lower volatility substances in Clevenger, using pentane.

2. Nine components were identified in Freesia flower perfume, the most important (as quantity range): linaloole, β-ionone, terpineole, and undecanone.

3. Hyacinth flower perfume contains 10 substances, and the most important is benzyl benzoate.

4. From the eleventh substances on the Tuberoses flower perfume, the most important are: methyl antranilate, methyl eugenate, benzyl benzoate and methyl benzoate.

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RESEARCHES REGARDING THE VEGETATIVE PROPAGATION ON *COTINUS COGGYGRIA*

MONICA DUMITRAŞCU

Key words: *Cotinus coggygria*, cuttings, ANA, IBA, rooting substrates

SUMMARY

During these experiments the rooting capacity of *Cotinus coggygria* cuttings was studied. The influence of rooting stimulators treatments (ANA and IBA) was studied, for different cutting periods, regarding roots quantity and quality. Also, the influence of substrate rooting type was evaluated, respective sand + pearlite 2:1 and peat + pearlite 2:1. The final results showed that the cuttings treatment with IBA gave better results compared with the variants treated with ANA, for both substrate types.

INTRODUCTION

This paper is important for testing the cuttings rooting capacity of *Cotinus coggygria* specie and finding the optimum cutting periods.

Studying the influence of dry matter content in the mother plants (N, P, K) upon the cuttings rooting and the influence of different hormonal treatments for rooting stimulating upon the quantity and quality of the newly formed roots on *Cotinus coggygria* represented the main objectives of this paper.

MATERIALS AND METHODS

The plant material for this experiments consisted in a plant population of *Cotinus coggygria* from Toboc nursery – Bucharest.

The cutting periods were 5 June, 20 June and 5 July.

Cuttings were trimmed to 8-10 cm length and the basal leaves were cut off, the upper ones being only shortened to 1/3. After that, the cuttings were sterilized by immersion into a Topsin (0.2%) and Curzate (0.2%) solution.

ANA (α-naftil acetic acid) and IBA (β-indolil butyric acid) were used as rooting stimulators (table 1). For rooting substrates two variants were tried: sand + pearlite 2:1 and peat + pearlite 2:1.

Cuttings were planted at 10 cm between the rows and 2-3 cm between the cuttings.

The culture was irrigated through microaspersion and shadowed. Also phytosanitare treatments were applied when needed.

Table 1 - Experimental variants

Sand + pearlite			Peat + pearlite		
Variant	**Rooting stimulator**	**Concentration (ppm)**	**Variant**	**Rooting stimulator**	**Concentration (ppm)**
Control	-	0	Control	-	0
V_1	IBA	500	V_1	IBA	500
V_2	IBA	1000	V_2	IBA	1000
V_3	IBA	2000	V_3	IBA	2000
V_4	ANA	500	V_4	ANA	500
V_5	ANA	1000	V_5	ANA	1000
V_6	ANA	2000	V_6	ANA	2000

RESULTS AND DISCUSSIONS

Mineral content in offshoots and leaves on *Cotinus coggygria*
(values reported to % dry matter)

Fig. 1

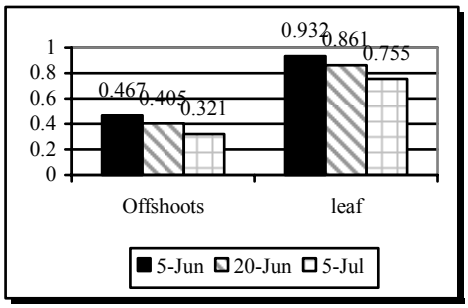
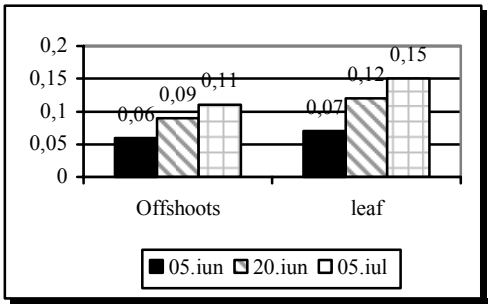


Fig. 2



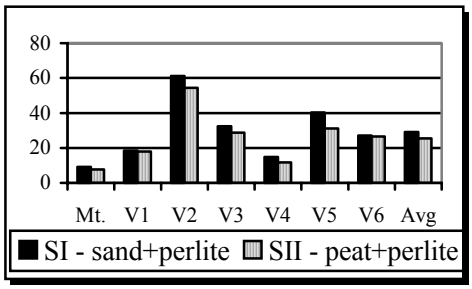
Offshoots and leaves content in dry matter and N, P, K varied depending on the cutting period and the environmental condition of the year (fig 1, 2).

Cutting period 5 June: all cuttings rotted, being insufficiently matured and therefore not ready to face the high humidity in the cutting bed.

Cutting period 20 June: the best results regarding the rooted cuttings percent registered on V_2 variant (IBA 1000 ppm) - 61.22% on SI and 54.28% on SII compared with untreated variant (control) – 9.16% on SI and 7.64% on SII (fig. 3).

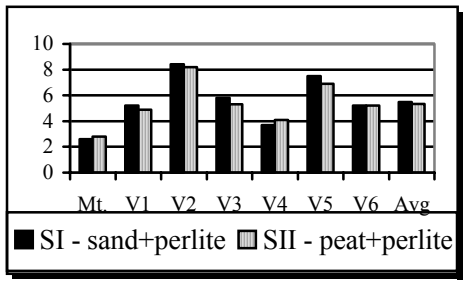
The influence of hormonal treatment and substrate type upon the rooting percent of *Cotinus coggygria* cuttings (20.06)

Fig. 3



The influence of hormonal treatment and substrate type upon the roots number formed per cuttings of *Cotinus coggygria* (20.06)

Fig. 4



Regarding the roots number formed per cutting, the best influence was shown on V_2 with 8.4 on SI and 8.2 on SII, followed by V_5 (ANA 1000) with 7.5 roots / cutting for SI and 6.9 roots / cutting for SII. The control had minimum value: 2.6 roots / cutting on SI and 2.8 roots / cutting on SII, those roots being thin and fragile (fig. 4).

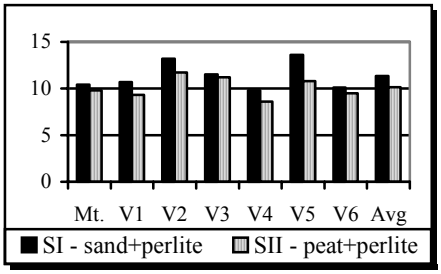
The average length of the roots varied between 13.6 cm on V_5 and 13.2 on V_2 to 9.8 cm on V_4 for the SI substrate. For SII substrate the values varied from 11.2 on V_2 and V_3 to 9.3 on V_1.

Cutting period 5 July: the results were not so good because of the cuttings were highly lignified at the cutting and planting date.

The rooting percent was more influenced on V2 variant (IBA 1000 ppm) – 27.33% for SI substrate and 24.85% for SII substrate. The weakest results were registered on V4 variant (ANA 500 ppm) – 6.24% for SI and 2.76% for SII. The untreated variant not rooted (fig. 5, fig. 6).

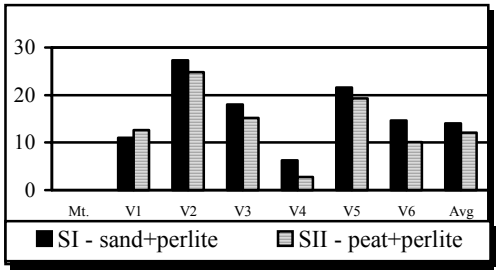
The influence of hormonal treatment and substrate type upon the roots length on *Cotinus coggygria* cuttings (20.06)

Fig. 5



The influence of hormonal treatment and substrate type upon the rooting percent on *Cotinus coggygria* cuttings (5.07)

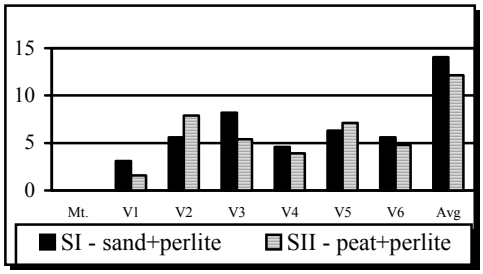
Fig. 6



Regarding the newly formed roots, the best effect was registered on V3 for SI substrate with 8.2 roots / cutting, respectively V2 for SII substrate with 7.9 roots / cutting (fig. 7).

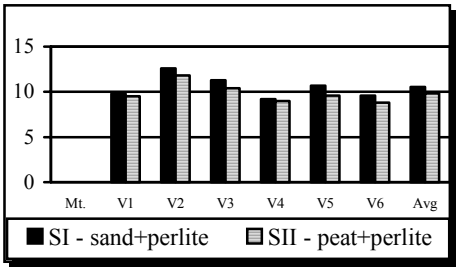
The influence of hormonal treatment and substrate type upon the roots number formed per cuttings on *Cotinus coggygria* (5.07)

Fig. 7



The influence of hormonal treatment and substrate type upon the roots length formed per cutting on *Cotinus coggygria* (5.07)

Fig. 8



The average roots length varied from 12.6 cm for SI substrate and 11.8 cm for SII substrate on V2 variant to 9.2 cm for SI and 9.0 cm for SII on V4 variant (fig. 8).

CONCLUSIONS

Too early cutting, when the offshoots are not well lignified can lead to cuttings rot. The cuttings treatment with IBA (V1-V3) showed better results compared with the variants treated with ANA (V4-V6) for both substrate types. The best results were registered for the stimulator hormones concentration of 1000 ppm, followed by the 2000 ppm concentration for both IBA and ANA. The roots number formed per cutting was best influenced of the IBA 1000 ppm treatment. The roots length was prevalent stimulated by ANA 1000 ppm variant for SI substrate and by IBA 1000 ppm variant for SII substrate. SI substrate – sand + pearlite proved to be more efficient for cuttings rooting on *Cotinus coggygria* compared with SII substrate – peat + pearlite.

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RESEARCHES REGARDING THE INITIATION OF AN *IN VITRO* CULTURE ON *CLEMATIS VITALBA*

GÂLĂ RUXANDRA, STĂNICĂ F.

Key words: *Clematis vitalba*, rootstock, micropropagation, initiation, stabilization

SUMMARY

The aim of this paper was the *in vitro* stabilization of some *Clematis vitalba* explants, starting from shoot-tips and uninodal fragments. The sterilizing agents we used were: oxygenate water 15%, mercuric chloride ($HgCl_2$) 0.05% and 0.025% and an universal detergent, applied in 4 experimental variants. The best results were obtained in V_3 ($HgCl_2$ 0.05% + detergent – 3 minutes) and V_4 ($HgCl_2$ 0.025% + detergent – 3 minutes). For stabilizing this culture we tested Murashige&Skoog medium (1962) in two variants, the differences between them being represented by the antioxidant substances amount added to the basal medium (ascorbic acid and citric acid).

INTRODUCTION

Clematis vitalba, as well as *Clematis viticela* and *Clematis flammula*, is often used as rootstock in the planting material production of clematis through grafting. The necessity of settling an *in vitro* protocol for *Clematis viticela* propagation rises from the request of rapid rootstock obtaining with a view to applying some micrografting methods both *in vitro* and *in vivo*. In the same time, all data obtained could be used for the *in vitro* culture implementation on *Clematis jackmani*, *Clematis montana* and other species from this sort.

MATERIALS AND METHODS

Bringing into operation an *in vitro* propagation methodology for *Clematis vitalba* was the main purpose of this work, in order to rapidly produce rootstocks for ornamental *Clematis* species.

The initial material consisted in *Clematis vitalba* shoot-tips and uninodal fragments. The *Clematis vitalba* offshoots were cut off in June, directly from the plants in the Botanical Garden within Faculty of Horticulture.

For an aseptic *in vitro* culture, all the explants were careful sterilized before the *in vitro* inoculation. Thus, we tried four sterilization variants:

V_1 – oxygenate water 15% (15 minutes);

V_2 – mercuric chloride 0.05% + detergent (5 minutes);

V_3 – mercuric chloride 0.05% + detergent (3 minutes);

V_4 – mercuric chloride 0.025% + detergent (3 minutes).

The culture medium tried for the initiation and stabilization phase was Murashige&Skoog (1962), with half macrosalts quantity and free of growth

hormones. To the basal MS medium we added citric acid and ascorbic acid in two different variants. First medium type was supplemented with 0.05 g/l citric acid + 0.05 g/l ascorbic acid, and the second type had a higher antioxidant concentration: 0.075 g/l citric acid and 0.075% ascorbic acid. The culture media were prepared in conformity with the usual protocol, having 2.5% sugar, 0.7% agar and a pH value of 5.8.

The explants from V_1 and V_2 variants were rinsed with sterile distillate water + 0.01 g/l ascorbic acid in order to avoid the rapid oxidation.

We noticed the rapid oxidation of the sectioned surfaces on the shoot-tips' base and uninodal fragments on V_3 and V_4 variants. The necrotic zones were cut off before the inoculation onto the medium. On the culture medium used for the sterilized explants inoculation from V_3 and V_4 variants, the antioxidants quantity was 0.075 g/l for both ascorbic acid and citric acid. The initial material was rinsed with sterile water + antioxidant agents and the culture medium had a smaller quantity of citric acid and ascorbic acid, respectively 0.05 g/l.

REZULTS AND DISCUSSIONS

As a result of the measurements taken in 30-35 days from the inoculation date we studied the sterilizing agents influence on the sterilization process. The resistance to the sterilizing agents depended on the explant type used (shoot-tip, uninodal fragment) and the sterilizing time.

In the initiation and sterilization phases we noticed that the best sterilizing agents were mercuric chloride ($HgCl_2$) 0.05% + detergent, respectively the V_3 variant.

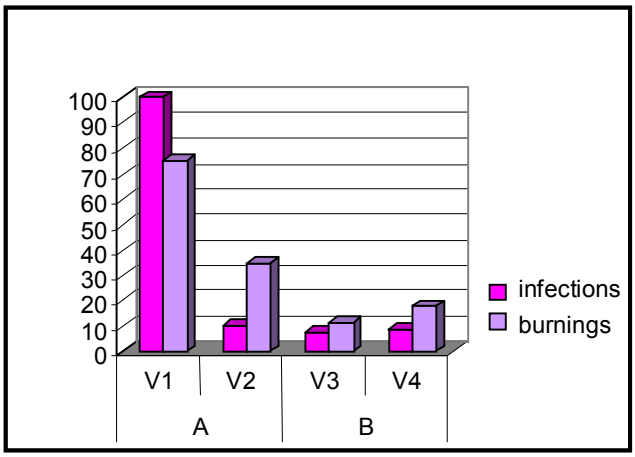

Fig. 1 – Infections and burnings following the sterilization process (%)

It is obvious the effect of the sterilization variants on the *Clematis vitalba* explants (fig. 1). The small percent of infected explants on V_3 (7.6%) and V_4 (8.8) was due to the positive effect of the sterilizing agents in small concentrations. The short sterilizing time and the small sterilizing agents' concentrations determined the diminution of the burned explants. The oxygenate water (15%) used for a long time (15 minutes), followed by the rinsing with sterile distillate water + ascorbic acid 0.01 g/l, determined a very high percent of burnings.

The explant type used for inoculation influenced the *Clematis vitalba* sterilization process. At the end of the stabilization phase we noticed the plants grown from the shoot-tip explants: V_3 – 90%; V_4 – 82%; V_2 – 75% (fig. 2).

For a higher percent of sterile uninodal fragments we recommend further on testing different sterilization methods and different sterilization times.

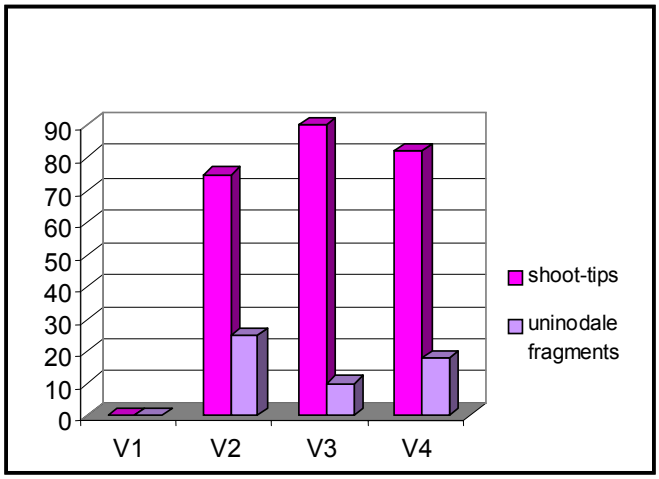

Fig. 2. – Sterile explants at the end of stabilization phase (%)

It is well known that the phenols emission represents a serious problem for many woody species. Using the antioxidant agents both in the rinsing water after the *Clematis vitalba* explant sterilization and in the culture medium, determined a considerable diminution of the phenols emission on *in vitro* culture at this specie. However the high concentrations could have side effects like burning the explants.

CONCLUSIONS

Regarding the best variant for the initial material sterilization for *Clematis vitalba* propagation we can easily conclude that the mercuric chloride and detergent mixture showed the best results (V_3 and V_4 variants). We have to

mention that a combination of more sterilizing agents had a better effect on the explants, especially on that brought directly from the field.

The best initial material was represented by shoot-tips and also uninodal fragments from very young growing offshoots. The optimum period for cutting the offshoots is in June. The more advanced is the lignification process the harder is the sterilization of the plant material.

The ascorbic acid and the citric acid can both be used as components of culture media for the initiation and stabilization phases, in concentrations between 0.5 – 0.075 g/l. These acids play an important role in phenols elimination at the plant level. Further on we will test these and other agents in culture media for propagation and rooting phases.

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STUDIES REGARDING *IN VITRO* PROPAGATION OF ROSE

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MARILENA STĂNESCU

Key words: rose, *in vitro* propagation, explant, nutritive substratum.

SUMMARY

A healthy biological material obtaining and reducing the obtaining period represent one of the specialists concerns.

The work followed:

- to study the genotype's influence regarding the explants growing in initiation stage;
- to establish an optimum auxin/cytokinin ratio for the efficient propagation of rose;
- to study the interaction auxin – genotype in rooting stage;
- to establish the factors who influence the *in vitro* plants acclimatization in septic life conditions.

INTRODUCTION

The experiences regarding the rose explants behaviour on *in vitro* culture were made in Biotechnology Laboratory of Research – Development for Vineyard and Vine Station Stefanesti – Arges.

MATERIALS AND METHODS

The biological material is represented by rose explants of Baccara and Rosabunda genotypes.

Nutrient medium for aseptic cultures consisted in inorganic substances (macro- and microelements), organic substances (auxins, cytokinines and vitamins), carbon source (dextrose) and agar. Medium's pH was 5.7 before autoclavation; the autoclavation was made at 121ºC and 1 atm. for 20 minutes. We used Murashige&Skoog macro- and microelements of and Lee-Fosard vitamins.

Conditions of incubation

For the micropropagated and the rooting explants growing, the growth chamber was provided with 14 hours photoperiod, 2.500 L light intensity and 21-24ºC temperature.

Plants acclimatization

The rooting of *in vitro* microcops and plants acclimatization, obtained in aseptic conditions, were made in a heated greenhouse on a substratum consisting of manure, peat and pearlite in equal parts.

The high atmosphere humidity (over 85%) was provided using the polyethylene thin sheet during 21 days.

The temperature in the heated greenhouse varied, but not more of 25ºC.

The *in vitro* rooting was made simultaneous with the acclimatization on pearlite substratum and after that the plants were transplanted in flower pots on a substratum consisting in manure, peat and pearlite in equal parts.

RESULTS AND DISCUSSIONS

The initiation of in vitro cultures: the inoculation of Baccara and Rosabunda rose cultivars explants on Murashige-Skoog nutrient medium (1962) supplemented with giberreline acid (0.1 mg/l), benzilaminopurine (2 mg/l) and naftilacetic acid (0.004 mg/l) goes to obtain different percentages depending of genotype.

In this stage, Rosabunda cultivar has a better behaviour (70% growing explants) and a multiplication tendency (2 microcops / explant).

The Baccara explants' growing was about 54% and the microcops were more vigorous, compared to Rosabunda cultivar.

In vitro propagation:

The obtained results demonstrated that in this stage the differences depend on the genotype. So, at benzilaminopurine constant concentration (1.2 mg/l), with different concentrations of naftilacetic acid, the Rosabunda cultivar had a better multiplication compared with the Baccara cultivar.

The best results were obtained on the medium containing 0.004 mg/l ANA and 1.2 mg/l BAP, the multiplication rate was 9.5 microcops / explant at Rosabunda cultivar and 6.8 microcops / explant at Baccara cultivar.

The auxin high concentration demonstrates a diminution of multiplication rate, obtaining 2.5 microcops / explant at Rosabunda cultivar and 2 microcops / explant at Baccara cultivar. In the same time, on a high auxin concentration support higher microcops have been obtained.

The rooting stage

In vitro microcuttings rooting makes evident a better behaviour at Rosabunda cultivar. Rosabunda cultivar had the smallest value (23%) on nutrient medium without phytohormones. AIB adding to the nutrient medium influenced the rhizogenic process, the best percentage being obtained at 0.6 mg/l AIB.

So, the Baccara cultivar had the same behaviour under AIB actions with Rosabunda cultivar.

On nutrient medium without auxins the rooting percentage was 10%, but at 0.6 mg/l AIB on nutrient medium, the rooting percentage was 80%.

Acclimatization

In heated greenhouse (septic conditions) the nutritive substratum and higher atmospheric humidity favour the plants acclimatization after 30 days, with values between 80% at Rosabunda cultivar and 73% at Baccara cultivar. The plants were fortified these having a higher grow effect and the flowers effect at 45 days after acclimatization.

After 10 months, since *in vitro* initiation, at plants fortification in the heated greenhouse flower buttons were obtained.

CONCLUSIONS

The Rosabunda and Baccara cultivars had good results on *in vitro* culture, multiplication by this technique having the followed stages:

Culture stage	Nutritive medium (substratum)
Aseptic conditions	
1. The initiation stage	Nutrient medium
2. Micropropagation	Nutrient medium
3. Rooting	Nutrient medium
Septic conditions	
4. Acclimatization	Nutritive substratum
5. Fortification	At flower pots and at soil

In the growing explants the micropropagation and the rooting *in vitro* stages are controlled by the light and temperature conditions:

- the photoperiod on 14 hours;
- the light intensity on 2500 L;
- the temperature between 21-24ºC.

For acclimatization stage is necessary:

- nutritive substratum consisted of manure, peat and pearlite in equal parts;
- atmospheric humidity more than 80%.

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RHIZOGENESIS STIMULATION IN *ROSA* SP. FOR THE OBTAINING OF HIGH BIOLOGICAL VALUE PLANTS BY CUTTINGS

OLTEANU I., PETRESCU C.

Key words: rose, propagation, cuttings, own roots

SUMMARY

A large number of rose varieties are actually propagated by cuttings and transplanted directly with their own roots. An experiment using two miniatures rose varieties and five cultivars from bush and climber floribunda type has been conducted to achieve an efficient propagation method to speed up the transplanting material obtaining. We tried to evaluate the effect of some commercial phytohormones in order to stimulate the rhizogenesis process in demy-ligneous small cuttings. We obtained the best results with Rhizopon IBA 0.1% powder for miniature roses and with Incit 5 NAA for climber floribunda type roses. For bush Floribunda – Bonica the best result were registered on Rhizopon solution 1500 ppm for 3 seconds.

INTRODUCTION

Miniature, Floribunda bush and Climber roses represent an increasing interest in our country for nurseries landscape design of parks and hobby gardeners because of their abundant flowers, beautiful colours and the long blossom season.

A large number of rose's varieties have been created in the last years, being relatively easy to propagate by cuttings and grown by their own roots.

Many new varieties exhibit a good ecological adaptability and a good recover following excessive winter low temperatures.

The miniature roses were introduced in Europe by Sweet from Mauritius Island and rapidly have known a large extension, especially after 1958. Actually hundreds of hybrids have been created and released by famous companies from Denmark, Holland, France and Germany.

There are at least five variants of miniature roses: Parade, Patio-Hit, Party, Palace and Victory.

Many varieties from Floribunda and Climber Floribunda and "English roses" exhibit a great interest being propagated by demy-ligneous cuttings and grown directly by own roots (Wagner St., 2000).

The studies concerning rose cutting propagation were mentioned by Couvillon A.G. (1988), Loach K. (1988), Satchi H. and co. (1997), Stoltz L.P. (1988) and Wagner St. (2002).

The purpose of our research made at S.C. ECO-HORTICULTURA S.R.L. was to stimulate the rhizogenesis process in cuttings to increase the root formation ratio, the roots vigour and to shorten the production time in nursery.

MATERIALS AND METHODS

The experiment has been organized in a glasshouse on a raised bed with a 10 cm layer of mixed peat moss and sand 1:1.

The cuttings were harvested from shoots on two years old mother plants propagated *in vitro*. The mother plants were recovered after a long period of low temperatures during the last winter.

To stimulate the rhizogenesis process, we used Rhizopon (IBA) pills 1000-1500 ppm in a hydro-alcoholic solution 25% by immersion for three seconds and also Incit 5 (NAA) powder 0.5%.

The shoots had been selected and cut at 2-3 buds for miniature roses and 1-2 buds for floribunda and climber roses. The inferior bud has been "blinded" but the upper bud and an entire leaf has been kept.

The temperature in rhizogenic stratum has been variable between 21-28°C from 25.07 – 1.08. After 30 days the rooted cuttings were transplanted in 10 cm PE pots, 4 plants for each pot in a common mixed soil Primaflor Agro CS Slovakia.

We tested the following varieties:

- Bombon and Orange – two miniature roses with small leaves and flowers
- Bonica (Meilland) – Floribunda bush type
- Heidelberg (Kordes), Coral Dawn (Boerner and co.), Parade, Sympatie (Kordes) and Don Juan – all of climber type three years old from our collection.

RESULTS AND DISCUSSIONS

Analyzing the table concerning the phytohormones treatment effect on the roots number and length and shoot growth of the cuttings, the best results have been obtained with miniature roses Bombon 93.3% and with Orange 90% rhizogenesis compared to the standard (non treated), 42% and respectively 31% using Rhizopon 0.1% powder. The root number and length had also been superior for both varieties.

Table 1

Rhizogenesis stimulation in Miniature, Floribunda and Climber Roses propagated by cuttings

Cultivar	Treatment	Cuttings	Rhizogenesis / caulogenesis		Callus	Necrotic	Roots	Root length	
		no.	no.	%			average no.	total	%
Bombon (Mn)	Standard	45	19	42.3	3	23	3.00	25	2.50
	P 0.1%	60	54	93.3	11	5	8.23	336	25.60
	L 50 mg	60	41	68.3	16	3	3.94	213	12.53
	L 50-vf	90	75	82.5	20	5	3.95	246	14.47
Orange (Mn)	Standard	45	14	31.1	9	17	2.89	45	5.00
	P 0.1%	40	36	90.0	4	-	2.72	174	9.66
	L 1000	45	33	73.3	12	-	3.44	279	8.72
	L 1000-vf	140	60	42.9	24	56	3.13	118	7.87
Bonica (Fl)	Standard	60	26	43.3	24	10	0.90	14	1.69
	P 0.1%	60	54	45.0	4	2	5.73	579	26.30
	L 1500-vf	56	34	60.7	6	16	4.57	255	15.93
Heidelberg (Cl)	Standard	60	38	63.3	14	8	4.93	110	7.33
	P 0.1%	60	34	56.7	10	16	8.35	420	24.70
	L 1000	60	32	53.3	8	20	9.31	264	24.00
	Incit 5-0.5%	60	52	86.7	-	8	10.04	875	35.00
	Incit 5-0.5% vf.	60	51	85.0	-	9	5.43	225	14.00
Sympatie (Cl)	P 0.1%	30	12	40.0	6	12	6.25	51	12.75
	L 1000	30	12	40.0	-	18	6.50	63	15.75
	Incit 5-0.5%	30	18	60.0	-	12	4.66	78	13.00
Don Juan (Cl)	Standard	30	12	40.0	3	15	1.50	75	18.75
	P 0.1%	30	9	30.0	-	21	5.33	84	28.00
Standard Dawn (Cl)	Standard	30	18	60.0	3	9	3.83	49	8.16
	P 0.1%	30	18	60.0	-	12	7.00	132	22.0
	L 1500	30	12	40.0	-	18	4.75	62	15.0
	Incit 5-0.5%	30	12	40.0	-	18	6.00	43	10.7

Standard= non treated; L50=P0.1%IBA- Rhizopon powder; L= Rhizopon, sol ppm IBA%; vf= shoot tip; Incit 5=0.5%NAA powder

The treatment with Rhizopon solution 1000 ppm realized only 68.3% at Bombon and 73.3% at Orange. The treatment was much better for the tip of the shoots cuttings of Bombon 82.5% and 42.9% for Orange.

Using the same treatments with Rhizopon powder 0.1% and 1500 ppm solution in Bonica we obtained 45% rooted cuttings on powder and 60.7% on Rhizopon solution compared to 43.3% on the standard. The roots length and vigour have been superior.

Much better results we achieved using Incit 5 (NAA, 0.5% powder) at Heidelberg – 86.7% and 60% for Sympatie compared to the standard 63.3% and 40% respectively.

The treatment with Incit 5 powder at Heidelberg had been efficient for the root length and vigour of roots.

For Coral Dawn the Rhizopon solution 1500 ppm had given better results.

CONCLUSIONS

Rhizogenesis in demy-ligneous cutting roses is depending on the season, temperature optimum condition, stratum humidity, air humidity and variety.

To create an optimum environment conditions is necessary to use a very well drained rhizogenic stratum with peat moss and sand 1:1, pH=6 and to protect cuttings with permeable cotton-cloth tunnels shaded from direct sunrays and producing mist frequently to realize 80-90% humidity in the air and 70-80% in the stratum. The optimum temperatures are 22-25°C.

The commercial stimulators use is much more efficient even at the limits of favourable temperatures in the optimum season and give better results in roots number, length and vigour.

For miniature roses the concentration of AIB must be diluted Rhizopon powder at 0.1-0.2% active substance and can be higher for solution with short time immersion.

Floribunda and climber type roses demand a higher concentration of Rhizopon (0.5% AIB) or Incit 5 (0.5% NAA).

One month after transplanting in pots we noticed a tendency to get in flowers for many rooted cuttings. A reason for that must be the juvenility, the mother plants being propagated by *in vitro* method.

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THE INFLUENCE OF SUBSTRATUM AND pH UPON THE GROWTH AND BLOSSOM PROCESSES ON *LISIANTHUS RUSSELIANUS* HOOK.

PETRA SORINA, DAVIDESCU VELICICA,
TOMA F., CIOBANU FLORICA

Key words: *Lisianthus*, dwarf, substratum

SUMMARY

Worldwide, scientists have as an aim that, starting from a basis flower species, they obtain several types and hybrid species of a most reduced size as possible. Thus, those species are likely to be cultivated in flowerpots and flower stands, and they can also be found in the decoration of the gardens or of the green spaces.

One of those species from which different types and hybrid species of reduced size were obtained is also *Lisianthus russelianus*.

In our country, their culture is lesser known, but it can be grown successfully. That is why we have tried to establish some technological links.

Results were obtained after the researches have demonstrated the influence of the culture substratum upon the precociousness of the blossoming, of the flowers number formed on the plant and of their quality.

INTRODUCTION

Lisianthus russelianus can be found on the Romanian market within the range for cut flowers and it stands out because of the flowers' colouring (shades of pink, mauve and white), because of the robustness of the flower stems and of a good durability within a vase. On the other hand, around the world, there are species and hybrid species of a reduced size (dwarf species) cultivated in flowerpots or stands which are considered as actual.

The aim of these researches was the evolution following of some dwarf hybrid species, on seven different culture substratums (from the point of view of the pH and physical and chemical features) so that the best variant of culture substratum is established, with direct technological implications.

MATERIALS AND METHODS

The experiment has taken place within the greenhouses of the Floriculture department – The Horticulture Faculty of Bucharest.

The used biological material was represented by hybrid transplant F_1 of dwarf, simple flowered, multicoloured *Lisianthus russelianus*. The seeding for transplants obtaining has been done on the 5th of October 2001, after which followed the planting out (18th of December 2001) and planted on the 25th of April 2002.

For the experiment organising there have been established 7 variants of different pH and composition culture substratum, as it follows:

Table 1

Experimental variants

Variants	The components of the culture substratum	The ratio between components
V1	red peat, leaves ground, sand	1 : 2 : 0.25
V2	red peat	1
V3	red peat, black peat, leaves ground	1 : 1 : 1
V4	black peat	1
V5	red peat, leaves ground, sand	1 : 1 : 0.25
V6	red peat, leaves ground, sand	2 : 1 : 0.25
V7	red peat, leaves ground, sand	3 : 1 : 0.25

In order that the material is as uniform as possible on the plantation moment, the transplants have been pinched to some 3/4 pairs of leaves, the transplants were planted in flower pots with the diameter of 10 cm and the height of 8 cm.

During the proceeding of the experiment, potassium and calcium based fertilisations (KNO_3 and $Ca(NO_3)_2 \cdot 4H_2O$) were applied and observations and biometrical measurements were carried out, regarding the plants size, the number of flowers and flowers formed on the plant, as the number of flowers blossoming simultaneously on the plant.

There have also been made some analysis (through the drawing of sample of the 7 variants of substratum) regarding their chemical composition and pH, as well at the beginning of the experimental culture, as at its end.

Table 2

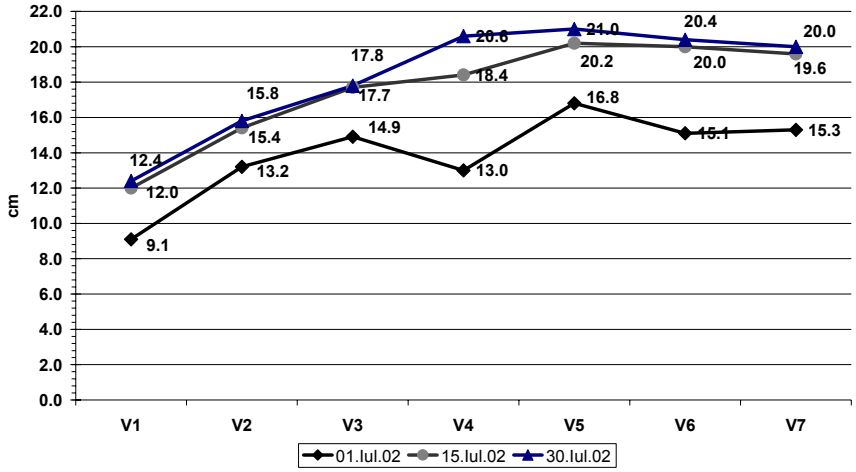
The pH value at the beginning of the experimental culture (a) and at its end (b)

pH	Variants						
	V1	V2	V3	V4	V5	V6	V7
a	7.26	5.79	6.65	7.01	6.43	6.90	6.82
b	7.47	6.12	6.74	7.35	7.52	7.75	6.67

RESULTS AND DISCUSSIONS

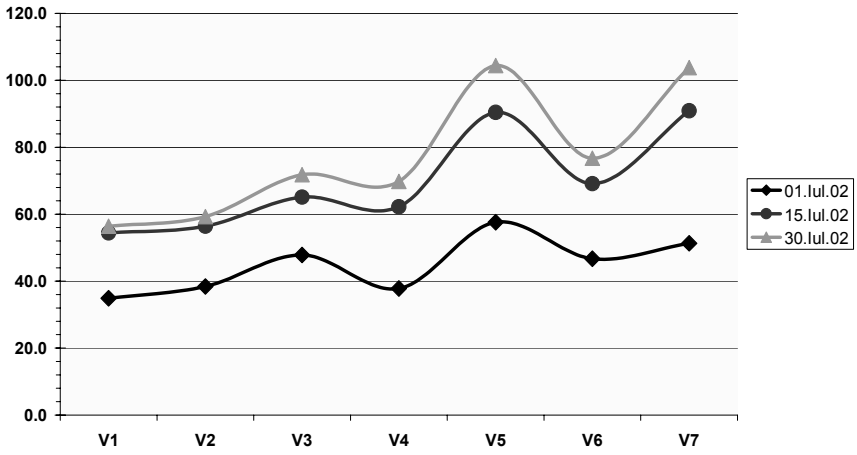
Regarding the height growth evolution of the plants, one can observe that the most reduced size of 12.4 cm registered on the V1 variant, and the higher size of 21.0 cm - on the V5 variant.

Fig. 1 - The dynamics of the leaves forming at the Lisianthus



As regards the leaves number per plant, we can notice that V5 and V6 had 104.4 respectively 103.8 adult leaves, the variants with the most reduced number being V1 and V2 with 56.4, respectively 59.3.

Fig. 2 - The evolution of the height growth at the Lisianthus



The blossom period has started approximately 7 months after the seeding and it has unfolded during one month and a half.

From the point of view of the adult flowers percentage, there have been registered values of more than 80% on all the variants, V2, V3 and V4 having even 100% adult flowers.

Referring to the number of flowers formed on the plant, the best evolution was registered on the V5 and V6 with 20.52, respectively 19.01 flowers/plant, comparatively to V1 and V2 which had the worst evolution (9.71, respectively 11.23 flowers/plant). Variants V5 and V6 have been remarked by reaching the blossom peak 2 weeks earlier than the other variants.

From the point of view of adult flowers number per each plant, V5 and V3 had the best behaviour with 5.4, respectively 5.2 adult flowers per plant.

CONCLUSIONS

- Among the 7 culture substratum variants, from the point of view of the adult flowers (20.52), as well as from that of the leaves number (104.4) there have stood out the plants from V5 variant (with the ratio between red peat: leaves ground: sand as 1:1:0.25 and the pH values ranging between 6.43 at the beginning of the experiment and 7.52 at its end).
- Also concerning the blossom precociousness there have stood out V5 and V6 variants, registering an advance of approximately 2 weeks comparing to the other variants.
- The worst results have been registered at the V2 variant, where the initial pH was the lowest (5.79) and at the V1 variant with the highest initial pH (7.26).

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RESEARCHES REGARDING THE SEEDS GERMINATION DEPENDING ON SOWING TIME AND SEEDS AGE ON *LISIANTHUS RUSSELIANUS* HOOK.

PETRA SORINA, ŞELARU ELENA,
TOMA F., CIOBANU FLORICA

Key words: seeds, photosensitivity, germination, vitality

SUMMARY

Lisianthus is used both as cut flower and pot plant.

A *Lisianthus* culture can be establish from transplants, rooted cuttings or planting material resulted from *in vitro* propagation techniques. The most common propagation method is sowing for transplants production. However, the culture quality and the plants number resulted (1 g contains 22000-25000 seeds) highly depend on the environmental conditions during germination and on the seeds age.

The results obtained showed the importance of both light (*Lisianthus* seeds are known like photosensitive) and temperature during germination process (the higher temperature is over 25°C, the smaller is the germination percent) and also the seeds age.

INTRODUCTION

For few years *Lisianthus russelianus* Hook made its appearance on Romanian market convincing in cut flower and pot plant assortment. In our country this culture is not so wide spread. The knowledge about plant biology and environmental requires are necessary to decide for the most advantageous technological variants.

This paper aims to establish the influence of sowing period and the seeds age upon the germination rate.

All data obtained represent a part of the researches made for elaborating a culture calendar adapted to our country's conditions for *Lisianthus russelianus* Hook included in a research project.

MATERIALS AND METHODS

The experimentations took place in the greenhouses within Floriculture department from the Faculty of Horticulture in Bucharest.

Lisianthus russelianus seeds from 'Heidi' series (harvested and conditioned in the fall off 2001) were used in order to establish the best sowing period. Each 15 of the month 0.05 g (almost 14000 seeds) were sown.

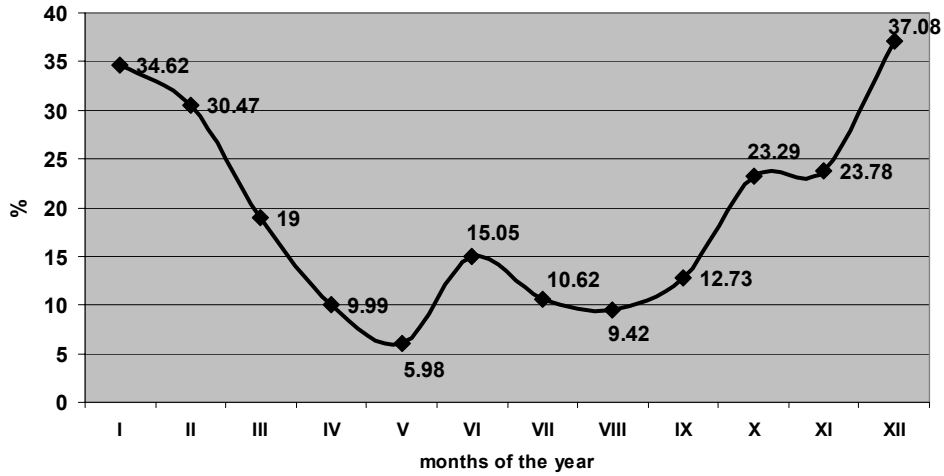
Regarding the seeds vitality, four experimental variants have been tried, representing different years of seeds harvesting (1998 – V1, 1999 – V2, 2000 – V3, respective 2001 – V4). To have precise results between November 2001 and March 2002, the sowing was repeated in the same date of the month.

The seeds were laid in pots having 12 cm diameter, in a sift leaves soil substratum. The seeds were not covered (because they are photosensitive). To assure a favourable microclimate, the pots were covered with a transparent glass and the irrigation was made by infiltration.

RESULTS AND DISCUSSIONS

The rising rate varied between 5.98% (May sowing) and 37.08%, the maximum value being registered in December sowing (fig.1).

Fig. 1 - The germination rate depending on the sowing time



The days number from sowing until plant rising begin did not varied much, the average value being 7.91 days. One can easily notice that plant rising was more rapid at the sowings from October to March (fig. 2).

Regarding the seeds vitality, the older the seeds are (3-4 years) the more days are between the sowing and plant rising (average - 12.5 days) for V1 (seeds from 1998) and V2 (seeds harvested in 1999).

Fig. 2 - The days number required for germination

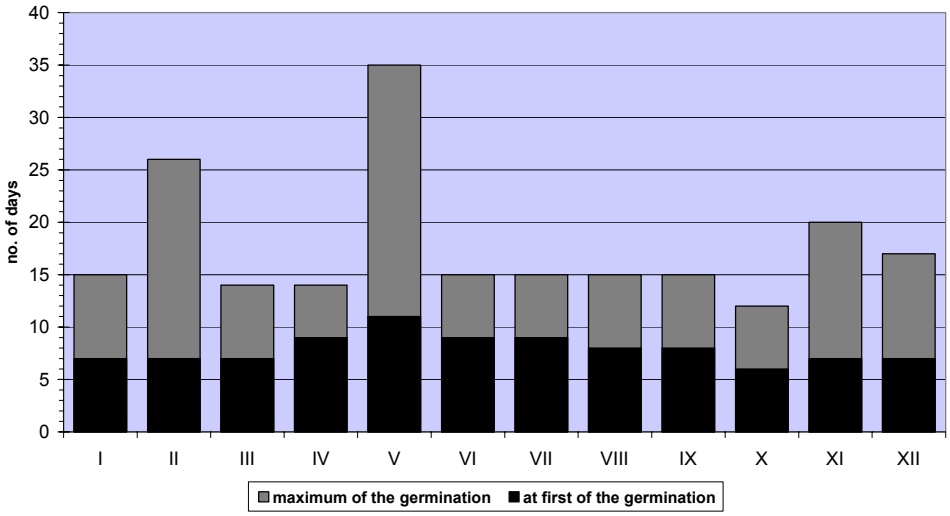


Table 1

Days number from sowing to plant rising depending on the seeds age

Variant	The sowing month					Average
	november'01	december'01	january'02	february'02	march'02	
V1	12	10	14	13	12	**12.20**
V2	12	10	14	13	12	**12.20**
V3	6	7	10	7	8	**7.60**
V4	6	6	9	7	7	**7.00**

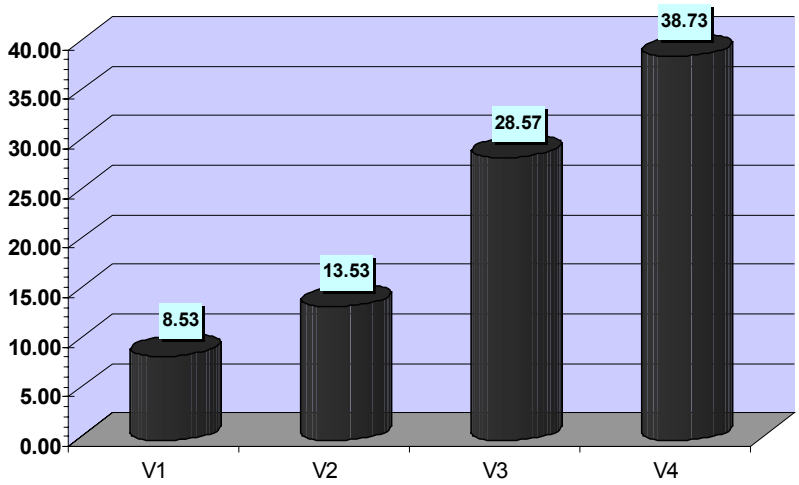
The rising rate lowers from 38.74% - registered for V4 (seeds harvested in 2001) to 13.52% - for V2 (seeds from 1999), respective 8.52% – V1 (seeds from 1998).

Table 2

The germination rate depending on the seeds age

Variant	The sowing month				
	november'01	december'01	january'02	february'02	march'02
V1	11.28	15.80	8.90	4.19	2.47
V2	20.79	18.11	10.54	12.90	5.29
V3	42.35	36.94	22.58	28.34	12.62
V4	42.74	42.54	24.32	62.47	21,60

Fig. 3 - Te rising rate depending on the seeds age (variants average)



CONCLUSIONS

- The rising rate is higher in autumn - winter months (increasing between October and March is higher with 20%) and lower in spring – summer months (between April and September lowers with 20%). Temperature influences the rising rate, so we noticed that the higher the temperature level is, (over 30°C – in summer months) the lower is the rising rate (the optimum germination temperature is between 22 and 26°C).
- Regarding the days number required from the sowing until the rising begin this is 7.91 days (average value), and the average days number from sowing until the maximum rising is 13.41 days.
- The older the seed age is, the greater is the diminution of the germination rate and the higher is the number of days required for plant rising. Thus, the maximum rate, 38.74%, registered at the seeds harvested in 2001 (V4), these rising in 7 days (variant average), compared with V1 variant (seeds harvested in 1998), in which case the germination rate dropped until 8.52%.

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RESPONSE TO TRANSPLANTING OF *CHAMAECYPARIS* AND *PICEA* ORNAMENTAL SPECIES

ALINA POSEDARU, STANCIU NICOLAE

Key words: species, transplanting, stimulator

SUMMARY

The interest for the coniferous trees culture for ornamental purposes is great lately, since they play an important part in nursery production – Iliescu Ana-Felicia, 2002.

All researches in this field aim to set up the culture technologies for these ornamental coniferous and their introducing in the landscape arrangements.

Regarding cutting in hotbeds, usually the cuttings remain there until the spring, or seldom, as for hardly rooting species (like coniferous ones), they remain another vegetation season. After this culture cycle, the rooted cuttings are planted on pots. This pots are kept for 1-2 years in solariums or greenhouses, being careful taken off, and after that the plants are planted in the nursery formation field. For the cutting and pot plants, in the culture technology (temporary or permanent) the soil is substituted with other substratums, prevalent organic materials.

In the present paper, the rooted cuttings were treated before pot planting with Transvital and TL stimulation products, applied once with the plant watering.

MATERIAL AND METHOD

To fortify the rooted cuttings in pots we had in view their uptake ability to transplanting in pots.

The experiments were organized in the propagation fields (tunnels) between 1998 – 2002 years.

The plants were collected from 8 ornamental species of *Chamaecyparis* and 5 of *Picea.*

The rooted cuttings of those species, after fortification on a rooting medium for one growing season, were transplanted in pots (the spring before growing season) and after a fortification period they were planted in the nursery field.

We used plastic pots (ϕ = 7-16 cm) having in view the plant size and its rooting system. The land mixture for planting included: manure, leaf earth, peat, sand (2:2:2:1) and sod, manure (2:1).

Before pot planting, the roots were trimmed (removing the damaged ones) and introduced into a solution of water and cow manure, yellow loam. Transvital and TL biostimulators were also added to water for plant watering. After planting, the pots were placed in greenhouse shaded sites.

RESULTS AND DISSCUSION

The graphs 1 and 2 show the transplanting uptake percentage of ornamental *Chamaecyparis* species.

Statistically, by Duncan test, the highest uptake percentage to transplanting was recorded with *Chamaecyparis obtuse "Crispi"*. The uptake values on both culture media were 51.3-77.3 % (graph 1). This specie holds the first place for all B factor levels, entirely statistically measured.

The lowest uptake percentages to transplanting were recorded with *Chamaecyparis lawsoniana "Ellwoodi"* over the whole experimental period and on both cultural media (36.4-63.3 %).

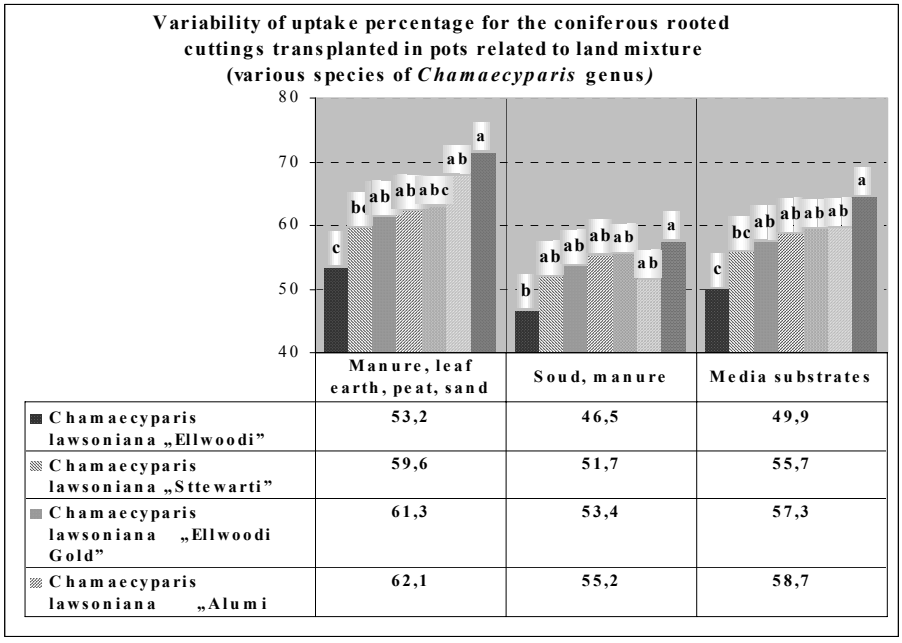
The uptake values to transplanting for *Picea* species over 4 year investigations were statistically measured and are shown in graphs 3 and 4.

Picea pungens "Glauca Globosa" had the best uptake yields to transplanting on both culture media (77.4- 99.4 %). All *Picea* and *Chamaecyparis* species reached higher uptake percentages to transplanting versus the untreated control over the whole experimental period.

Referring to the culture media (graphs 2, 4) one can see that the best culture media for all the ornamental species investigated proved to be: sand, providing 45.0-88.0 % uptake percentage.

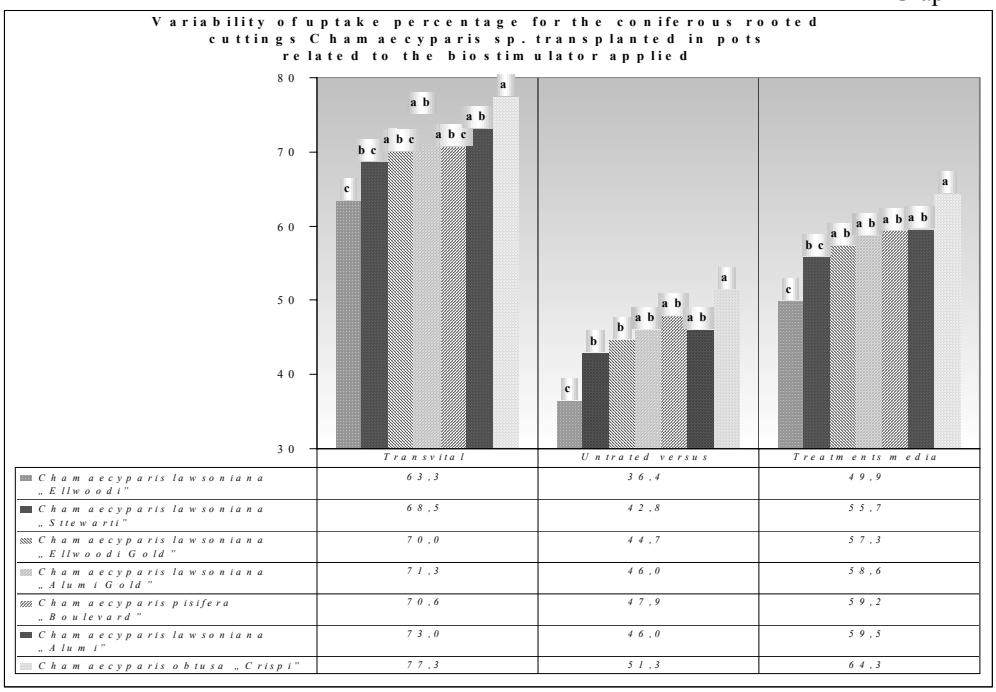
CONCLUSIONS

Graph 1



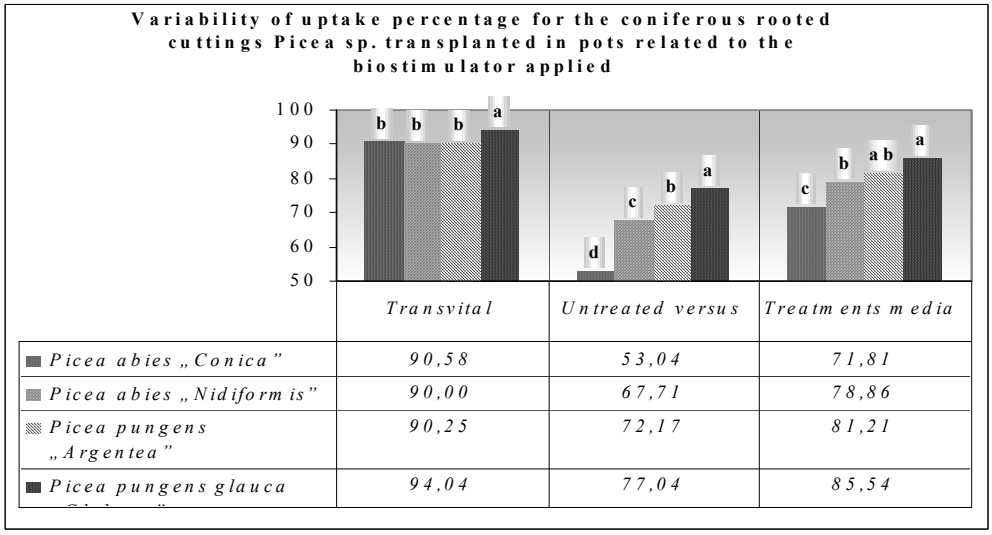
	Manure, leaf earth, peat, sand	Soud, manure	Media substrates
Chamaecyparis lawsoniana „Ellwoodi"	53,2	46,5	49,9
Chamaecyparis lawsoniana „Sttewarti"	59,6	51,7	55,7
Chamaecyparis lawsoniana „Ellwoodi Gold"	61,3	53,4	57,3
Chamaecyparis lawsoniana „Alumi	62,1	55,2	58,7

Graph 2



	Transvital	Untrated versus	Treatments media
Chamaecyparis lawsoniana „Ellwoodi"	63,3	36,4	49,9
Chamaecyparis lawsoniana „Stewarti"	68,5	42,8	55,7
Chamaecyparis lawsoniana „ElwoodiGold"	70,0	44,7	57,3
Chamaecyparis lawsoniana „Alumi Gold"	71,3	46,0	58,6
Chamaecyparis pisifera „Boulevard"	70,6	47,9	59,2
Chamaecyparis lawsoniana „Alumi"	73,0	46,0	59,5
Chamaecyparis obtusa „Crispi"	77,3	51,3	64,3

Graph 3

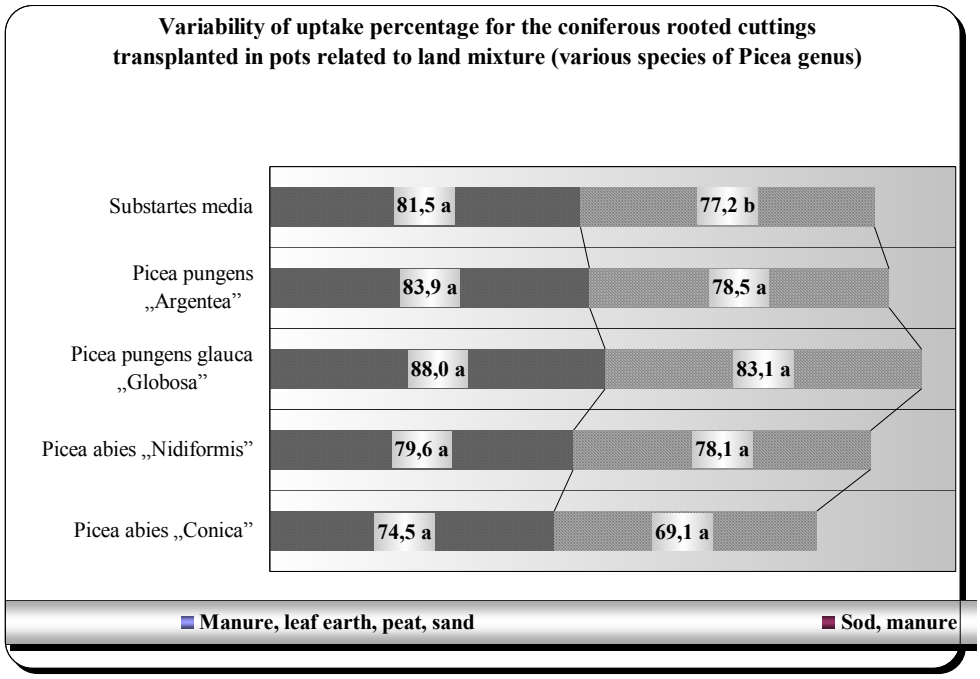


	Transvital	Untreated versus	Treatments media
Picea abies „Conica"	90,58	53,04	71,81
Picea abies „Nidiformis"	90,00	67,71	78,86
Picea pungens „Argentea"	90,25	72,17	81,21
Picea pungens glauca	94,04	77,04	85,54

The highest yields to transplanting were recorded with *Chamaecyparis obtusa "Crispi"* specie on both culture media (51.3-77.3 %).

The lowest uptake percentages to transplanting were recorded with *Chamaecyparis lawsoniana "Ellwoodii"* on both culture media over the entire experimental period (36.4-63.3 %).

Graph 4



The ornamental species studied reached higher yields to transplanting versus the control.

The best culture medium inducing a good uptake to transplanting on all the ornamental species studied was: manure, peat, leaf earth and sand (45.0-70.6 %).

In case of *Picea* species, the best uptake percentage to transplanting was reached with *Picea pungens "Glauca Globosa"* on both culture media (72.1-90.3%).

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STUDIES AND RESEARCHES REGARDING METHODS AND TECHNIQUES OF BONSAI OBTAINING FOR INDOOR PLANTS

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PASCU BEATRICE, BALTAG DANIELA, TOMA MARIANA

Key words: bonsai, pruning, wiring

SUMMARY

These researches are part of a larger project regarding: growing the biological material for Bonsai processing, methods and techniques of Bonsai obtaining, caring and perfecting of Bonsai at user, educate and professional formatting of young people for Bonsai creation and caring.

The experimental program included two aspects: first, obtaining and growing the biological material required by the proposed purpose and secondary, Bonsai specific interventions (pruning, wiring, transplantation etc.).

At first, the work was done on *Podocarpus macrophyllus* plants. The results regarding plant's reaction at pruning and wiring operations are interesting, they including private aspects of behaviour.

INTRODUCTION

Most involved works in shaping a Bonsai, which is going to look like a genuine old tree, are pruning and wiring.

The pruning refers to branches and thicker shoots (which have passed the herbaceous phase). The science but also the art of making a decision, in choosing the branches you are going to keep or going to get rid of, as well as selecting the right length when pruning the ones meant to shape a Bonsai's skeleton, will be major features of Bonsai's appearance and uniqueness.

Philosophical principle of Ikebana imaginary triangle: sky – man – earth, has its resonance in a Bonsai, too. Balance and proportion must be assured through branches size and position. Asymmetry must also be looked for and maintained. Each branch outline or profile has to be clearly comprehended, pruning being of a crucial importance.

Buds removal, shoots pinching off, leaf cutting are also parts of the pruning wide range. Wiring is the operation through which correction of radical change of branches profile and growing orientation might be made.

Hand in hand with pruning, wiring has its central role in shaping a Bonsai; by this technique remarkable transformations of a plant's appearance can be achieved.

MATERIALS AND METHODS

Podocarpus macrophyllus plants of 3-5 years old have been obtained by cutting, pruning and orientation stem or branches interventions that were done depending on the natural plants outline as well as the grower's intention.

Copper and plastic protected aluminium wires have been used for wiring and bending branches.

During their growing, the plants have been monitored and measured, and each intervention of eliminate or shoots pinching, has been marked, calendar and dimensional.

RESULTS AND DISCUSSIONS

Part of the obtained results is shown in tables 1 and 2. Stem height is arbitrary taken by stem top pruning, only unimportant changes could occur after this removal. Stem thickness register a slow growth. Similar records have been made to branches level.

After pruning, a strong sprouting has been recorded at the stem top and on its length as well as on the branches length. Part of these shoots have been removed (partially or totally), or pinched depending on the grower option.

The pruning applied and summer's favourable climatic conditions have intensified the growing processes especially at the leaves level.

A special importance is presented by certain observations which will be the fundament of a protocol elaboration for the necessary interventions, regarding Bonsai shaping and caring process.

CONCLUSIONS

- The technique of shaping a plant as Bonsai can be gained only by strong documentation and an intensive practical exercise.
- Knowing the growing rhythm of the plants it is necessary a correct prognostication of their longer time period evolution.
- Plant reaction to pruning and wiring works is generally predictable though each plant has its own elements of behaviour.

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Table 1

Observations and determinations of Bonsai shaping for *Podocarpus macrophyllus* plants

(performers: Avram Mihaela, Pascu Beatrice)

Plant	Observation date	Plants tallness (cm)	Stem length (cm)	Circumference of stem base (cm)	Branches (no.)	Branches length (cm)	New shoots on: (nr.)				New shoots length (cm)			Leafs on: (N°.)				Leafs length (cm)		
							Stem top	Stem	Branches	Total	Stem top	Stem	Branches	Stem	Branches	New shoots	Total	Stem	Branches	New shoots
1.	30.07	-	31	2.0	7	-	1	6	13	20	-	-	-	37	48	56	141	5.8	5.5	4.6
	02.10	34	31	3.0	7	52	-	-	17	17	-	-	1.7	36	73	119	228	-	-	-
2.	30.07	-	28	1.8	6	-	2	4	4	10	-	-	-	27	72	37	136	6.6	4.8	3.6
	02.10	35	28	2.9	6	7.4	-	1	12	13	-	1	1.8	30	68	55	153	-	-	-
3.	30.07	-	33	2.2	4	-	1	5	2	8	-	-	-	33	82	34	149	6.2	5.6	5.8
	02.10	45	30.5	3.2	6	10.4	-	-	5	5	-	-	3.6	44	105	44	193	-	-	-
4.	30.07	-	24	2.3	6	-	-	3	-	3	-	-	-	22	115	31	168	5.9	5.7	2.4
	02.10	24	24	3.2	6	10.9	-	3	-	3	-	3	-	30	165	10	205	-	-	-
5.	30.07	-	29	1.7	4	-	-	5	-	5	-	-	-	41	56	21	118	6.6	5.9	2.9
	02.10	34	30	2.9	4	11.6	1	-	3	4	0.5	-	2.7	54	53	31	138	-	-	-
6.	30.07	-	36	1.8	9	-	1	6	2	9	-	-	-	42	61	68	171	6.8	5.6	2.5
	02.10	32	28	3.1	9	6.9	1	2	6	9	0.5	0.5	3.3	44	70	53	167	-	-	-
7.	30.07	-	57	1.6	-	-	-	9	-	9	-	-	-	68	-	78	146	6.6	-	6.3
	02.10	14	38	3.0	-	-	-	11	-	11	-	2.7	-	61	-	59	120	-	-	-
8.	30.07	-	33	2.0	6	-	1	1	10	12	-	-	-	38	70	74	74	5.7	5.1	6.1
	02.10	20	33	3.1	6	8.25	3	1	13	17	1.2	2.5	1.7	39	67	90	196	-	-	-

Table 2

Observations and determinations of Bonsai shaping for *Podocarpus macrophyllus* plants (performer: Petra Sorina)

Plant	Observations date	Plant tallness (cm)	Plant length (cm)	Stem length (cm)	Circumference of stem base (cm)	Branches (nr.)	Branches length (cm)	New shoots on: (nr.)				New shoots length (cm)			Leafs on: (N°.)				Leafs length (cm)		
								Stem top	Stem	Branches	Total	Stem top	Stem	Branches	Stem	Branches	New shoots	Total	Stem	Branches	New shoots
1.	17.05	7	14	13	-	-	-	-	-	-	-	-	-	-	33	-	-	33	-	-	-
	17.07	7	14	13	-	-	-	3	-	-	3	6.5	-	-	33	-	45	78	-	-	-
	6.08	9	16	13	1.5	3	2.2	-	-	-	-	-	-	-	33	1	-	34	6.1	1.5	-
	6.09	9	16	13	1.5	3	2.2	-	-	-	-	-	-	-	33	1	-	34	-	-	-
2.	17.05	16	23	11	-	3	10.5	-	-	-	-	-	-	-	21	51	-	72	-	-	-
	17.07	18	26	11	-	3	12.6	-	-	5	5	-	-	1.4	21	91	-	112	-	-	-
	6.08	18	26	11	2.2	3	12.3	-	-	5	5	-	-	1.4	21	63	22	104	7.4	5.8	4.5
	6.09	18	26	11	2.2	3	12.3	-	-	5	5	-	-	1.1	21	62	20	105	-	-	-
3.	17.05	23	26	21	-	3	4.0	-	-	-	-	-	-	-	39	4	-	43	-	-	-
	17.07	23	26	21	-	3	5.0	17	-	-	17	1.6	-	-	39	-	-	218	-	-	-
	6.08	23	23	21	2.0	-	-	7	-	-	7	1.6	-	-	39	-	60	99	6.7	3.2	-
	6.09	23	23	21	2.1	-	-	7	-	-	7	3.8	-	-	39	-	107	246	-	-	-
4.	17.05	29	44	42	-	5	8.9	-	-	5	5	-	-	3.7	61	-	-	158	-	-	-
	17.07	29	44	42	-	5	8.9	1	6	5	12	2.0	1.1	4.0	61	-	-	187	-	-	-
	6.08	29	44	42	1.8	5	8.9	1	-	9	10	3.0	-	2.8	61	65	65	191	6.3	6.4	4.5
	6.09	29	44	42	1.8	4	9.4	1	-	8	9	2.5	-	2.8	60	66	50	176	-	-	-
5.	17.05	27	27	27	-	4	10.5	-	-	3	3	-	-	3.0	-	-	-	135	-	-	-
	17.07	29	29	27	-	4	10.5	3	-	5	8	1.8	-	2.0	-	-	-	175	-	-	-
	6.08	29	29	27	1.5	4	10.5	3	-	5	8	2.3	-	2.2	45	77	27	178	7.1	6.4	3.9
	6.09	29	29	27	1.5	4	10.5	3	-	5	8	3.2	-	2.5	45	77	27	178	-	-	-
6.	17.05	34	51	51	-	6	7.5	-	-	-	-	-	-	-	-	-	-	112			
	17.07	35	52	51	-	6	7.5	3	-	1	4	1.1	-	0.5	-	-	-	136			
	6.08	37	53	51	2.0	6	7.5	3	-	4	7	1.3	-	1.1	59	49	40	148			
	6.09	36	53	51	2.0	6	7.5	3	-	4	7	1.5	-	3.0	59	53	48	160			

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PRACTICAL ASPECTS CONCERNING HETEROCARPY IN *CALENDULA OFFICINALIS* L

ELENA ŞELARU, DIANA ZAMFIR VÂŞCĂ, IOANA SĂFTOIU

Key words: *Calendula*, heterocarpy

SUMMARY

According to the heterocarpy phenomenon, the *Calendula officinalis* seeds were separated, by shape and colour, on six different types: light - brown hook, dark - brown hook, light - brown horseshoe, dark - brown horseshoe, dark - brown snail, light - brown snail. Sorted on seed size, the following decreased order results: hook, horseshoe, and snail.

There were studied the influence of seeds character (shape, colour and size) on germination and further evolution of the new plants.

In our country, there are many species from the botanic family Compositae. Many of them are ornamental species, such as *Calendula officinalis*.

This plant is not only ornamental but it also has many others values (medicinal, cosmetic) and this is the reason why *Calendula* culture has an important development.

Normally all the dry fruits on the flower head, including the seeds, have the same shape. There are some species, including *Calendula*, where heterocarpy phenomenon occurs, meaning that the seeds from the central flower are different, by shape, colour, weight, even anatomical characters.

The practical interest for farmers is when those different characters have influence on germination, flowers yield and quality.

MATHERIAL AND METHOD

The *Calendula* seeds used in our studies were obtained from a local population cultivated in the experimental field of the Floriculture department of U.Ş.A.M.V. Bucharest.

After flower harvesting we sorted, conditioned and classify the seeds by the following criteria: shape, colour and size. Six different types were obtained. For each type we determined: the number of seeds on 1 g, the weight of 1000 seeds, on an electronic balance (0.01% precision). Any botanical considering is useful in seeds grouping.

To study the quality parameters of seed germination we structured the experimental variants consisting on 50 seeds for each type, and the control (a mixture

of different type of seeds). These variants were sown at the beginning of April (07.04.), in small boxes on a litter with sand substratum. Sowing distances were 2 - 3 cm between rounds and 2 - 3 mm deep.

In the experimental culture we applied all the specific care works for annual species seedlings.

RESULTS AND DISCUSSIONS

As a result of seeds sorting using colour, shape and size criteria, six type of seeds were obtained, with visible different characters: light - brown hook, dark - brown hook (*A*), light - brown horseshoe, dark - brown horseshoe (*B*), dark - brown snail and light - brown snail (*C*) (**Figure 1**).

Figure 1. Calendula main seeds type

One thousand light colour seeds are heavier compared to the dark ones, available on every seed type on the following decreasing order: hooks (13.823-12.531 g), horseshoes (9.706-8.965 g) and snails (7.182-6.940 g). The results are included in **table 1**.

Comparing the values with the control variant (a mixture of unsorted seeds) parameters, it can be noticed that the control is intermediary, close to the six type media (*9.433* instead of *9.85*8 g).

Analyzing the number of seeds at 1 g, the order is reversed, but the control is keeping the middle position (*106* instead of *110.83* seeds /g)

Table 1. Seeds number and weight

No. crt.	Seeds type	1000 seeds weight (g)	Seeds number/g
1	Light - brown snail	7.182	130
2	Dark - brown snail	6.940	152
3	Light - brown horseshoe	9.706	104
4	Dark - brown horseshoe	8.965	115
5	Light - brown hook	13.823	80
6	Dark - brown hook	12.531	84
7	Mixture	9.433	106

The same measurements were performed on the control variant, but in addition we determined the proportion of each seed type on control structure (**table 2**).

Table 2. The structure of the seeds mixture

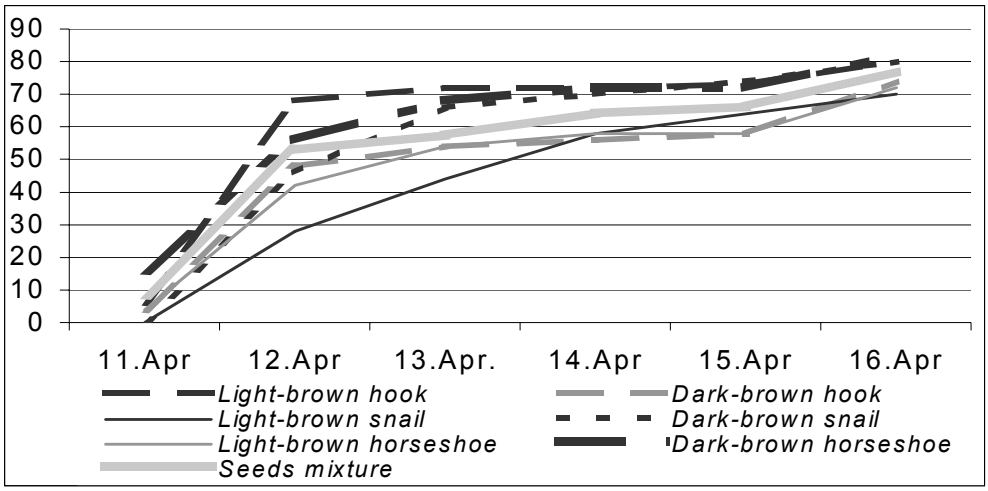
No. crt.	Seeds type in seeds mixture	Seeds number/g	Seeds mixture structure (%)
1	Light - brown snail	13	12.26
2	Dark - brown snail	31	29.24
3	Light - brown horseshoe	24	22.64
4	Dark - brown horseshoe	17	16.04
5	Light - brown hook	14	13.21
6	Dark - brown hook	7	6.61
Total		**106**	**100**

The values are situated in an interval between 29.24% for the “dark brown snail”- the highest value and 6.61% for the “dark- brown hook”- the smallest value.

For the thinning dynamics, as it can be seen in the **figure 2**, there are no significant differences between the six seed type. All the six types had a thinning percent overwhelmed by a minimum value of 70% (the “light - brown snail”) and a maximum of 82% (the “dark - brown horseshoe”).

The most powerful thinning was in the first two days, then the trend is persisting but the intensity is lower.

Figure 2. The seeds dynamic thinning



CONCLUSIONS

- *Calendula* seeds can be separated by shape on three different types: "hooks", "horseshoes" and "snails", each type having two colour (light and dark brown)
- One thousand seeds weight has values starting at 6.940 g (on "dark – brown snail") and reaching 13.823 g (on "light - brown hook").
- The germination parameters show no significant differences between the seeds type, for the thinning dynamics and rhythm and for the small plants growing rhythm.
- Between the shape, colour and size of the seeds and their germinate faculty no significant differences with practical interests were noticed.

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STUDIES CONCERNING THE INFLUENCE OF TYPE EXPLANT UPON THE REGENERATIVE CAPACITY OF *POLYANTHES TUBEROSA* L. PLANTS

TOMA, FL.

Key words: explant, culture media, regeneration, tuberose

SUMMARY

The *in vitro* production of the biological material is already well known for a lot of flower species. The *in vitro* multiplication in case of tuberose is strongly recommended because of the difficulties concerning the flower bulbs production.

The aim of our researches, extended on more years, was to study the effect of the *in vitro* multiplication upon the production of flower bulbs and the blossoming of percentage of tuberose.

We used two types of explants – buds of 1 – 2 mm excised from bulbs and inflorescence fragments of 3 – 4 mm (excised from the flowers insertion point). These explants were inoculated on five culture media, based on variation of NAA, KIN and BAP concentration.

The results of our studies showed a clearly superior regenerative capacity of the tuberose plants for the variants initiated from buds explants.

INTRODUCTION

It is already well known that the *in vitro* plant production has a juvenility and fortification effect for various plants.

Our researches are to show how the *in vitro* micropropagation could solve out the difficulties concerning tuberose flower bulbs production.

These paper results belong to a very large research and study program, regarding the biology and technology of *Polyanthes tuberosa* L. plants, developed at Faculty of Horticulture from Bucharest.

MATERIAL AND METHOD

The biological material has been belonging to an aboriginal population from Bucharest area.

The explants were excised from the bulb – buds of 1 – 2 mm length with rhizome fragments of 1 – 2 mm and from the inflorescence – fragments of 3 – 4 mm length (table 1).

Table 1. Experimental variants

Variant	Hormones concentrations (mg/l)			Explant type	Inoculation date
	NAA	KIN	BAP		
V 1	0.2	0.5	2.0	buds	April
V 2	0.2	1.0	2.0	buds	April
V 3	0.2	1.5	2.0	buds	April
V 4	0.2	2.0	2.0	buds	April
V 5	2.0	0.5	2.0	buds	April
V 6	0.2	0.5	2.0	inflorescence fragments	July
V 7	0.2	1.0	2.0	inflorescence fragments	July
V 8	0.2	1.5	2.0	inflorescence fragments	July
V 9	0.2	2.0	2.0	inflorescence fragments	July
V 10	2.0	0.5	2.0	inflorescence fragments	July

The explants sterilisation was realised with $HgCl_2$ 0.1% for 20 minutes. After the immersion of explants in $HgCl_2$ we applied two to three washes with sterile water and a 70% ethanol solution before inoculating the explants on culture media.

We used Murashige&Skoog (1962) culture media supplemented with different ratio of NAA, KIN and BAP hormones.

The climatic conditions in the growing room were 20 – 22°C, 2000 – 2200 lx with 8 hours dark and 80 – 85% UR.

The plants acclimatization was realized on sand substrate under high relative humidity conditions. After acclimatization the plant were planted in pots of 10 cm diameter where they grew until autumn.

RESULTS AND DISCUSSIONS

The coefficient of the plants regeneration varied between 31.66% at variants V7 and V9 and 91.66% at variant V5 (table 2).

We could observe that the inflorescence fragments gave an inferior percent of plants regeneration (fig. 1).

Also, the number of plants regenerated per explant is superior at the variants initiated from buds explants (fig. 2).

The acclimatization was better for the plants regenerated from the bulbs buds. In the case of the plants regenerated from the inflorescence fragments the acclimatization was realized with some significant loses of the plants (fig. 3).

Table 2. The plants regeneration

Variant	Regenerated explants		New plants per explant	Plants height	Leaves number
	no.	%	no.	cm.	no.
V 1	17.66	88.33	1.37	4.38	0.75
V 2	17.33	86.66	1.99	3.77	0.59
V 3	17.33	86.66	4.11	3.87	0.61
V 4	11.66	58.33	1.37	2.59	0.32
V 5	18.33	91.66	1.44	4.46	0.78
V 6	7.33	36.66	1.35	2.58	0.23
V 7	6.33	31.66	1.26	2.14	0.17
V 8	8.00	40.00	1.32	3.04	0.30
V 9	6.33	31.66	1.15	2.40	0.26
V 10	11.66	58.33	1.86	4.01	0.43

Fig. 1. Plants regenerated ratio

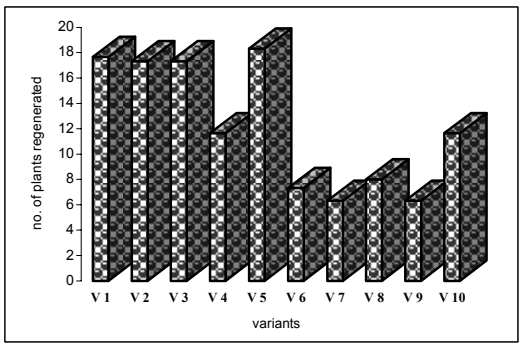


Fig. 2. Plants number regenerated per explants

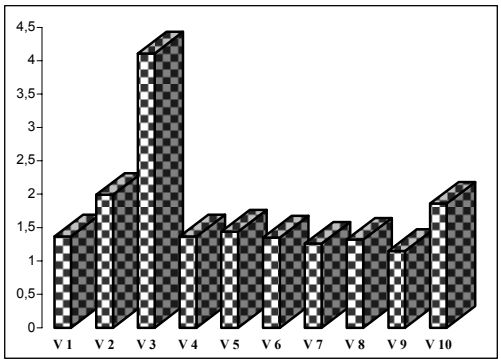
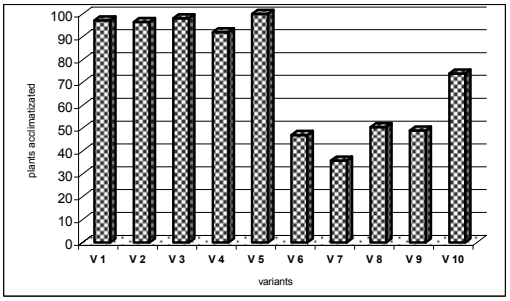
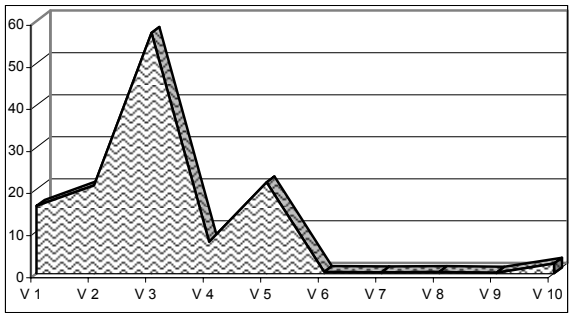


Fig. 3. Plants acclimatization ratio



The coefficient of the *in vitro* multiplication varied between 0.03 at variants V7 and V9 and 3.40 at variant V3. But these values were strongly increased by the number of bulbs produced from each plant. Thus, the coefficient of the bulbs multiplication was varied between 0.13 at variant V9 and 57.2 at variant V3 (fig. 4).

Fig. 4. The variation of the bulbs coefficient multiplication



CONCLUSIONS

- buds explants excised from the bulb determined the best coefficient of the plants regenerated and the growth of these plants was superior.

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RESEARCHES REGARDING THE INFLUENCE OF *IN VITRO* PLANT PRODUCTION UPON SOME PHYSIOLOGICAL PROCESSES FROM *POLYANTHES TUBEROSA* L. PLANTS

TOMA FL., BURZO I., DOBRESCU AURELIA, PETRA SORINA

Key words: tuberose, planting, respiration, perspiration, chlorophyll pigments

SUMMARY

Polyanthes tuberosa L. is one of the most appreciated flowers because of its very strong and pleasant perfume. The present work belongs to a larger researches program concerning the biology and technology of this beautiful flower.

We analyzed the respiration, perspiration and chlorophyll pigments levels in the tuberose plants depending of the bulbs obtaining method (*in vitro* and in field) and the climatic conditions the bulbs were stored in during the latent period (20–22°C + 80–85% UR and 10–12°C + 50–60% UR).

The results of our studies showed that for the plants regenerated from *in vitro* tissue cultures the metabolism is more intense in the first part of vegetation, assuring this way an early and better flowering process. Similar results were recorded in the case of the plants regenerated from the bulbs stored under 20–22°C + 80–85% UR.

INTRODUCTION

It is all accepted that the physiological processes occurring in plants are very expressive indicators for the quality of vegetal production.

In this reason we marked in our research program, concerning the biology and technology of *Polyanthes tuberosa* L. plants, the most important physiological processes of the plants.

MATERIAL AND METHOD

The biological material used for the physiological determinations belonged to an aboriginal population from Bucharest area.

The experimental variants were performed by the variation of the method of bulbs production, the bulbs size and the temperature and humidity level the bulbs were stored in, during the latent period (table 1).

For the plants respiration determinations we used the Riken analyzer that permits to measure the CO_2 quantity eliminated in the time unity. In the case of the perspiration we used the weighing method of water quantity evaporated in the time unity. Finally, the level of the chlorophyll pigments was determined by Arnon method based on the chlorophyll extraction from leaves in 80% acetone solution and the extract extinction determination under a spectrophotometer in the variable wave lengths.

Table 1. Experimental variants

Variant	Bulb production method	Bulbs diameter (cm)	Temperature in the latent period (ºC)	U.R. in the latent period (%)
V 1	*in vitro*	> 3.1	8 – 10	50 – 60
V 2	*in vitro*	> 3.1	20 – 22	70 – 80
V 3	*in vitro*	2.6 - 3.0	8 – 10	50 – 60
V 4	*in vitro*	2.6 - 3.0	20 – 22	70 – 80
V 5	in field	> 3.1	8 – 10	50 – 60
V 6	in field	> 3.1	20 – 22	70 – 80
V 7	in field	2.6 - 3.0	8 – 10	50 – 60
V 8	in field	2.6 - 3.0	20 – 22	70 – 80

RESULTS AND DISCUSSIONS

The plants respiration had an ascendant level until August (table 2).

Table 2. The variation and the dynamics of the level of respiration

Variant	Respiration level (mg CO_2/kg/h)			
	XII	VI	VII	VIII
V1	49.62	157.59	156.80	121.03
V2	68.16	196.02	241.50	97.75
V3	60.60	115.57	146.50	147.50
V4	68.68	154.80	159.10	114.00
V5	29.20	145.09	144.20	193.73
V6	33.64	183.87	176.30	152.01
V7	45.22	110.59	133.30	148.04
V8	50.06	120.37	165.20	113.88

In the latent period, the respiration was more intense for the bulbs propagated *in vitro* and for the small bulbs. But at the vegetation period beginning, the plants regenerated from the bigger and the *in vitro* bulbs and also, from the bulbs stored at 20–22°C + 80–85% UR, had a superior respiration level (fig. 1).

We also analyzed the respiration level for different phases of flowers opening (table 3). We noted that the flower bud had the maximum respiration level and the flower complete opened had the minimum respiration level. In the senescence phase, the tuberose flower presented an increasing respiration level.

Concerning the perspiration level, we noticed that in the first vegetation months, the plants regenerated from *in vitro* propagated bulbs had a low and constantly perspiration. Regarding the plants regenerated from the bulbs multiplied in field, the perspiration level was superior and increasing with each month (table 4).

Fig. 1. The respiration level variation

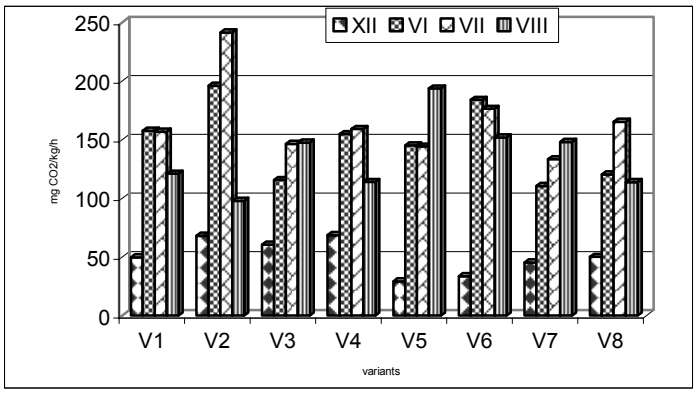


Table 3. Respiration level depending on the flower opening

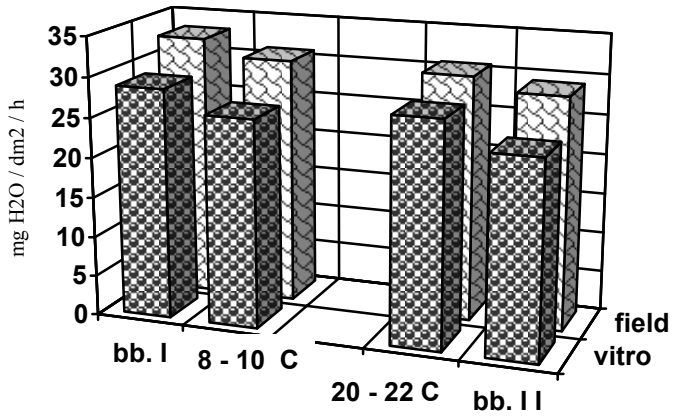
The flower opening phase	The respiration level (mg CO_2/kg/h)
bud flower I	386.71
bud flower II	296.07
bud flower III	244.28
opening begin	227.91
semi-opened I	231.97
semi-opened II	242.10
semi-opened III	242.00
completed opened	220.48
senescent	260.39

Table 4. The variation and dynamics of perspiration level

Var.	The perspiration level (mg $H_2O/dm^2/h$)		
	VI	VII	VIII
V1	28.83	28.80	206.89
V2	27.97	26.23	200.38
V3	26.05	25.95	157.44
V4	24.51	24.07	132.07
V5	32.90	91.37	145.15
V6	30.86	64.00	136.71
V7	30.59	51.90	129.00
V8	29.00	49.75	119.22

We also noticed that the plants regenerated from bulbs stored in 10–12°C and 50–60% UR conditions had a superior perspiration level compared to the plants regenerated from the bulbs stored under 20–22°C and 80–85% UR regime (fig. 2).

Fig. 2. The perspiration variation depending of the climatic regime



The chlorophyll pigments presented a descendent evolution, excepting the b chlorophyll (table 5).

Table 5. The variation and dynamics of chlorophyll pigments

Variant	Total chlorophyll mg/100 g		**a** chlorophyll mg/100 g		**b** chlorophyll mg/100 g		**a** chlorophyll / **b** chlorophyll	
	VI	VIII	VI	VIII	VI	VIII	VI	VIII
V 1	67.55	35.49	57.86	21.46	9.69	14.03	5.97	1.53
V 2	86.81	63.82	73.56	49.16	13.25	14.66	5.55	3.53
V 3	51.72	31.65	41.42	20.42	10.30	11.23	4.02	1.82
V 4	72.85	51.64	64.28	40.98	8.57	10.66	7.50	3.84
V 5	58.77	33.86	52.84	23.30	5.93	10.56	8.91	2.40
V 6	81.75	44.98	73.94	33.42	7.81	11.56	9.46	2.89
V 7	46.56	30.13	37.55	23.56	9.01	6.57	4.16	3.58
V 8	57.56	34.18	50.62	24.56	6.94	9.62	7.29	2.55

CONCLUSIONS

- The method of bulbs production, the bulbs size and the climatic conditions assured during the bulbs latent period, determine significant differences for the level and dynamics of physiological processes for tuberose plants.

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STUDIES REGARDING THE GROWING OF *NEPHROLEPIS X MUSCOSA* HORT. PLANTS ON ORGANIC AND MINERAL SUBSTRATUMS

TOMA FL., PETRA SORINA, ANGHEL CATALINA

Key words: *Nephrolepis*, peat, river stony sand, plants growing

SUMMARY

Replacing classical substrates, based on several components, by mineral or organic substratums, consisting of one material only, is one of the newest links in the researches programs concerning the culture of flowers species.

In this reason, we organized some researches regarding the possibilities that flowers species could grow on the river stony sand substratum, assuring the plants nutrition by mineral or organic fertilization.

In this work we used the control variant on peat. The plants nutrition was assured with weekly mineral fertilization.

Our results showed that the plants cultivated on the mineral substratums had similar or comparable growth with the plants cultivated on peat. These results mean that the river stony sand may be a serious alternative to peat, more expensive and difficult to obtain.

INTRODUCTION

Being original from different climatic areas, the flowers species have very variable needs concerning the culture substratum.

In this context, the preparation of ideal substratum for each species is, often, a very difficult and expensive operation.

"Universal" substratums utilization, useful for several species is thus, presently more and more common.

These researches about *Neprolepis x muscosa* Hort. plants continue other similar studies extended at Faculty of Horticulture from Bucharest.

MATERIAL AND METHOD

The biological material was represented by plants regenerated *in vitro* with a medium growth of 7.5 cm height and 2.2 leaves number. These plants were planted in March and in July the growth of the plants permit a new multiplication.

The experimental variants were set up depending on the substratum type variation, the pot size, the plants number per pot and the fertilizer regime (table 1).

In order to assure the best fertilization regime for the plants and according with the rule regarding the plants decorative by leaves, we applied weekly the fertilizer, nitrogen alternating with Complex NPK 1:1:1, in three different concentrations, each.

Monthly, we performed biological measurements to determine the growing rate influenced by the experiment variation factors.

Table 1. Experimental variants

Variant	Substratum	Pot's size (cm)	Plants per pot (no.)	Fertilizer concentration (%)
V1	peat	8	1	0.01
V2	peat	8	1	0.05
V3	peat	8	1	0.1
V4	river stony sand	8	1	0.01
V5	river stony sand	8	1	0.05
V6	river stony sand	8	1	0.1
V7	peat	12	3	0.01
V8	peat	12	3	0.05
V9	peat	12	3	0.1
V10	river stony sand	12	3	0.01
V11	river stony sand	12	3	0.05
V12	river stony sand	12	3	0.1

RESULTS AND DISCUSSIONS

The re-establish of the plants was more rapidly for the variants with peat substratum. But after this phase, the plants growth depended more on the fertilizer regime (table 2).

Table 2. The dynamical of the plants growing

Variant	Leaves number (no.)			Leaves length (cm)		
	April	May	June	April	May	June
V1	4.10	5.00	5.33	8.40	12.20	16.50
V2	3.60	4.20	6.42	14.30	18.30	22.28
V3	3.70	4.20	5.28	12.80	16.90	20.57
V4	3.00	3.60	4.57	13.30	16.30	20.42
V5	3.10	4.40	4.71	9.70	12.40	16.57
V6	3.50	4.50	5.50	8.10	12.80	16.75
V7	2.70	3.90	4.60	9.50	12.60	16.30
V8	3.00	4.00	5.37	11.80	16.20	20.33
V9	3.30	4.40	5.17	11.00	14.60	19.52
V10	2.50	2.50	2.53	10.40	12.90	15.76
V11	2.40	3.00	3.33	10.70	13.50	17.00
V12	2.20	2.70	3.38	9.20	12.40	16.53

We noticed that generally, the variants on peat substratum presented the best growing, but in the middle of experiments, in case of some variants (V4 and V6), on river stone sand substratum, the plants growth was the best (fig. 1, 2, 3).

Fig. 1. The variation of leaves number

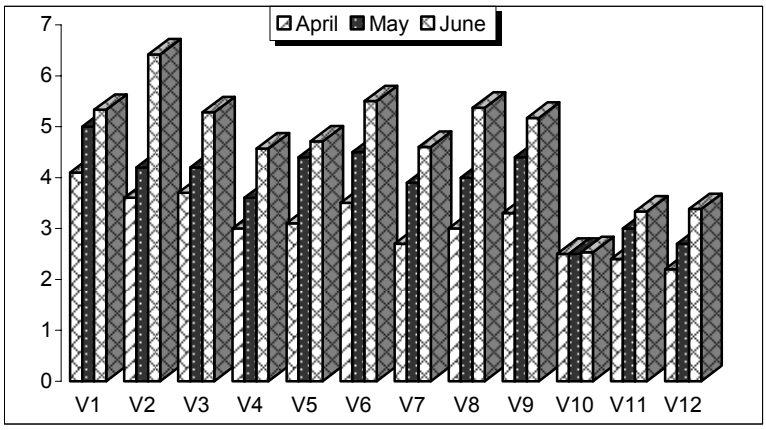

Fig. 2. The variation of leaves length

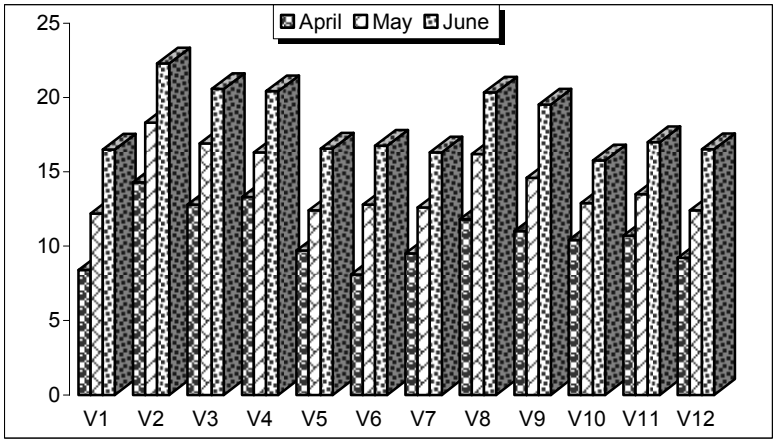

Fig. 3. Plants growth differences of between the variants

The monthly growth rate showed that the plants from the variants on river stony sand, fertilized with 0.1 % concentration fertilizer, had a similar or comparative growth rate with the plants from variants on peat substratum but fertilized with 0.01 % and 0.05 % fertilizer (table 3).

Table 3. The variation of monthly growth rate

Var.	Leaves number (no.)			Length of leaves (cm)		
	April	May	June	April	May	June
V1	1.90	0.90	0.33	0.90	3.80	4.30
V2	1.40	0.60	2.22	6.80	4.00	3.98
V3	1.50	0.50	1.08	5.30	4.10	3.67
V4	0.80	0.60	0.97	5.80	3.00	4.12
V5	0.90	1.30	0.31	2.20	2.70	4.17
V6	1.30	1.00	1.00	0.60	4.70	3.95
V7	0.50	1.20	0.70	2.00	3.10	4.30
V8	0.80	1.00	1.37	4.30	4.40	4.13
V9	1.10	1.10	0.67	3.50	3.60	4.92
V10	0.40	0.00	0.03	2.90	2.50	2.86
V11	0.20	0.60	0.33	3.20	2.80	3.50
V12	0.00	0.50	0.68	1.70	3.20	4.13

CONCLUSIONS

- The river stony sand can be a good substratum for *Nephrolepis x muscosa* Hort. plants; in the case of weekly fertilization with N/NPK 0.1 %, the plants growth was best, comparable or similar with the plants growth cultivated on peat.

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STUDIES CONCERNING THE BEHAVIOUR OF THE *FICUS BENJAMINA* L. PLANTS ON THE SOME ORGANIC COMPOST

TOMA, FL., PETRA SORINA, VLAD PETRA

Key words: ficus, organic compost, growing

SUMMARY

Because its *habitus* and leaves aspects, similar to the birch tree, *Ficus benjamina* L. is one of the most appreciated indoors plants.

Our researches followed the plants reaction at different organic composts, obtained from other agricultural activities (in this work flax and husk of grapes compost). These substrates were added in the basis substrate in 3 different ratios each other.

We used two varieties of *Ficus benjamina* – with green leaves and variegated leaves. The plants were obtained from cutting on sand + peat substrate.

The cuttings were obtained in May and in June we started the experiment. Monthly we realized biometrical observation and monthly we determined the growing rate, too.

INTRODUCTION

It is well known that the substrate is one of the most important technological links in the culture of the pot flowers. It is not easy to find the best correlation between the cost of substrate and the needs of the plants for this factor.

We experimented, in this work, the culture of the *Ficus benjamina* L. plants on the flax and husk of grapes compost, added in different ratio in substrate.

MATERIAL AND METHOD

The biological material was represented by cuttings from two varieties of *Ficus benjamina* (with green and variegated leaves). We realized seven experimental variants of substrate for each variety of *Ficus* plants (table 1).

Table 1. Experimental variants

Var.	Basis substrate * (%)	Compost (%)
V 1	100	–
V 2	75	25
V 3	50	50
V 4	25	75
V 5	75	25
V 6	50	50
V 7	25	75

* leaves compost – 3 units + manure compost 2 units + pearlite 1 unit

RESULTS AND DISCUSSIONS

From the tables 2 – 5 we observe that in low and medium ratio the two types of compost determine significant growing increase for both varieties of *Ficus*.

Analyzing the growing rate depending on the substrate composition we note that, generally, the flax compost stimulates the plants height and the husk of grapes compost stimulates the leaves number of the plants (fig. 1, 2).

Fig. 1. Height plants growing rate

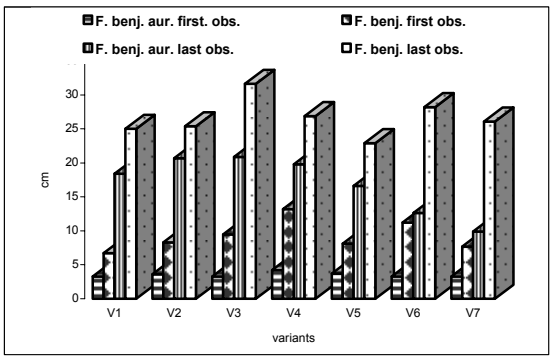
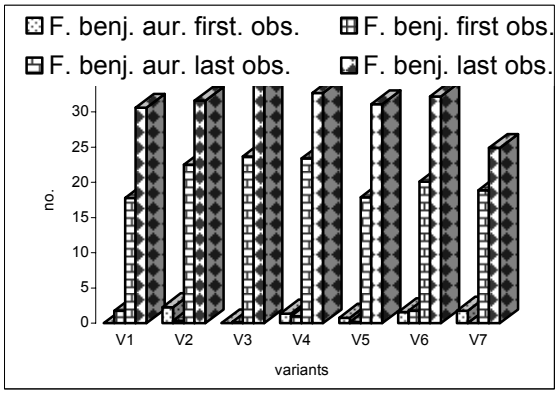


Fig. 2. Leaves number growing rate



CONCLUSIONS

- The use of the flax and husk of grapes compost in the substrate culture in case of *Ficus benjamina* is stimulating the growing of plants.

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Table 2. Plants height at *Ficus benjamina*

Var.	July		September		November		January		March		May		**Total growing rate (cm)**
	Plant height (cm)	Growing rate (cm)	Plant height (cm)	Growing rate (cm)	Plant height (cm)	Growing rate (cm)	Plant height (cm)	Growing rate (cm)	Plant height (cm)	Growing rate (cm)	Plant height (cm)	Growing rate (cm)	
V1	11.3	6.7	17.6	6.3	18.5	0.9	18.7	0.2	21.4	2.7	29.6	8.2	25.0
V2	12.9	8.3	18.8	5.9	19.2	0.4	19.6	0.4	21.6	2.0	30.0	8.4	25.4
V3	14.1	9.5	20.5	6.4	21.4	0.9	21.7	0.3	23.5	1.8	36.2	12.7	31.6
V4	17.8	13.2	24.2	6.4	26.2	2.0	26.7	0.5	27.3	0.6	31.5	4.2	26.9
V5	12.7	8.1	16.6	3.9	18.0	1.4	18.0	0.0	19.5	1.5	27.5	8.0	22.9
V6	15.8	11.2	21.0	5.2	22.5	1.5	22.8	0.3	24.0	2.5	32.8	6.8	28.2
V7	12.3	7.7	16.3	4.0	17.6	1.3	17.9	0.3	19.6	1.7	30.7	11.1	26.1

Table 3. Leaves number per plant at *Ficus benjamina*

Variant	July		September		November		January		March		May		**Total growing rate (cm)**
	Leaves (no.)	Growing rate (cm)	Leaves (no.)	Growing rate (cm)	Leaves (no.)	Growing rate (cm)	Leaves (no.)	Growing rate (cm)	Leaves (no.)	Growing rate (cm)	Leaves (no.)	Growing rate (cm)	
V1	1.8	0.0	9.0	7.2	10.5	1.5	10.5	0.0	12.0	1.5	19.6	7.6	17.8
V2	4.1	2.3	12.6	8.5	15.4	2.8	15.5	0.1	19.2	3.7	24.3	5.1	22.5
V3	1.8	0.0	10.5	8.7	12.5	2.0	12.8	0.3	20.5	7.7	25.5	5.0	23.7
V4	3.2	1.4	10.6	7.4	12.9	1.3	13.0	0.1	19.6	6.6	25.2	5.6	23.4
V5	2.6	0.8	9.3	6.7	10.7	1.4	10.7	0.0	12.3	1.6	19.7	7.4	17.9
V6	3.4	1.6	11.4	8.0	12.9	1.5	13.2	0.3	15.0	1.8	21.9	6.9	20.1
V7	3.6	1.8	9.2	5.6	9.8	0.6	10.0	0.2	11.2	1.2	20.7	19.5	18.9

Table 4. Plants height at *Ficus benjamina* aureovariegata

Var.	July		September		November		January		March		May		**Total growing rate (cm)**
	Plant height (cm)	Growing rate (cm)	Plant height (cm)	Growing rate (cm)	Plant height (cm)	Growing rate (cm)	Plant height (cm)	Growing rate (cm)	Plant height (cm)	Growing rate (cm)	Plant height (cm)	Growing rate (cm)	
V1	6.1	3.3	11.2	5.1	12.5	1.3	12.5	0.0	13.8	1.3	21.2	7.4	18.4
V2	6.4	3.6	11.8	5.4	12.0	1.2	13.8	0.8	15.7	1.9	23.5	7.8	20.7
V3	6.1	3.3	13.2	7.1	14.6	1.4	15.1	0.5	17.5	2.4	23.7	6.2	20.9
V4	7.0	4.2	13.4	6.4	15.7	2.3	16.2	0.5	17.8	1.6	22.6	4.8	19.8
V5	6.5	3.7	12.2	5.7	13.5	1.3	13.9	0.4	15.2	1.3	19.4	4.2	16.6
V6	6.1	3.3	10.4	4.3	11.8	1.4	12.0	0.2	14.0	2.0	15.4	1.4	12.6
V7	6.1	3.3	10.0	3.9	10.4	0.4	10.4	0.0	11.6	1.2	12.7	1.1	9.9

Table 5. Leaves number per plant at *Ficus benjamina* aureovariegata

Variant	July		September		November		January		March		May		**Total growing rate (cm)**
	Leaves (no.)	Growing rate (cm)	Leaves (no.)	Growing rate (cm)	Leaves (no.)	Growing rate (cm)	Leaves (no.)	Growing rate (cm)	Leaves (no.)	Growing rate (cm)	Leaves (no.)	Growing rate (cm)	
V1	5.4	1.8	17.5	12.1	23.0	5.5	23.1	0.1	25.2	2.1	34.2	9.0	30.6
V2	4.0	0.4	13.0	9.0	23.0	10.0	23.5	0.5	27.6	4.1	35.2	7.6	31.6
V3	3.8	0.2	10.7	6.9	19.7	9.0	20.2	0.5	28.0	7.8	37.5	9.5	33.9
V4	4.6	1.0	11.4	6.8	21.6	10.2	21.8	0.2	29.8	8.0	36.3	6.5	32.7
V5	3.8	0.2	11.5	7.7	14.0	2.5	14.4	0.4	26.7	12.3	34.7	8.0	31.1
V6	5.4	1.8	11.0	5.6	12.3	1.3	12.7	0.4	25.8	13.1	35.8	10.0	32.2
V7	3.6	0.0	8.8	5.2	10.8	2.0	11.0	0.2	22.8	11.8	28.5	5.7	24.9

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STUDIES REGARDING THE SOILLESS CULTURE OF *GARDENIA JASMINOIDES* L. PLANTS

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Key words: substrate, fertilizer, *Gardenia*, growth

SUMMARY

The utilization of "universal" substrates or soilless culture is very frequent in the last years because of their multiple advantages.

The aim of our researches was the study of *Gardenia* plants behaviour in conditions of soilless culture using as substrates river stony sand.

The plants nutrition has been assured by two complex fertilizers (Complex I – 15N:15P:15K and Complex II – 20N:18P:18:18 SO2:1,5Cl) in 0.05% concentration applied weekly and 0.1% concentration applied weekly and twice per month.

Our results showed that in case of using Complex II, the plants response concerning the growing and flowering was best.

Regarding the concentration and application frequency of fertilization solution, the results were better in the variant with weekly application of 0.1% concentration of fertilizer solution.

INTRODUCTION

The flower plants have a very variable need concerning the substrates. But the preparation of the ideal substrate for each species is frequently a difficult and expensive operation.

In this reason, the utilization of "universal" substrates, available for a great number of flower species, is actually, even more necessary.

The inert substrates are one of the best solutions for lots of species. We tried, in this experiment, to establish the reaction of *Gardenia* plants for this culture method.

MATERIAL AND METHOD

The biological material was represented by one year old plants, multiplied *in vitro*. These plants were cultivated, till the start of the experiment, in the substrate composed of manure (1 unit), leaves compost (1 unit), peat (1 unit) and sand (0.5 units).

Half of the plants presented shoots from basis and the other half had shoots starting from 20 cm height. The level of the plants vegetation in the moment of the experiment initiation is marked in the table 1.

The plants were planted on river stony sand, in pots of 14 cm diameter.

Table 1. The plants growing in the moment of experiment starting

Variant	Type of cut	Plants height (cm)	Shoots number (no.)	Shoots length (cm)	Leaves number (no.)
V1 – V7	short	8.19	4.5	7.33	11.92
V8 – V14	high	18.75	5.87	3.68	22.00

The composition of the fertilizer solution and the calendar of its application are noted in the table 2. The plants from the control variant were cultivated in the same substrate they have been cultivated until the experiments initiation.

Table 2. Experimental variants

Variant	Type of cut	Substratum	Fertilizer type	Solution concentration (%)	Fertilization frequency
V1	short	organic	–	–	–
V2	short	inert	Complex I	0.05	weekly
V3	short	inert	Complex I	0.1	twice of month
V4	short	inert	Complex I	0.1	weekly
V5	short	inert	Complex II	0.05	weekly
V6	short	inert	Complex II	0.1	twice of month
V7	short	inert	Complex II	0.1	weekly
V8	high	organic	–	–	–
V9	high	inert	Complex I	0.05	weekly
V10	high	inert	Complex I	0.1	twice of month
V11	high	inert	Complex I	0.1	weekly
V12	high	inert	Complex II	0.05	weekly
V13	high	inert	Complex II	0.1	twice of month
V14	high	inert	Complex II	0.1	weekly

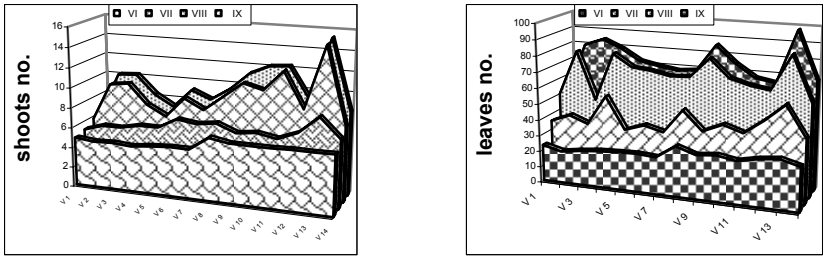
RESULTS AND DISCUSSIONS

The plants growing and flowering depended on the culture substrate and the fertilizer program, too (fig. 1).

Fig. 1. Growing differences between variants

From the table 3 we note that in the first two months the plants growing is better at the variants with organic substrate. But in the next months the plants cultivated on the inert substrates have a clearly superior growth (fig. 2).

Fig. 2. The dynamical of the plants growth



The plants flowering is better at the plants from variants with inert substrates, fertilized with Complex II fertilizer (table 4).

Table 4. The variation and dynamic of plants flowering

Var.	Flowered plants number (%)			No. of flower per plant		
	VII	VIII	IX	VII	VIII	IX
V1	10.0	0.0	10.0	1.0	-	1.0
V2	10.0	0.0	20.0	1.0	-	1.5
V3	10.0	20.0	20.0	2.0	2.5	1.5
V4	0.0	10.0	0.0	-	2.0	-
V5	0.0	20.0	10.0	-	1.5	2.0
V6	30.0	30.0	10.0	3.0	2.5	1.0
V7	0.0	20.0	20.0	-	1.5	1.5
V8	10.0	0.0	0.0	2.0	-	-
V9	0.0	30.0	0.0	-	2.0	-
V10	30.0	20.0	10.0	2.0	3.0	2.0
V11	10.0	20.0	10.0	1.0	1.5	2
V12	20.0	10.0	0.0	1.5	1.0	-
V13	40.0	20.0	30.0	3.0	2.5	2.0
V14	20.0	30.0	0.0	1.5	2.0	-

CONCLUSIONS

- Gardenia plants have a good growth on the inert substrates if the fertilizer program assures the needs in the basis mineral elements.

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Table 3. The dynamic of the plants growth

Var.	Viable plants %	Height of plants (cm)				Shoots number				Length of shoots (cm)				Leaves number			
	IX	VI	VII	VIII	IX	VI	VII	VIII	IX	VI	VII	VIII	IX	VI	VII	VIII	IX
V 1	100	9.1	11.3	13.8	14.2	4.8	5.1	5.7	6.1	7.5	7.9	8.2	8.3	23.1	35.4	49.7	50.1
V 2	100	8.5	10.2	14.3	18.4	4.6	5.7	9.5	10.1	7.4	7.5	7.7	8.3	20.1	40.1	78.2	80.1
V 3	100	8.7	10.5	12.0	18.8	4.7	5.7	9.7	10.2	7.5	7.8	7.9	8.4	21.9	35.7	48.0	84.6
V 4	90	8.7	11.3	14.8	18.9	4.6	6.1	7.7	8.3	7.5	7.7	7.9	8.3	23.1	54.3	78.5	79.4
V 5	100	8.8	12.1	12.3	19.8	4.8	6.1	6.7	7.2	7.1	7.4	7.8	8.5	23.7	34.3	71.0	72.4
V 6	90	8.9	13.3	14.8	18.8	4.9	7.1	8.7	9.1	6.7	7.8	8.3	8.7	24.1	38.5	69.7	70.1
V 7	90	8.9	14.1	15.8	18.9	4.9	6.8	7.7	8.3	6.9	6.9	7.9	8.8	23.3	35.3	67.2	68.1
V 8	100	19.3	20.9	22.9	23.7	6.2	7.1	9.3	9.5	3.9	4.1	4.2	4.4	31.4	50.3	68.0	69.4
V 9	100	18.7	19.5	25.3	27.9	5.9	6.3	10.7	11.3	3.7	3.8	4.3	4.8	27.5	38.5	80.2	85.7
V 10	90	18.8	19.1	22.8	24.3	5.8	6.6	10.3	12.1	3.7	3.9	4.2	4.9	28.7	43.8	69.0	75.3
V 11	100	18.8	18.9	20.5	21.4	5.9	6.2	12.3	12.3	3.7	3.9	4.2	4.3	26.7	39.8	65.6	67.4
V 12	100	19.2	21.7	30.3	31.8	5.9	6.9	8.7	9.2	3.8	4.3	4.7	4.9	29.3	48.7	63.7	65.2
V 13	80	19.0	23.4	29.0	30.5	5.9	8.7	15.0	15.3	3.9	4.4	5.2	5.2	30.7	59.4	86.0	98.2
V 14	90	19.1	22.7	26.5	28.6	5.9	6.8	7.5	8.3	3.8	4.0	4.1	4.8	27.5	40.3	57.9	68.5

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THE LOTUS – AN INDIAN SOUL REPRESENTATIVE

MARIANA TOMA

Key words: lotus, symbol, India

SUMMARY

Rosea plena

Having an amazing beauty doubled by an exquisite perfume, lotus rightly gained its first place between the aquatic flowers, being one of the most fascinating flower species from the world. Representing the metaphor of the universe which is born from the primordial waters, as well as, according to Hinduism, the origin of the divine characters, the lotus symbolizes perfection, fertility, purity, and the enlightenment. The lotus flower – seen as a symbol of the cosmic harmony and considered the only flower which can transcend the time – is in fact, through its diverse colours, a link between earth and heaven, a gate towards eternity. An eyes and soul relish, a generous miracle of life, heavenly blessing, the lotus will always have a special place in the heart of every human being who seeks for the Absolute.

BOTANICAL DESCRIPTION

GENUS: **Nelumbo Adans.**
FAMILY: Nymphaeaceae (Nelumbonaceae)
SPECIES: - *Nelumbo nucifera Gaertn. (syn. N caspica, N. Komarovii, N. speciosum, N. nelumbo, Nymphaea nelumbo)* - Indian lotus (sacred or Oriental)
- *Nelumbo lutea Willd* (syn. *N. nucifera subspecia lutea, N. Pentapetala, Nymphaea pentapetala)* - American lotus (less significant)

NELUMBO NUCIFERA

A perennial aquatic plant, to be found along stagnant, not too deep waters and on slow courses, which presents:
-rhizome: thick, horizontally spread above the lakeside stratum,
-leaves: big, round, gently sinuous on the edges, green-blue coloured, waxed, 50-60 cm in diameter, floating on the surface of the water,
-stem: having air spaces inside, it can reach 1.80-2 m in height, it ends with a single flower,
-flower: big, floating on the water lustre, 20-30 cm in diameter, in various colours (white, cream - coloured, yellow, orange, pink, red, blue, violet and, which is more, the hybrids present different colour series, too), very beautifully scented, (a suave perfume, gently medicinal, with clearness and freshness valences), the calyx is formed of 4 sepals, and the corolla of numerous nacreous petals, which are brilliant and disposed concentrically, going down slowly to the stamen (numerous

and very scented). The flower can be simple, with a number of petals - less than 25, semidouble - 25-50 petals, or double - with more than 50 petals. The petals' closing system allows the plant the possibility of controlling its own internal water circulation to protect itself against the weather caprice. The flower scenting components are held especially in the stamen: the cariofilene, the pentadicane, the metaxibenzene, 1.4 – found in essential lilac, hyacinth, sweet cherry, peppermint oils - the types of lotus and its different degrees of hybridization can be determined by measuring the percentage of this scented component.
- blossom period: in the middle of summer, early in the morning, the flower closes up as the air is getting warmer, a flower lasts for 2-5 days, then the petals become darker in colour and they fall down.
- pollination: entomofila (Coleoptera)
- fruit: decorative, becomes mature underwater, capsule shaped, spongy, containing 15-20 seeds
- seeds: equipped with an aeriferous aril, which breaks when the mucilaginous substances from the inside swell up and then releases the seed which falls to the bottom of the water to start its germination process. The lotus seeds have the capacity of maintaining life for centuries, so, in 1951 in Japan, in Kemigawa (Chiba) 3 lotus seeds, 2000 years old, were discovered. At water contact they germinated and one of them gave birth to a little plant which blossomed and was named the Ohga lotus.

ECOLOGICAL EXIGENCENCE

Relative to the medium, lotus is not a sensitive plant, having a great capacity of accommodation. However, in order to enjoy a lotus culture we need to take into account the following: it adores the sunny paces and it offers resistance to low temperatures of -10ºC / -18ºC, but the cold temperatures determine a deep hibernation.

CULTURE TECHNIQUES

Lotus can multiply either by seeds (it necessitates sacrificing) or by rhizome fragment – the most used method by the producers. The rhizome divides every 3-4 years, and each fragment is provided with 2-3 eyes. Pools are used for plantation in the following size: the minimum height - 30 cm, the minimum diameter - 50 cm. The culture substratum must contain 1/3 garden earth, 1/3 leaves earth (or sawdust compost), 1/3 clay earth, and bone powder as a slow liberation fertilizer. The blossom will occur the same year beginning with July, and as related to the culture obtained through seeding (in March), the plants will blossom beginning with August, the same year. In order to outrun the blossom, the temperature must be maintained between 18º - 20ºC.

ATTENDANCE WORK

Among the special attendance work there are:

-the treatment against the leaves fleas: spraying with Roténol (a non remanent product), or introducing red fish or *Coccinela larva* in the pool

-cutting off the yellowish leaves and withered flowers

-in case of very cold winters, the rhizome will be kept in a humid bowl, frost protected

HYBRIDS

The most important types of hybrids were obtained during 1839-1855 and 1870-1910. The source of today's hybrids is *N. alba, N. lotus, N. rubra, N. coerulea, N. capensis, N. flava, N. tetragona, N. amazonum.*

USES

The plant has various uses: nourishment (fully edible), traditional and modern medicine, cosmetics, perfumes, floral arrangements, temple offerings, special cultures in pools (especially in botanical gardens).

LOTUS, MORE THAN A FLOWER

"The one who is a real man gets up early in the morning and offers a lotus flower to the first person he meets, either a friend or enemy"- Old Indian Thinking

Considered both a symbol of vegetation and life consequently, the lotus is the universe metaphor itself, which comes to life out of the primordial waters.

The lotus symbolizes the inside nature display and the spirit expression which leads the spirit from the obscure depths of ignorance to the bright summits of the inner peace; which in other words is the human consciousness evolution – from instinctive impulses to the spiritual liberation.

For artists, the lotus flower represents an alternative to the human existence banality, lotus motif being largely found in architecture, sculpture and art, in all its forms. For the Orient, lotus represents the correspondence between materiality and spirituality. Despite seeming a delicate, apparently fragile plant, the lotus is full of sense and metaphor: symbol of fertility, perpetuation, renaissance and illumination. Owed to the remarkable long germination period, this flower is believed to be the only one to transcend time, overpassing the time barriers. The lotus flower is also a symbol for hope, being considered sacred: the way a fascinating lotus flower is able to rise out of the mud, to reach the surface without being touched by it, symbolises also the way how humanity is able to defeat any difficulty and to continue the spiritual elevation towards the fusion with the Absolute.

GODS' FAVOURITE FLOWER

Lotus not only relates to a religion in India, but it is also the flower which represents perfection and metaphorically speaking, it symbolizes what God

represents in the world. The candid white lotus flower symbolizes the Christic Consciousness, bearing the significance of purity and knowledge. Ever since the time of the Arien tribes in India, the lotus was worshipped as "The Mother of the created"; the divine creatures are believed to have been born out of the lotus flowers. In "Bhagavad Gita'' man is advised to live as the lotus: to work in a detached way, to dedicate his actions to God, to keep himself pure like the beautiful flower that stays above the dirty water and the mud; according to Hinduism, inside each earthling there is the sacred spirit of a lotus flower. In Buddhism the lotus represents "The maximum drafting off one's own person and dedication to the others" or "The maximum spirit exaltation", which also represents Nirvana. The Indian cult for the lotus flower spread up in many other cultures, raising the interest and imagination for people all over the world and belonging to all times.

CONCLUSION SUBSTITUTE

"...You are the Power of Innocence surrounding everything, / And the pure Knowledge flower, / You are the endless column of Love, / And the Eye which bathes the world in purity, / And, which is more, you are the gentle blowing of the Holly Spirit, / The refreshing vertical between the Earth and Heaven, / Perfume giving off from a Flower, / Whose petals glitter in Eternity; / The refreshing light of Divinity, / Pouring out on me the gift of Your blessing."

" Hymn to the White Lotus Flower" by Ana Luiza

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FRUIT GROWING

INFLUENCE OF PLANTING DISTANCE ON STRAWBERRY FRUIT BEARING, WHEN MULCHING WITH BLACK POLYETHILENE FILM

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Key words: strawberry, mulching, fruit bearing

SUMMARY

Soil mulching, by using polyethylene black film, represents an alternative in improving the growing technology on strawberry.

The advantages of this method consist in: keeping the soil humidity, the culture is not being invaded by weeds (Diaconeasa M. and all., 1996), clean and good quality fruits are being obtained, and the insect attack risk is low.

Further, to experiments made in various planting distances on strawberry mulched with black polyethylene film, it was seen that the distance of 25/25 cm gave the best results regarding the yield.

It is required for strawberry, as well as for other fruit tree species, the crop concentration, specialisation and diversification, under the conditions of private properties (Baciu A. and all., 1994). Strawberry farming profitability depends more on the intensification of production process, and less on plantation size (it is noted that in other countries small strawberry plantations prevail too,). As a conclusion, the strawberry culture must be urgently relaunched to diversify the fruit tree farming in order to get higher rates in profit, in the shortest possible time (Coman M., 1996).

MATERIAL AND METHOD

Biological material used was delivered by S.C.P.P. Dolj, by taking under research the cultivar *Red Gauntlet*. The experiment was placed at SDE Banu Mărăcine, in five variants, using various planting distances of plantlets:

- **Variant V_1** – with planting distance between plants of 15/15 centimetres;
- **Variant V_2** – with planting distance between plants of 20/20 centimetres;
- **Variant V_3** – with planting distance between plants of 25/25 centimetres;
- **Variant V_4** – with planting distance between plants of 30/30 centimetres;
- **Variant V_5** – with planting distance between plants of 40/40 centimetres.

The experiment was set up on 4th of May 2001, by manually planting the running on polyethylene black film with punches, having the punch diameter of 5 centimetres.

This paper' objectives were the following: finding out the catching percentage and plants' strength during winter time, the plants number per surface unit, strawberry plants growing dynamics depending on the planting distances, the inflorescences number per plant and flowers average number per plant, the strength of film, the estimated crop.

RESULTS AND DISCUSSIONS

Catching percentage and plants' strength in winter

Plants' strength to frost is expressed by the number of missing plants. In the spring of 2002 year, after vegetation start, observations were performed to find out the missing plants, and the results were surprising: recording the missing plants it was noticed that plants have faced better the winter frosts only in variant V_1 (with planting distance of 15/15 centimetres). Percentage of frozen plants for variant V_1 was 8.5%. From here we can draw a conclusion: runners being planted at small distance (15/15 centimetres), did not have enough space to accumulate the necessary reserve substances and they froze easier, in comparison to other plants.

Dynamics of strawberry plants growth depending on planting distance

Vigour of strawberry plants may be expressed by the leaf average number per plant (table 1).

We can see in table 1 that in the same year of culture establishing (2001) the leaves average number per plant varied between 5.22 and 5.81, the variant with the most vigorous plants was V_3 (25/25 centimetres), and the variant with least developed plants was V_5 (40/40 centimetres).

In the spring of the next year (2002), the plants growth was much higher, thus resulting more vigorous plants in comparison to the culture establishing year. On the 24th April 2002, when the observations were taken, the average number of leaves per plant was between 7.1 and 9.2, the variant with the most vigorous plants was again V_3 (25/25 centimetres), while the variant with the least developed plants was this time V_1 (15/15 centimetres). Further to those observations, one can conclude that the most vigorous plants were the ones in variant V_3, while the least developed plants were the ones in variant V_1.

Table 1

Dynamics of strawberry plants growth (average number of leaves/plant)

Variant	Observation date		Average
	17 August 2001	24 April 2002	
	Average number of leaves/plant	Average number of leaves/plant	
V_1	5.25	7.10	6.18
V_2	5.64	7.35	6.50
V_3	5.81	9.20	7.51
V_4	5.56	8.65	7.11
V_5	5.22	8.75	6.99

Influence of planting distance on the formation of runners

In order to find out to what variant from the planting distances has influenced the capacity of plants issuing, their issuing and number were followed-up. In the year 2001 the removal of issued runners was done in two stages, on the 17th of August and the 5th of October, and the next year this operation was done in one single stage, on the 2nd of May 2002, followed by other stages for runner's removal, since the strawberry plant can issue runners until late autumn.

In the first year, until the 5th of October 2001, 7.81 runners/plant were formed in variant V_1, and the lowest number of issued runners was in variant V_5 (5.68 plantlets/plant).

In the second year after the planting, until the date of 2nd of May 2002, the average number of runners per plant issued was maximal in variant V_3 (2.56), while the variant V_1 had the minimal value (1.2 runners/plant) (table 2).

Table 2

Dynamics of runners' formation

Variant	Time period	
	Until the 5th of October 2001	Until the 2nd of May 2002
	Average number of runners / plant	Average number of runners / plant
V_1	7.81	1.2
V_2	6.99	2.36
V_3	7.04	2.65
V_4	6.57	2.12
V_5	5.68	2.57

Influence of planting distance on the inflorescences formation and flowers average number per plant

By analyzing the plants number that have issued inflorescences in the first year of culture, it was seen that the highest percentage of plants with inflorescences was met in variant V_4 (with planting distance of 30/30 centimetres) – 58.5%. The lowest percentage of plants with inflorescences was recorded in variant V_5 (with planting distance of 40/40 centimetres) – 27.5% (table 3).

The average number of inflorescences per plant, in the first year, has varied between 1.3 in variant V_1 (with planting distance of 15/15 centimetres) and 2.49 in variant V_3 (with planting distance of 25/25 centimetres); the average number of flowers per inflorescence was minimal in variant V_1 – 4.5, and maximal in variant V_3 – 5.95 (table 3).

Analyzing the average number of inflorescences per each variant, it was noticed that this was between 1.68 (variant V_1), and 3.35 (variant V_3). The average number of flowers per inflorescence has varied between 6.6 flowers in variant V_4, and 8.75 flowers in variant V_1.

The second year after the culture was established (2002), when analyzing the number of plants that have issued inflorescences, it may be stated that the percentage of issued inflorescences in all variants was more than 90% (table 3).

Table 3

Percentage of plants with inflorescences, inflorescences average number of per plant, production calculated in the first and second year of culture (2001-2002)

Var.	Percentage of plants with inflorescences (%)		Inflorescences average no. per plant		Flowers average no. per inflorescence		Average calculated crop (g/plant)	
	2001	2002	2001	2002	2001	2002	2001	2002
V1	33.3	94.37	1.3	1.68	4.5	8.75	81.9	205.8
V2	40.5	95.21	1.6	2.85	4.58	7.35	102.6	293.3
V3	35.8	94.39	2.49	3.35	5.95	8.11	207.4	380.3
V4	58.5	95.23	1.74	2.75	5.42	6.6	132.0	254.1
V5	27.5	94.11	1.87	2.55	5.10	7.65	133.5	273.1

As regards the film's strength, it was seen that in variants with lower planting distances, the strength was higher, thus being better protected against the action of sun beams in plants.

Estimated crop by variant (g/plant) has varied between 81.9 g (V_1) and 207.4 g (V_3) in the first year after planting, and between 205.8 g (V_1) and 380.3 g (V_3) in

the second year after planting, thus, variant V_3 (25/25 cm) proved itself to yield higher values than the other variant (table 3).

CONCLUSIONS

- Out of experimental data obtained, the best planting variant in strawberry by mulching with polyethylene black film is 25/25 cm.

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PARTIAL RESULTS REGARDING IRRIGATION INFLUENCE ON THE HIGHBUSH BLUEBERRY CROP, UNDER PEDOCLIMATIC CONDITIONS OF MUSCEL SUBMONTAINOUS AREA (Bilceşti - 840)

CĂTĂLIN BĂDESCU

Key words: highbush blueberry, irrigation

SUMMARY

Although Bilceşti is sited at 840m altitude, the rainfalls reach yearly over 740 mm but the blueberry crop is affected by dry periods which occur mainly during fruit growth and maturation phenophases. The studies performed in 2003 have emphasized that for obtaining high yields irrigation is needed. When the irrigation water amounted 110cm, the yield increase was 72%. The fruits in the irrigated plots were bigger vs. non-irrigated control but the dry weight was a bit low. Our investigation results in sub-mountain area have led to an irrigation need in such areas.

INTRODUCTION

The investigations conducted at Bilceşti over a 30 year period have shown that even if the rainfalls attained on the average 740mm, yearly, the blueberry crop is damaged due to water shortcomings in most years. During 1962-2001 the dry periods had a significant influence on the fruit yield (Fig. 1).

MATERIALS AND METHODS

The irrigation study was started in 2003 with Blueray cv. Involving 3 irrigation techniques and a non-irrigated control. A double plastic layer separated the plots on an 80cm dept (Fig. 2). The irrigations were applied before and during fruit ripening (July-August).

Fig.1. Drying process due to drought in the previous year

Fig.2. Plot separation per each treatment

RESULTS AND DISCUSSIONS

Before and during ripening season, the rainfalls amounted 186.4mm. Never the less, the yield was particularly affected by two dry intervals of 8-10 days, the effect getting worse by lack of rain in the 1st half of July (Fig.3). In fact, over 60% of 125.4 mm were recorded in 3 days (23.24 and 30.00). August was a drier month over several years and 61 mm representing 65% were recorded only in 2 days (10.17).

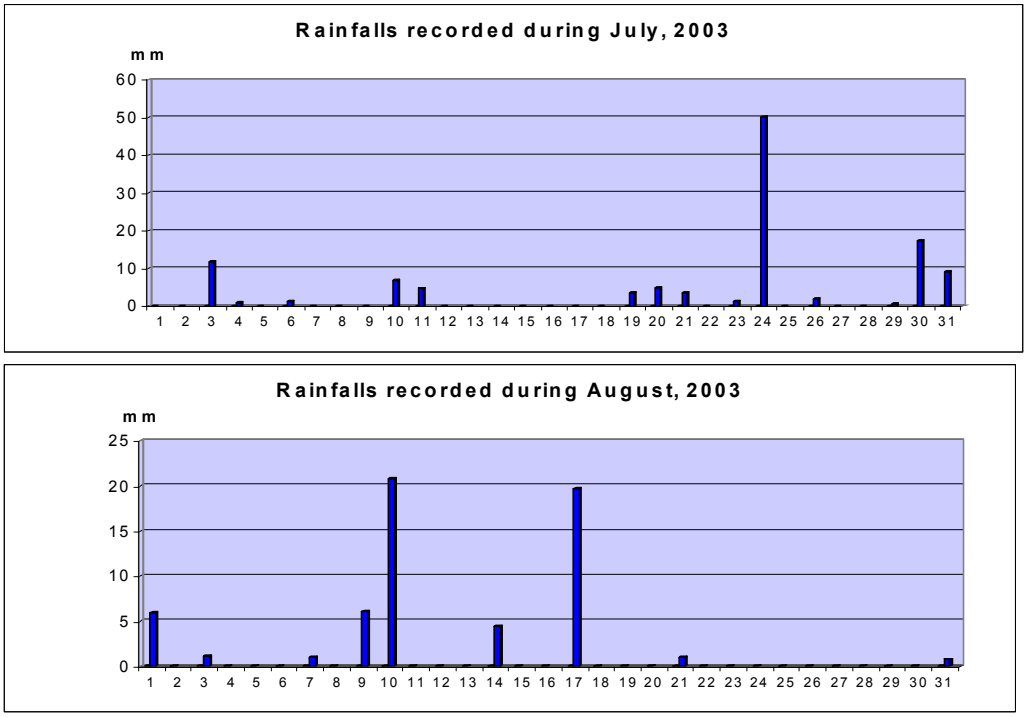

Fig. 3. Rainfalls recorded during July-August, 2003

During July-August, 4 irrigations were applied (28 m /ha in T1, 113 m in T2 and 137 m in T3).

The highest yields in all treatments where reached at the first picking. The average weight in the treatments 2 and 3 was 424 g and 319 g respectively (Table 1). At the 1st picking the difference between drip irrigation treatment and the untreated control was insignificantly (265 g/plant vs. 252 g/plant). Harvesting was practically ended on August 19, afterwards the yield going very low. All irrigated treatments were superior to non-irrigated control in terms of fruit yield.

Table 1. Average fruit yield per bush, average fruit size and dry matter in all 3 irrigated treatments and non-irrigated control

Date of picking	T1- drip irrigation			T2-sprinkle irrigation per stripe			T3-sprinkle irrigation per band			Non-irrigated control		
	P(g)	g	S.U.	P(g)	g	S.U.	P(g)	g	S.U.	P(g)	g	S.U.
25.07	265	1.40	13.0	319	1.40	13.4	424	1.22	12.2	252	1.28	13.2
31.07	158	1.57	13.4	217	1.48	11.8	206	1.00	12.2	139	1.20	14.6
02.08	106	1.41	13.6	68	1.64	14.0	54	1.62	13.2	37	1.07	14.0
05.08	100	1.19	14.0	168	1.30	14.0	165	1.30	11.4	122	1.21	14.0
08.08				102	1.37	14.6	55	1.15	10.2			12.0
13.08	150	1.20	14.6	120	1.40	12.8	192	1.04	14.2	142	1.13	14.2
19.08	142	1.34	15.7	136	1.12	12.6	231	1.22	12.2	111	0.80	19.7
26.08	32	0.98		53	0.97	16.1	72	0.92	13.5	13	0.82	
Total	954	1.30	14.1	1183	1.34	13.7	1400	1.18	12.4	815	1.07	14.5

P-yield per bush (g); g-average fruit size; S.U.-dry matter (%)

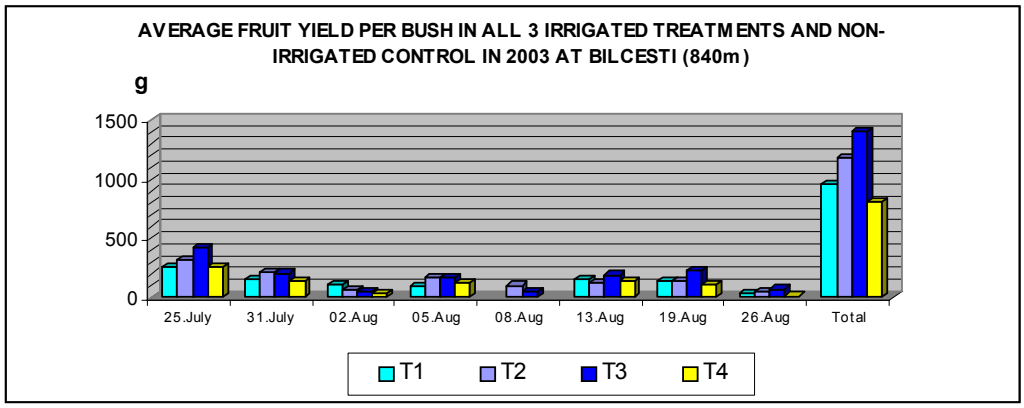

Fig. 4. Average fruit yield per bush in all 3 irrigated treatments and non-irrigated control in 2003 at Bilceşti.

Under 2003 weather conditions, when the 1st irrigation was applied early July, T3 was mostly irrigated recording an average yield of 1400 g per plant followed by T2 with 1183 g per plant (Fig.4.). The difference of 17% between T1-954 g (Fig.5.) and control (815 g) was significantly lower, taking into account the irrigation amount (4 times lower than in T2 and T3).

Having in view the planting system as stripes (3x1x0.8) at 6.250 plants per ha density, the yields were quite good: 5.09 t/ha in the control plot; 5.96 t in T1; 7.40 t in T2; 8.75 t in T3 (Fig.6). The irrigation effect is obviously, recording a yield increase of 0.9-3.6 t/ha. The plant response was shortly and the yield increase was obtained by loss of dehydrating fruit and also by berry size increases.

Fig. 5 Drip irrigation

Fig. 6 Sprinkle irrigation per band

In the irrigated treatments the berries were larger than in the control. Therefore, according to the average index, the berry size was 1.34g in T2, 1.30g in T1 and 1.18g in T3 vs. 1.07g in the control. At the first 3 pickings the fruit were bigger (1.40-1.64g in all treatments) the size going down below 1g at the last picking (Fig.7).

Also, the dry weight of berries was influenced by irrigation. In T3, were the highest yield was recorded, the dry weight had the lowest percentage – 12.4 %. Between T2 (13.7%), T1 (14.1%) and control (14.5%) the differences were lower. This one-year period investigation did not allow getting into deeper details on the irrigation effects. Therefore, in future the steady will approach the time of application and the optimum irrigation amount.

Fig. 7. Blueberry fruits in the 3 irrigation treatments and control 31.07.2003 and 26.08.2003.

Personally I believe that the poorer results recorded with the drip irrigation are due to lower water amounts applied. In future it is regarded not only the effective irrigation techniques bat also the economic aspects like the investment costs, plantation operation and equipment feasibility.

CONCLUSIONS

1. The investigations conducted at Bilceşti over a 30-year period have shown that even if the rainfalls attained annually 740mm on the average, due to an unbalanced distribution, the blueberry crop is affected by water shortcomings.
2. To solve to water supply matter, an experiment (Blueray cv.) with 3 treatments and 1 control was started.
3. Although in 2003 before and during the ripening season the rainfalls recorded 186.4mm, 4 irrigations of 28 and 137 cm/ha were applied, providing an increase of 0.9 and 3.6 t/ha vs. the control (5.09t/ha).
4. In all irrigated treatments the fruit were bigger (1.27g-1, 18g) vs. the non-irrigated control 1.07g) but the dry matter was a little lower (12.4% in T2 and

14.1% in T1) vs. 14.5% in the control.

5. The results of the first irrigation studies in an area with average rainfalls over 740mm have emphasized the fruit yield increase in case of blueberry crops; that may be true for other fruit species, particularly for those with a superficial rooting system.

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ASPECTS ON THE IMPACT AND CONTROL OF PEAR FIRE BLIGHT UNDER BILCEŞTI CONDITIONS

CRISTINA BĂDESCU

Key words: *Erwinia amylovora*

SUMMARY

The studies have been carried out in a pear orchard (Cure′CV.) grafted on quince and established in 1994. Six control treatments were tried. The climatic conditions in 2003 were generally favourable to this pathogen (*E. amylovora*) spreading. Although, in spring the infection spots were removed, in late May and early June the infection was rapidly spread. The attack frequency ranged from 4.76% to 20.48%. The intensity was rather different, between 3.33% in the treatment 1 and 56.48% in the untreated control. The attack level was between 0.48 % (T1) and 6.34% (T2) being levelled than in case of control (12.03%). Among the control schemes, those applied in T1 and T2 were mostly effective (95.76% and 87.32%) respectively, however, their use did not succeed stopping the spread of this pathogen. Having in view the danger caused by this pathogen it might be possible that in the future the pear orchards are entirely killed if the authorized organizations did not take severe control measures.

INTRODUCTION

In the early 90′s, the first symptoms of fire blight were signalled in the fruit area of Dâmbovița Valley. Unfortunately, the attack has rapidly spread and in two years all the quince trees were damaged. Due to a lack of the quarantine measures the fire blight was rapidly spread in Muscel fruit area and at the moment it is a major hazard for the majority of the pear orchards. This phenomenon was favoured by the high percentage (90%) of Cure′CV which is susceptible to this disease. Having in view the high yields recorded in the past (over 4,000 tons in Muscel district, 1935-1938) and some years ago (1986- 1989), 11,000-14,300 t/year in Argeş district, control measurements were taken in order to prevent this disease spreading off.

MATERIALS AND METHODS

The investigations were carried on in a pear orchard (Cure′CV.) grafted on quince and established in 1994. Six control schemes for each treatment including one row of 52 trees were tried. The chemical applications and specific cure practices were done. The results were compared to the control where only cure methods were involved.

RESULTS AND DISCUSSIONS

After the cure practices in late March and early April were performed cutting the sick shoots infected in August, one year ago, then the phitosanitary applications were effected (Table1.). The climatic conditions were favourable to *E. amylovora* spread. After the rainfalls had been scarce in February and March (in 2003, the total rainfalls were 50% lower than average over 36 years 1966-2002), in April and May they reached a normal amount (Fig. 1). The rain amounts (43.0 mm) in April and (76.4 mm) in May favoured the spread of this pathogen mostly where the rainy period was simultaneously with rather high temperatures, unusually for this month. Under the circumstances, in April only a few infected spots were found but in late May and early June, the infections had rapidly spread.

Table 1.The treatments involved to control *E. amylovora* in a pear orchard (Cure′CV.) grafted on quince and established in 1994 at Bilceşti, 1st semester of 2003

Date	Application I	Application II	Application III	Application IV
	23 April	5 May	20 May	30 May
V1	Kocide 0,3% ,US1 0,2%	Kocide 0,3%	Kocide 0,04% , US1 0,2%	Kocide 0,04%
V2	Novozir 0,2%, US1 0,2%	Novozir 0,2%	Novozir0,04% , US1 0,2%	Novozir 0,04%
V3	Aliette 80WG 0,3% ,US1 0,2%	Aliette 80WG 0,3%		
V4	Alcupral 0,3% , US1 0,2%	Alcupral 0,3%	Alcupral 0,04% ,US1 0,2%	Alcupral 0,04%
V5	Funguran 0,3% , US1 0,2%	Funguran 0,3%	Funguran0,04% ,US1 0,2%	Funguran 0,04%
V6	Blinght Ban 0,04%	Fire Ban 0,27%		

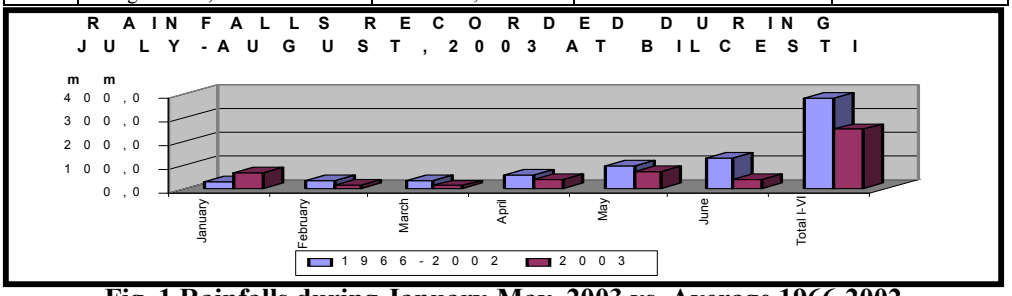

Fig. 1.Rainfalls during January-May, 2003 vs. Average 1966-2002

Due to lack of some laboratory methods, the field investigations and observation in June were utilized in finding the attack level and application efficacy. Following those observations, one could see that the infections were visible both in the treatments and untreated control. The infected trees were unevenly grouped in the two treatments, *Erwinia amylovora* being visible only in one replication. Only in 2 treatments of 7, the infection was visible in all 3 replications. The infection level was scored on 1-7 scale, most trees not showing symptoms and the disease intensity of the

damaged trees was between 3 and 5. The attack frequency varied from 4.76% to 48%. The untreated control was less damaged (average index, 16.20%) than T4 and T2 with a frequency of 17.46% and 20.48% (Table 2.).

Fig. 2. Cure′ pear, over 90%. damaged by *E. amylovora* in July 2003

Fig. 3. Cure′ pear damaged by *E. amylovora* before and after cure practices (July 2003).

If the damage frequency related to the average index per treatment was pretty close, the intensity has ranged from 3.33% (T1) to 56.48% (untreated control). In the other treatments the average intensity was 11.07% (T3) and 33.33% (T5) – table 4. Within the same treatment, the attack intensity per tree showed no difference from 2-3% to 100% (Fig.2). A total damaged was noticed in 3 of the 6 treatments.

Table 2. The pathogen frequency and damage intensity caused by *E. amylovora* in a pear orchard (Cure′CV.) established in 1994 at Bilceşti where 6 control treatments were utilized (April-June)

No.	Treatment	RI		RII		RIII		Average	
		AF	D I	AF	D I	AF	D I	AF	D I
1	V1	0.00	0.00	14.29	10.00	0.00	0.00	4.76	3.33
2	V2	21.43	12.67	40.00	40.75	0.00	0.00	20.48	17.81
3	V3	0.00	0.00	38.46	33.20	0.00	0.00	12.82	11.07
4	V4	14.29	6.50	21.43	66.67	16.67	10.00	17.46	27.72
5	V5	0.00	0.00	16.67	25.00	11.11	75.00	9.26	33.33
6	V6	6.67	10.00	9.09	10.00	22.22	15.75	12.66	11.92
7	Control	0.00	0.00	7.69	100.00	40.91	69.44	16.20	56.48

AF - Attack frequency (%) DI - damage intensity (%)

It is interesting that the damage was visible in spots. In the same treatment (1-2 replications), the symptoms were not obviously but in the 3rd replication, the frequency and intensity had high values. In the untreated control (average intensity of 56.48%) the damage was mainly in the 3-rd replication. Practically, the trees, starting with no. 30 to no. 40 in the 2-rd replication were damaged. Of the 15 trees of this row, only 6 did not show any symptoms.

It is alarming that although all the damaged trees had been removed last year, this year the trees are entirely or 80-90% damaged (Fig. 3.). That can be seen in the control treatments where the strict applications have been for two years.

The attack level when the frequency was relatively low and intensity medium was very low in all treatments of all 6 treatments, only in T2 and T4, the attack values went over 5% reaching 6.34 and 5.63 % respectively. The highest value was recorded with the untreated control (12.03%), a double value versus the other treatments (Table3).

Table 3 Attack level of *E. amylovora* in a pear orchard (Cure′CV.) established in 1994 at Bilceşti following the management control during April-June

No.	Treatment	Attack level			
		RI	RII	RIII	Average
1	V1	0.00	1.43	0.00	0.48
2	V2	2.72	16.30	0.00	6.34
3	V3	0.00	12.77	0.00	4.26
4	V4	0.93	14.29	1.67	5.63
5	V5	0.00	4.17	8.33	4.17
6	V6	0.67	0.91	3.50	1.69
7	Control	0.00	7.69	28.41	12.03

The most effective treatments proved to be T1 and T6, where the efficacy was 95.76% and 87.32% respectively. The lowest efficacy in fire blight control (only 32.25%) was recorded in T4.

Our investigations in the past two years have shown that *E. amylovora* is very hazardous for the pear orchards in Muscel County. It is very difficult to manage this problem especially when the private farmers do not take any measures even if 50% of trees are damaged.

CONCLUSIONS

1. The weather conditions in May 2003 (high rainfall amount and hot temperatures) favoured the spread of *E. amylovora*.
2. In all treatments, the attack level was 6.34% versus the control with 12.03%.
3. Although in T1 the attack percentage was 0.48% we can not ascertain that the pathogen was entirely controlled.

4. Among the control schemes, T1 and T6 were mostly effective (95.7% and 87.3% respectively)
5. Having in view the rapid spread of this pathogen and lack of strict control measures, the breeding of new tolerant cultivars should be done simultaneously to a safe control management as well as governmental quarantine measures.

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RESEARCH REGARDING THE INFLUENCE OF CONDUCTING MODALITY UPON PRODUCTIVITY OF SOME APPLE CULTIVARS

BĂRBAT NICOLETA LAURA

Key words: productivity, apple

SUMMARY

The researches were done during the period 2000-2002 within the experimental field of the Fruit Growing Department, University of Agronomic Sciences and Veterinary Medicine of Bucharest. Florina and Prima apple trees, which were conducting in four crown forms, represented the biological material: Solen, Solen with two branches, structured Ax and Free Palmetta.

The results of these studies showed that the highest productive potential was found on structured Ax (18.4 kg/tree on Florina and 17.2 kg/tree on Prima) and the smallest productivity were registered on Free Palmetta (6.2 kg/tree on Florina and 6.4 kg/tree on Prima).

MATERIAL AND METHOD

For these researches Florina and Prima varieties were analyzed since they are immune to *Ventura inequities* and tolerant to *Podosphaera leucotricha*.

Prima is an American variety, which was obtained from *Malus floribunda* 84 and Rome Beauty, Golden delicious, Melba, Red Rome, Stark, and Wealthy. This apple tree is vigorous when is in grafting with a vigorous rootstock. Florina is a French variety, with small vigour and appreciated tasteful qualities.

The trees have been planted 7 years ago, on a distance of 4/2 m. From the beginning the trees were conducted in four new crown forms, which were inspirited from French fruit growing.

During the research period we determined: the trunk's growth rhythm, the branch's growth rhythm, flower's pollinated capacity, trees productive potential, a.s.o.

The crown was easy to form and the trees height was stopped to 1.7 m from the soil level.

RESULTS AND DISCUSSIONS

The most important results are presented in the following tables:

Table 1 -The presence of the branches in the crown (average years 2000-2002)

Variety	Solen	Solen with two branches	structured Ax	Free Palmetta
Prima	11.66	10.66	21.33	15.66
Florina	12	9.66	15.66	17.33

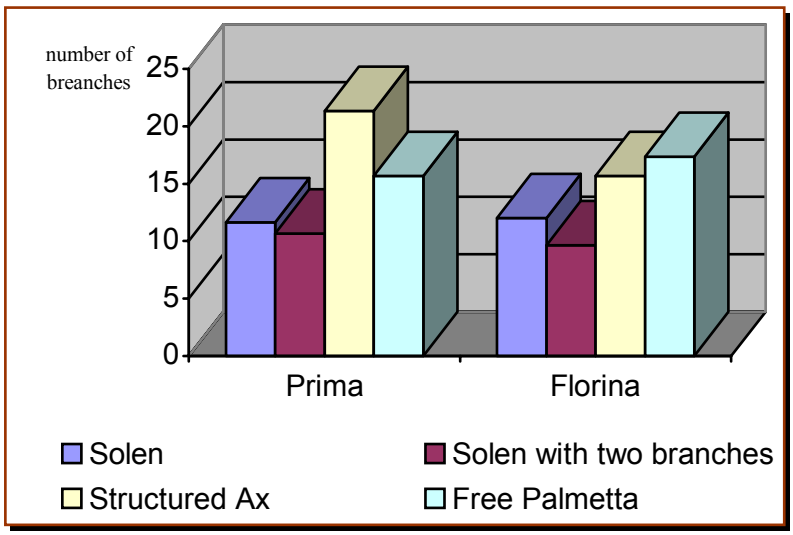

Figure 1 - Number of branches

Table 2 - Flower's pollinated capacity –2002

Crown form	Variety	Nr. flowers/ inflorescence	% Flower's pollinated capacity
Solen	Prima	4	62.5
		5	66.6
	Florina	3	100
		4	50
		5	80
Solen with two branches	Prima	5	80
	Florina	3	66.6
		6	80
Structured Ax	Prima	3	100
		4	50
		5	70
	Florina	4	75
		5	60
Free Palmetta	Prima	3	50
		4	50
		5	60
	Florina	3	77
		4	75

Table 3 - Productive potential (kg/tree)

Crown form	Florina			Prima		
	2000	2001	2002	2000	2001	2002
Solen	0.8	4.7	15.8	1.2	6.8	16
Solen with two branches	0.4	8.2	13.1	0.45	5.7	14.1
Structured Ax	1.1	11.4	18.4	0.9	10.8	17.2
Free Palmetta	1.3	4.1	6.2	1.8	3.8	6.4

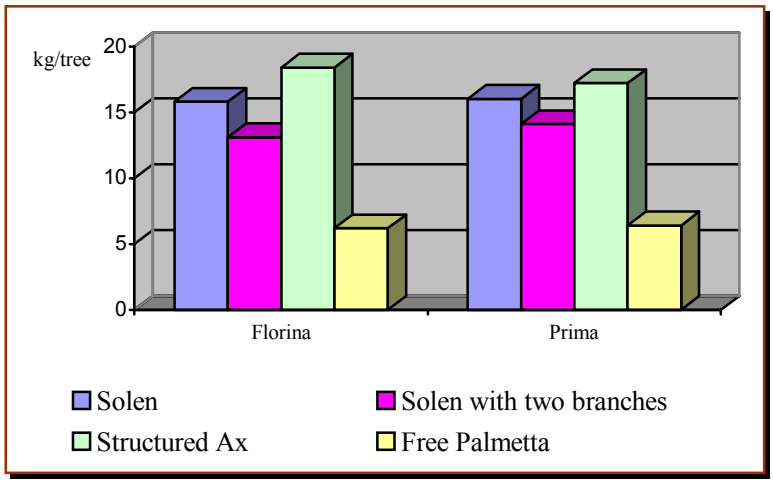

Figure 2 - Productive potential on Florina and Prima varieties

CONCLUSIONS

The observations referring the trunk's growth rhythm, the branch's growth rhythm, flower's pollinated capacity, productive potential of trees etc. shows interesting data, which are different from a crown form to another.

In the first three years from the first fructification, the highest productivity on Florina was obtained at Structured Ax – 15 kg/tree, and the smallest at Free Palmetta – 6.2 kg/tree.

Prima variety accomplished the highest production at Structured Ax – 17.2 kg/tree and the smallest at Free Palmetta – 6.4 kg/tree (Table 3).

The fruits were qualitative superior and had a good resistance at storage.

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COMPARATIVE STUDY OF APPLE TREES DEVELOPMENT IN THE NURSERY

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Key words: nursery, scion, rootstock

SUMMARY

The quality of material seedlings obtained through grafting is expressed through: aerial part height, bud's viability, stock and scion diameters in the grafting point, the roots size and the degree of root system embranchment.

Persistent analysis effectuated to Pioneer variety emphasized the fact that rootstock M.106 favourably influenced the trees grafted height, so there were obtained heights of 125 to 160 cm.

In the case of Florina variety grafted on rootstock M.106, the trees aerial part registered bigger growths, despite the more reduced vigour of this variety (145-210 cm).

MATERIALS AND METHODS

For these researches Florina and Pioneer apple varieties were analyzed, both grafted on M.106. The trees were two years old when our researches were done and they were obtained by grafting in dormant eye.

The rootstocks were obtained by layering and they have been planted at a distance of 90/15 cm. The scions have been harvested from specialized virus-free orchards.

The experiment was organized in two variants and each variant had three repetitions. For staving off the errors, each repetition had 10 apple trees. The observations were done in the end of second year in the nursery, immediately after nursing the trees.

The quality standard on the root system was verified and observations and measurements were performed regarding the root system, the trees height and the graft and stock diameters. The roots were estimated by their number and length.

Also, the degree of root system embranchment, the bud's viability and the distance between knots were determined.

RESULTS AND DISCUSSIONS

Table 1 - The quality of seedlings on Florina variety

Number of trees		Height (cm)	Rootstock's diameter (cm)	Scion's diameter (cm)	Number of buds/scion
Repetition I	1	200.0	1.80	1.00	56.0
	2	145.0	2.00	1.40	49.0
	3	185.0	1.80	1.30	60.0
	4	195.0	1.80	1.30	66.0
	5	165.0	1.80	1.30	63.0
	6	195.0	1.80	1.30	64.0
	7	170.0	2.10	1.40	63.0
	8	195.0	1.80	1.30	59.0
	9	210.0	1.80	1.40	60.0
	10	180.0	1.80	1.40	54.0
Average		184.0	1.85	1.31	59.4
Repetition II	1	180.0	1.80	1.20	55.0
	2	180.0	2.00	1.40	56.0
	3	175.0	1.90	1.40	52.0
	4	170.0	2.00	1.20	52.0
	5	180.0	2.00	1.30	56.0
	6	170.0	2.00	1.30	52.0
	7	185.0	2.00	1.30	62.0
	8	180.0	2.00	1.30	60.0
	9	185.0	2.00	1.30	64.0
	10	170.0	2.00	1.30	58.0
Average		177.5	1.97	1.30	56.7
Repetition III	1	165.0	1.70	1.20	60.0
	2	170.0	1.70	1.20	66.0
	3	195.0	2.00	1.30	72.0
	4	200.0	1.80	1.30	70.0
	5	195.0	2.00	1.30	63.0
	6	180.0	2.00	1.20	65.0
	7	190.0	1.70	1.20	64.0
	8	192.0	1.70	1.20	66.0
	9	190.0	1.70	1.20	66.0
	10	195.0	1.70	1.20	65.0
Average		187.2	1.80	1.21	64.7

Table 2 - The seedlings quality on Pioneer variety

Number of trees		Height (cm)	Rootstock's diameter (cm)	Scion's diameter (cm)	Number of buds/scion
Repetition I	1	117.0	2.00	1.80	30.0
	2	115.0	2.20	1.50	30.0
	3	147.0	2.00	1.40	45.0
	4	125.0	2.50	1.50	35.0
	5	135.0	2.00	1.50	40.0
	6	150.0	2.20	1.50	50.0
	7	155.0	1.80	1.60	58.0
	8	155.0	2.00	1.70	58.0
	9	157.0	1.90	1.50	60.0
	10	150.0	2.00	1.60	54.0
Average		140.6	2.06	1.56	46.0
Repetition II	1	152.0	1.80	1.60	56.0
	2	150.0	1.80	1.80	54.0
	3	150.0	2.00	1.60	56.0
	4	157.0	1.90	1.80	60.0
	5	160.0	2.00	1.80	62.0
	6	160.0	2.00	1.70	62.0
	7	135.0	1.80	1.60	40.0
	8	152.0	2.00	1.80	56.0
	9	150.0	2.00	1.90	54.0
	10	150.0	1.90	1.80	52.0
Average		151.6	1.92	1.74	55.2
Repetition III	1	150.0	2.00	1.80	52.0
	2	145.0	2.10	1.50	46.0
	3	145.0	2.20	1.40	48.0
	4	115.0	1.80	1.60	30.0
	5	140.0	2.00	1.80	42.0
	6	150.0	2.00	1.80	50.0
	7	145.0	1.80	1.60	45.0
	8	152.0	2.00	1.80	50.0
	9	135.0	2.00	1.80	40.0
	10	140.0	2.20	2.00	44.0
Average		141.7	2.01	1.65	44.7

The data registered in tables 1 and 2 shows that the seedlings of the two apple varieties are corresponding to the quality standard.

CONCLUSIONS

1. By budding are obtaining apple trees which will have adequate development of height aerial part;
2. The rootstock M.106 provides a good embranchment of root system, so the percentage of successful grafting is very high;
3. The average height of the apple trees is between 180 cm on Florina variety and 145 cm on Pioneer variety;
4. No differences were found above and below the graft union, which shows that there is a good affinity between the scion and the stock.

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THE HIBRIDS CHERRY x SWEET CHERRY, POTENTIALS ROOTSTOCK FOR INTENSIVE GROW CHERRY

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DARJANSCHI ADRIANA-MIRELA

SUMMARY

At the end of study we obtained natural hybrids with small vigour between cherry and sweet cherry. Only 16 natural hybrids from all 38 had been retained for complex investigations. The hybrids investigated were 1.12 – 3.75 m high, with either cherry, sweet cherry or intermediary characteristics. We recommend some of them for rootstocks.

MATERIALS AND METHOD

The research was effectuated in 18 years of study. In the first step (1985-1990) we obtained the hybrids between Armonia, Germersdorf, Hedelfinger şi Ulster varieties and Morella, Spaniole and sweet cherry locale varieties.

The second step regarded small vigour hybrids selection (25 hybrids).

The third step consisted in seedling the hybrids in the nursery.

RESULTS AND DISCUSIONS

The natural hybrids were classified in five categories concerning vigour: small vigour, sub middle vigour, middle vigour, high vigour and very high vigour.

The hybrids cherry x sweet cherry 37, 40, 36, 41, 17, 16 have a small vigour (2.05-2.90 m), a very good ramification capacity (5-6 main branches and 8-14 secondary ramifications) and constant fructification.

The hybrids 36 and 40 showed the sweet cherry features (small leaves).

The hybrids cherry x sweet cherry 36, 41, 16, had the mixed features between cherry x sweet cherry (middle fruits branches and lives with intermediary features).

The hybrids cherry x sweet cherry 17 and 43 showed the specific cherry features (grand leaves, middle fruits branches and sweet fruits).

There are many differences between the hybrids regarding the vegetation process start (6-12 days), the blooming time, and the fruits maturity.

Table 1 - The small vigour hybrids cherry x sweet cherry in the 8th year from seedling (2003)

The hybrid	The surface transversal section of the trunk (cm^2)	High of the tree (m)	Permanent branches (no)		Fructification branches (no)		
			Ord.I	Ord.II	Bunch	Middles	Plete
CV.25	1.76	1.10	3	7	121	15	-
CV.18	2.65	1.36	4	6	126	12	-
CV.37	4.32	2.05	5	8	121	-	12
CV.40	4.75	2.18	5	9	123	-	10
CV.36	5.47	2.30	6	12	131	15	7
CV. 41	8.55	2.61	5	12	138	10	12
CV. 17	9.61	2.75	6	14	154	14	-
CV. 43	10.86	2.91	6	12	161	26	-
CV. 16	11.25	2.90	7	14	146	10	30
CV. 6	11.33	3.04	5	12	180	15	-
CV. 28	14.11	3.15	6	10	195	3	-
CV. 38	15.89	3.30	8	10	160	-	45
CV. 10	16.32	3.40	9	13	146	36	-
CV.2	16.89	3.51	9	15	151	10	31
CV.14	17.49	3.68	10	16	160	-	43
CV.23	18.23	3.75	10	13	180	3	-

Table 2 - The hybrids cherry x sweet cherry – rootstock with sub middle and middle vigour in the 8th year from seedling (2003)

The hybrid	The surface transversal section of the trunk (cm^2)	High of the tree (m)	Permanent branches (no)		Fructification branches (no)		
			Ord.I	Ord.II	Bunch	Middles	Plete
sub middle vigour							
CV.15	20.57	3.40	5	18	146	31	-
CV.16	22.21	3.68	6	21	141	26	15
CV.11	29.21	3.77	8	24	173	10	-
CV.29	30.00	3.83	8	21	164	25	-
CV.20	31.15	3.91	11	18	178	3	38
CV. 4	31.40	3.84	9	25	169	32	-
CV.7	32.96	3.88	12	16	179	40	-
CV.18	39.79	3.96	10	25	193	31	-
middle vigour							
CV. 22	40.24	4.10	5	15	186	32	-
CV. 5	41.30	4.15	7	18	196	43	-
CV.16	42.06	4.25	12	36	266	36	15
CV. 8	44.15	4.60	13	31	210	36	-
CV. 37	44.25	4.75	14	38	213	43	-
CV.35	48.00	4.60	15	41	212	30	12
CV.3	49.30	4.71	16	48	206	26	14

Table 4 - The hybrids productive potential cherry x sweet cherry (the 8th year from the seedling)

The hybrid	The fruits yield kg/tree	The productive index	The dominant features of the tree C/V
CV.25	-	-	C
CV.18	-	-	C
CV.37	2.31	0.53	V
CV.40	2.05	0.43	V
CV.36	3.40	0.62	C/V
CV.41	3.04	0.32	C/V
CV.17	3.21	0.33	C
CV.43	3.81	0.35	C
CV.16	34.3	0.30	C/V
CV.6	4.05	0.35	C
CV.28	4.75	0.33	C
CV.38	5.20	0.32	V
CV.10	3.40	0.20	C
CV.2	4.70	0.27	C/V
CV.14	6.53	0.37	V
CV.23	6.41	0.20	C

C = Cherry
V = Sweet cherry
C/V = Cherry / Sweet cherry

CONCLUSIONS

1. The hybrids cherry x sweet cherry with small vigour are very different regarding the morphological features and the productivity potential.
2. In the next period the compatibility between the rootstocks obtained and different sweet cherry varieties will be tested.

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THE IMPLEMENTATION OF HACCP (HAZARD ANALYSIS AND CRITICAL CONTROL POINTS) SYSTEM ON CONCENTRATED FRUIT JUICES TECHNOLOGY

CHIRA A.

Key words: food safety, hazard

SUMMARY

HACCP is the abbreviation for the English expression „Hazard Analysis and Critical Control Points".

To obtain high-quality products-capable of meeting the consumers' demands and complying with the European standards, it is recommended the certain risk-prevention and control methods should be applied.

In the horticultural product industry, the application of a HACCP system allows the identification of the technological process key-elements. The system analyses the hazard related to the concentrated fruit juice and the process, indicating the critical control points to the hygienic quality of the product.

INTRODUCTION

On the producer-user line (from manipulation to processing) there are a high number of factors that can affect fruits quality. Considering these products as primary product for the juice industry or as finite product in the case of their fresh consume, there are major preoccupations regarding the pesticides level and others chemical contaminants (fertilisers), as well as hygiene preserving during harvesting, manipulation, processing and storage. To reduce these risks, it is necessary for both the small producers, and the high-specialised companies, to apply prevented methods as HACCP type and not those based on the end control of products (that can affect the consumer healthy) and can induce significantly economical losses.

MATERIALS AND METHODS

The fruit concentrated juice has been obtained by an automated technological flux, with the aid of the KEMA equipment, using fresh fruits (apples from cultivars: Jonathan, Golden Delicious, Cretesc, Starking, etc.), having as destination, their industrialisation.

A HACCP study was performed based on the following working stages:

1. the presentation of the specifications about product;
2. the production technological flux description;
3. the potential risk identification and evaluation;
4. the critical control points (CCP) determination;
5. the critical limits fixation;
6. the monitorisation of the CCP parameters;

7. corrective actions, practised if the critical limits in CCP have been excelled;

The laborious study was finished by HACCP Plan elaboration, a base document, which represents a guide to follow, with a view of maintaining under control the relevant risks that could affect the concentrated fruits juice hygienically quality.

RESULTS AND DISCUSSIONS

Risks identifying during the fruit concentrated juice manufacture concerns especially: pesticides residue provided with the fruits, as a consequence of the phytosanitary treatments, nitrates provided by the excessive fertilisation and micro-organisms (yeast, moulds) presented on the fruits or on the technological equipment, because of the inadequate hygiene.

As a consequence of this study, there three Critical Control Points were identified:

- Primary matter reception, for the risks generated by the pesticides and nitrates;
- Brut juice pasteurisation, for the risks generated by yeast and moulds;
- The concentrated juice storage, for the risks generated by yeast and moulds.

Data presented in Table 1, emphasis that for these risks, the critical limits were established and the specifically parameters (product quantities, temperature or NTG) were controlled.

HACCP system, predicts also the critical limits surpass situation, therefore, there were predicted the corrective actions too, in order to determine the effect removing and the elimination of the causes which generated the manifested risk.

To assure the product traceability on the entire production and commercialisation circuit, it acts to register in specifically forms, which are useful as well to HACCP system revision.

To apply the HACCP Plan, as it was realised, the relevant risks have to be maintain under control, for the alimentary security of the fruits concentrated juice and to grant an adequate product for the people consume.

CONCLUSIONS

1. On the fruits concentrated juice technological flux production, three Critical Control Points were identified: at primary matter reception, at brut juice pasteurisation and at the concentrated juice storage.
2. The established monitorization system allows maintaining the relevant risks under control, for the hygienically quality of the analysed product.

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Table 1 - HACCP plan

No	Process step	Relevant hazard	Characteristics	Critical control point	Critical limits	Monitoring			Corective actions	Records
						Responsibility	Frequency	Methods		
1	Raw material reception	-pesticide residue -nitrate	-lindan -diazinon -diclorvos -etion -paration -NO_3	CCP 1	< 1 mg/kg < 0.3 mg/kg < 0.1 mg/kg < 0.5 mg/kg < 0.5 mg/kg < 60 mg/kg	Laboratory technician	2 week before provide	STAS 112497/86	Interrupt contract	-Analysis bulletin; -Survey report
2	Juice pasteurisation	-yeast -mould	-pasteurisation temperature	CCP 2	>90°C	Operator	permanent	Automatic records	Equipment check	-Pasteurisation report
3	Concentrated juice storage	-yeast -mould	-yeast determination -mould determination	CCP 3	< 100/ml < 100/ml	Biologist Biologist	-Every month -At delivery	Yeast medium culture	-repasteurisation -change of destination	Storage report

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THE EFFECT OF WINTER PRUNING ON THE YIELD OF CHESTER THORNLESS BLACKBERRY

LENUŢA CHIRA

Key words: floricane, buds, yield, blackberry

SUMMARY

Five-year-old Chester Thornless blackberry (*Rubus* sp.) plants were pruned, during the dormant period, to three floricanes with three, six, nine and twelve node lateral branches in order to determine the effect of lateral branch on bud-break, fruit cluster number, fruit number per cluster, fruit weight, total soluble solids (TSS), and yield level.

Percent bud-break of primary and secondary axially buds was reduced as the lateral branch number increased. Pruning did not affect weight (6g) or TSS (9.3%).

Yield per lateral branch was reduced as lateral branch number increased. A plant with three floricanes, each with 12 lateral branches produced 22.5 kg of fruit.

The results indicate that pruning lateral branches to a manageable length may be advantageous for thornless blackberry trained on double fence system.

INTRODUCTION

Thornless blackberries are highly productive and vigorous. The yield of blackberries is dependent, in part, on the number of nodes (buds) left on the floricanes after winter pruning. Reduction the floricane number and / or shortening the lateral branches by winter pruning will generally decrease yields but often improve fruit quality in raspberries and blackberries (Chandall and Daubenny, 1990; More and Skirvin, 1990). However we observed that node number was not always correlated with yield because not all primary and secondary buds produced a flowering shoot.

Improved knowledge about the relationship between node and number distribution and yield will help to determine the best pruning method necessary for the blackberry support system used.

Thornless blackberries have a semierect habit and require systems support.

This experiment was conducted in order to determine the effect of pruning severity on vegetative and reproductive growth characteristics of Chester Thornless blackberry trained to double fence system.

MATERIAL AND METHODS

Five-year-old Chester Thornless plants were planted in rows by 100 m length and trained by double fence system. The experiment was made in Bucharest area.

During the dormant period, the floricanes number on lateral branches was reduced, being retained three, six, nine or twelve node lateral branches per each

three floricanes. In all cases, equal numbers of lateral branches were in the top, middle and bottom one-third of each floricane.

During blooming period, in mid –May 2002, the number of fruit clusters (racemes) per lateral branch and their origin (primary or secondary axially bus) were recorded. In June, fruit and flowers on all the racemes were counted.

For yield and fruit quality determination, all ripe fruit on selected lateral branches, one each at the top, middle and bottom one-third portions of the floricanes, were handpicked, counted and weighed, at 2 to 3 intervals a 6 –week period, starting on 10 July.

To calculate the yield for the number of lateral branches in the section and the weights from the three sections summed.

Fruit were pooled for each plant and juice expressed through cheesecloth for total soluble solids (TSS) measurement with a refractometer Abbe.

RESULTS AND DISCUSSION

Pruning to 12 lateral branches decreased primary and secondary axillary buds emergence compared to three lateral branches (Tab. 1). As a result, the number of racemes per lateral branch decreased as lateral branch number increased (Tab. 1). A significant reduction (40%) in yield per lateral branch occurred when the number of lateral branches increased from three to twelve (Tab. 2), thus resulting from fewer racemes per lateral and fewer fruit per racemes (Tab. 2). Yield per floricane or plant was correlated with the number of lateral branches since the lateral branches number increased resulted in more axillary bud-break (Tab. 1).

However, yield per floricane was not directly proportional to the number of potential flower buds on the floricane.

The lack of an equivalent reduction in yield per floricane seems to be due to compensation by remaining nodes and secondary axillary buds in severely pruned floricanes, increased budbreak and fruit numbers per raceme (Tab. 1 and 2).

Pruning severity did not significantly affect either the TSS concentration (9.3%) or fruit weight (6 g).

In all treatments, ripe fruits were harvested over a 6 to 7 week period (data not presented). Most fruits on lateral branches at the top one-third of the floricane ripened in the first 2 weeks. After that, yield declined during the following 5 weeks. Fruit harvestings in the middle and bottom one-third section peaked in the third week and gradually declined.

Table 1

Effects of pruning severity of yield components of „Chester" thornless blackberry

Racemes/ no. of laterals	Nodes/ floricane	Racemes from primary buds	Racemes from secondary buds	Total racemes
3	35	10.8	2.5	13.3
6	60	11.0	1.8	12.8
9	90	9.2	1.4	10.6
12	139	8.8	1.0	9.8

Table 2

The relationship between winter pruning of the floricanes to three, six, nine and twelve lateral branches

Yield/ No. of nodes	Fruit weight - g-	No. fruits/ raceme	Yield/floricane - kg -	Yield/lateral - kg -
3	6	11.3	3	0.90
6	6.2	11.4	4	0.75
9	6	9.8	7	0.75
12	6	10	7.5	0.65

For plants with only three or six lateral branches per floricane, there was a small increase in yield late in the season, due primary to the delayed maturation of fruits on the racemes originating from secondary axillary buds. The difference in growth and developmental process, such as floral bud differentiation and bud-break, between secondary and primary axillary buds at a node, can be as much as 2 or 3 weeks (Takeda, 1987).

CONCLUSIONS

1. The results of this experiment suggest that pruning can affect the nodes fruitfulness, and this may influence the maturity range.
2. The racemes size (number of flowers or fruit per raceme) can be reduced if plants are lightly pruned. Severe pruning invigorates the fruiting lateral to produce larger racemes and increase the percentage of total yield derived from secondary axillary buds.
3. The results demonstrated that the light pruning (ex. leaving 12 lateral branches / floricane) did not reduce yield, but decreased the raceme size and fruiting laterals that developed from secondary buds.

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PHENOLOGICAL AND CLIMATIC SIMULATION ON THE APPEARANCE OF DAMAGES CAUSED BY LATE FROSTS IN PLUM CULTIVARS IN ROMANIA

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Key words: late frost, plum, simulation

SUMMARY

The study is an attempt of uncertain estimation, which accompanies the damages in the orchards due to late frost and it uses the probability theory. In this study we considered that this climatic accident occurs only in case of simultaneous appearance of phenophase and temperatures below critical values. It is found that in Mărăcineni area (5 km far from Piteşti), once in 22 years the yield could be ruined due to late frosts between 21 and 25 of April. To extend the applicability field of these studies for areas with no phenological observations, a package of multiple regression equations is settled, which can simulate the phenology dynamics till the end of plum blooming. The input data of the model are the daily average, minimum and maximum temperatures, starting with February 1st. Those are changed in 24 hours temperatures, by means of two original sinusoidal functions and taken over by regression equations, which every 5 days generate the beginning date of phenophase. Estimate precision of phenological dynamics is very high, the maximum deviation being not longer than two days. Phenological data calculated for tens of years, stand for the representative sample in settling the functions of cumulative frequency. By multiplying the phenological cumulated frequencies for 5 days and appearance probability of minimum temperatures below critical values, the damage probability may be calculated. This methodology is computerised.

INTRODUCTION

In literature, the most probable abiotic stresses affecting orchards are drought, excess soil water, low soil fertility and low temperatures during both winter and early spring when trees start their annual growing season. Other stress types have a biocenotic nature, like plant diseases, insects' attacks and the competition between trees (Kozlowski et al., 1991). More papers were consulted in order to asses the critical temperature thresholds: Zhang and Thicle, 1992, etc. Late frosts are usually very difficult to control and they are characterized rather as hazardous. In the continental-temperate climate from this country, late frosts sometimes affect fruit trees by damaging flowers, especially within intensive orchards. In order to avoid such climatic accidents by both proper zoning and specific control methods scientists tried to create and improve methodologies describing the phenological evolution of fruit trees (Snyder et al., 2000; Hakkinen, 2000 and Linkosao, 2000). Such technologies were based on totalising mean daily temperatures above the "biological plant threshold". The purpose of this paper was to elaborate a new method described by a simulation model that estimated, with a fairly good precision, the phenological dynamics till the end of blossom in plum.

MATERIALS AND METHODS

A database of phenological observations written in EXCEL program was used for the bud burst, the green tip and the early blossom as well as the petal fall on plum (Tuleu gras cultivar) orchard for a period of 31 years (1969-1976 and 1981-2003) together with weather data taken from a larger period (1969–2003). Mean, maximum and minimum daily temperatures were processed for this 35-year period. Phenological observations were taken on other 22 plum varieties within 1999 – 2003 period (5 years).The critical temperatures for this fruit tree species were: (-7.5°C) for bud burst, (-3.5°C) for green tip, (-2°C) for the early blossom and (-1.5°C) for the petal fall. From the climate point of view, this region was characterized as belonging to the first class in Romania.

RESULTS AND DISCUSSIONS

In this study the probability concept was defined as a ration between the number of undesired events (flower damage due to frost) and the total number of possible events under the conditions of the region. By multiplying the phenological cumulated frequencies and the probability of occurrence for minimum temperatures below critical values once in 5 days, the damage probability for the crops may be computed according to the following formula usable for not reciprocal-exclusive events (Hunt, 1986):

$$P(SE) = P(F) \times P(T/F)$$

where:

- P (SE) = the probability of the simultaneous occurrence of the two events,
- P (F) = the probability of the phenophase occurrence, and
- P(T/F) = the conditioned probability meaning the possibility of occurrence for some values that were equal or lower to the critical temperatures during the same period as the phenophase.

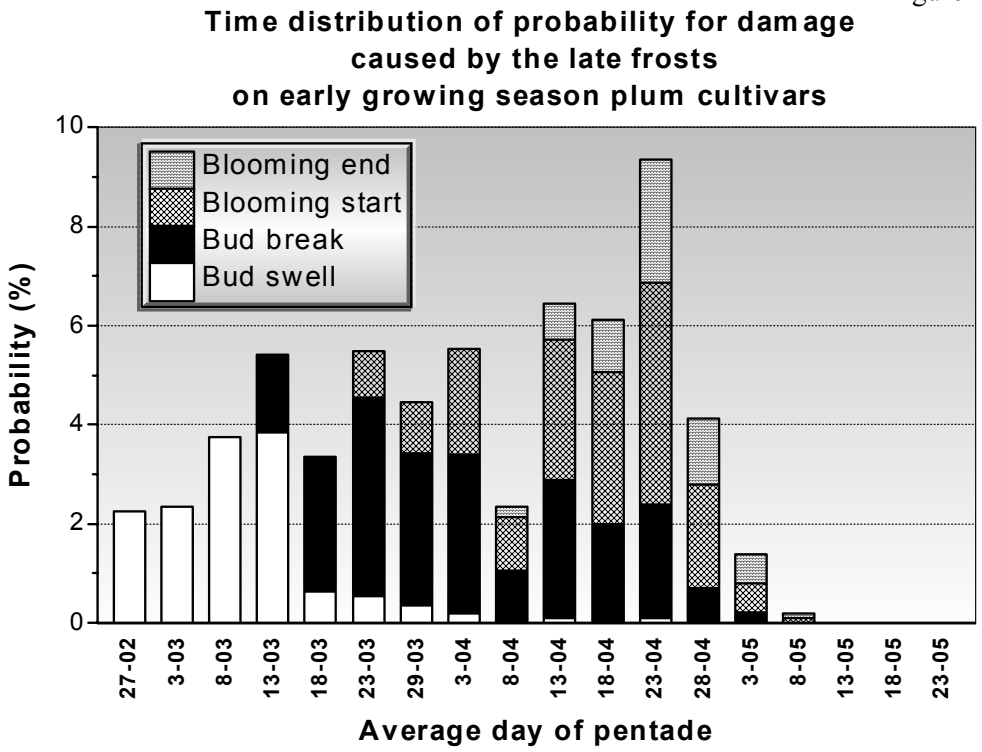
The time interval for calculations (5 days) is adequate to sample data amount (phenological observations in 31 years and 175 daily values of the air minimum temperature). To concentrate the information we have used either functions of normal density probability where the standardization hypothesis was validated (HI^2 or d'Agostino tests), or functions of relative frequency cumulated for the phenophases. Due to a small volume of weather reports, we have included in calculating on standard deviation estimation of the original population, at the upper limit of trust interval (a = 0.95).

According to the information in this area we have chosen the following critical temperatures for plum: - 7.5^{o}C for bud swell, - 3.5^{o}C for bud break – 2^{o}C for bloom start and – 1.5^{o}C for bloom end. Every year, the time differences between phenophases start on plum were low, the maximum standard deviation being 5 days for bud swell and only 2 days for bloom beginning. However, for analysis we have chosen two cultivar groups: earlier blooming April 10 (Early Rivers, Ruth Gerstetter, Silvia, Centenar, Ialomița, Diana, Vision) and later

blooming – April 15 (Vânăt românesc, Tuleu gras, Dâmbovița, Tuleu timpuriu, Blue free, Gras ameliorat). The fluctuation of blooming time was much longer, over a month (standard deviation of 10 days) related to the year investigated.

Organs figure 1 – The earlier growing season cultivars - flower were hazardously subjected to frosts on March 21 – 25 (P = 3.69%) and on April 21 – 25 (P = 4.46%) when once in 22 years the yield might be damaged. Characterizing the phenophases over longer periods (figure 1) one can see that their ongoing is partly superposed. To estimate the global risk, a major indicator for the zoning, we have summed up the damage probabilities specific to each vegetative phase.

Figure 1



With such information, is possible to have species and cultivars microzoning but also to find out the risks of yield damage, in some years. The possibility for going on with such studies is limited mainly due to lack of phenological observations. In order to solve that, we have worked out phenological simulators and adjusted them on computer. The equations within this kind of program were determined by using the present correlations between hour sums of constant thermic levels accumulated since February first till simulation time and phenophase start. So, the adequate time interval the hour and a set of original

sinusoidal functions were chosen which can convert the minimum, maximum and mean air temperatures recorded at any weather station into daily thermic values. To find out how these daily temperatures influence the phenological dynamics we had to sum them up and correlate them with time interval until the phenophase start. Although the program can make evaluations starting with February 5, every 5 days, the first precise simulations (multiple determination coefficient over 50%) for the bud swell could be done since February 28, for bud break since March 5 and for blooming since March 10. For zoning, the data of phenophase start estimated over decades by these simulators on the calculation basis for the functions of cumulated phenological frequencies. By their means, one can set the probability of damage caused by late frosts on plum as we did for Mărăcineni area.

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A NEW CLASS OF MULTIFUNCTIONAL FOLIAR NUTRITIVE PRODUCTS

VIORICA CHIŢU, E. CHIŢU, ADINA PERIANU, F.C. MARIN, ANIŞOARA HORO ROI, MIHAELA CALOGREA, L. FILIPESCU

Key words: foliar fluids, sequential application, multinutrients

SUMMARY

Foliar nutritive fluids are multicomponent products including both well-known nutrients common for liquid fertilizers and a new class of micelle overbasic naphthenates, which bring about growth regulator entities born by carbonation on the leaves surface, immediately after application. Four commercial brands have been formulated to provide appropriate amounts of nutrients at the convenient uptake rates according to the crop development stage. The sequential use of these brands has been tested on three-years base experiments.

INTRODUCTION

Foliar nutritive products are concentrated fluids containing: macronutrients (N+P+K), mezonutrients (Ca+Mg), micronutrients (B+Mo+Zn+Cu+Fe+Mn), biostimulants (naphthenic acids as ammonium and potassium salts) and inorganic fungicides (potassium bicarbonate, copper naphthenates). These fluids are not foliar fertilizers, biostimulants or growth enhancers. These fluids modelled properties match all the required properties of foliar bioactive products inducing vegetative growth and fruit yielding, but the foliar nutrition mechanism is completely changed due to non-ionic transport of active entities through plasma cell membranes by overbasic naphthenates micelles. The new class biological activities are extending over: dormant buds stimulation; fruitlets/flowers ratio; growth enhancing both in fruits and shoots; promotion colour in fruit peel; protection against fungi and other fruit diseases; extended protection against fungi and fruit diseases during the post harvest storage. The main objectives of this paper were: **a)** Modelling properties and composition for a proper sequential application of the foliar nutritive fluids according to the vegetation stage of plants and **b)** Testing the commercial brands capability to sustain growth and yield, associated with quality raise and storage diseases protection.

MATERIALS AND METHODS

Emulsified naphthenic acids in solutions containing urea and potassium hydroxide have been used to prepare overbasic metallic naphthenates. The emulsion control using synergistic mixtures of surfactants make possible the control of foliar fluids properties as well as formulation of different brands on NPK basis formula. Appropriate solvents have been used to differentiate the following

sequential brands: Nutrinaft A (better applied in March and April to provide nitrogen and essential mezzo- and micronutrients to improve crop strength), Nutrinaft B (better applied in May and June to provide less nitrogen and more P_2O_5 and potassium as well as micronutrients to improve crop growth), Nutrinaft C (containing more P_2O_5 and potassium better applied in July and August to improve ripening), Nutrinaft D (containing potassium/ammonium naphthenate, potassium bicarbonate and other components for finishing, better applied in September and post harvest to protect crop).

RESULTS AND DISCUSSIONS

Emulsifying overbasic naphthenates. The master core of the foliar nutritive fluids is made up by hydrolyzed overbasic naphthenates of all the cations used as nutrients. Emulsified naphthenates were the physical support on which the typical foliar products properties have been grafted. The solvent composition was crucial in property control of all brands.

Modelling commercial brands properties. *Solubility and* ***adherence*** are properties balanced by overbasicity of metallic naphthenates. Previous studies show that an overbasicity of 4/1 (molar ratio MeO/naphthenic acids) corroborated with an adequate composition of solvent brings about fair values of solubility and adherence. ***Surface tension***, which controls hiding power and penetration power, was modified by a careful selection of surfactants. Experimental data show that a drop of surface tension was possible when two surfactants (AES and NF10) were mixed in ¼ ratio and concentrations lay in 0.05 – 0.20 g/l interval. ***Control pH and carbonation process***. Initial pH of the concentrated emulsions as well as buffering capacity of nutrient fluids have been modelled by variation of 3 parameters: overbasicity of naphthenates, concentration of ethanolamines and ratio N from ammonia/N from urea and ethanolamines. This part of the experiments showed that the optimum pH of the concentrated emulsions should be 10. At this pH dilution and carbonation of the diluted product allow the brake of the emulsion and spread of the organic micelle film on the leaf surface. Figure 1 shows the pH of the diluted foliar fluids before spreading on the leaf and after the carbonation of the initial emulsified film. As this figure shows, due to the carbonation, the pH of the organic film on the leaf surface is just about 7.1. So, the pH harm of leaf is quite improbable.

Field data. To illustrate the new class of nutritive fluids mechanism of action and how their properties interact with a supposed mechanism, a field experiment was designed in which the pH leaves variation was measured after diluted Nutrinaft C 1/200 was spread on apple tree experimental lot. Figure 2 shows how pH leaves on the Jonathan apple trees drops due to carbonation of the liquid film on the leaves, finally reaching a neutral pH closed to that in figure 1.

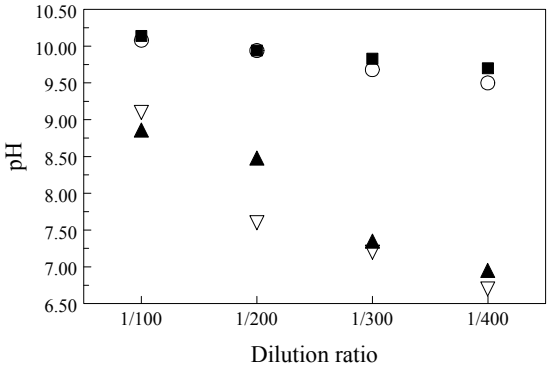

Figure 1. Hydrolysis zone after superficial carbonation of the diluted Nutrinaft B and C products.
○ Nutrinaft B/ maximum pH;
■ Nutrinaft C/maximum pH;
▲ Nutrinaft B/minimum pH;
▼ Nutrinaft C/minimum pH.

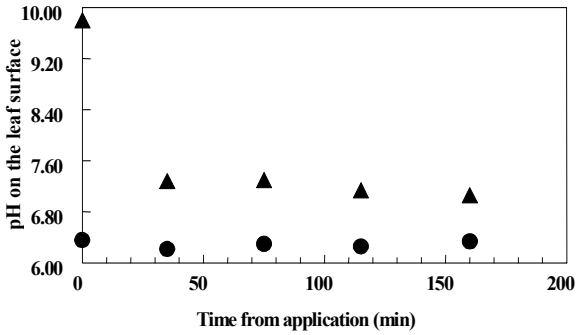

Figure 2. pH variation on Jonathan leaves against time after application
▲ treated
● non-treated

Diluted nutritive fluids action on the leaf. Concentrated emulsions are very stable. When they are diluted, two liquid phases are separated and, when they are highly diluted, the two phases are reciprocally dissolving generating a stable emulsion. Actually, this emulsion is spread at the leaf surface. When the solvent is evaporated, again two liquid phases are generated. The organic phase spreads on the leaf surface and gives birth to a thin and adherent film. The film is dried by evaporation and carbonation and due to the hydrolysis of overbasic naphthenates the organic film brings in a discontinuous micelles structure. Because the organic film is soluble at a pH value higher than 8.0, this mechanism of action excluded overdosage and permits the leaf take as much of nutrients as its capacity to generate alkaline metabolites.

Testing Nutrinaft Products in the field. In each experiment there were 5 variants for each apple variety: V1 – Haifa product; V2 – Nutrinaft treated lot; V3 – untreated (blind lot); V4 – nitrogen treated soil + Nutrinaft treated; V5 – nitrogen treated soil. The Nutrinaft products effect was revealed measuring the following parameters: A. Flower parameters (number of blossoms, number of fruit lets, number of harvested fruits); B. Fruit parameters (fruit production, fruit diameter, fruit weight), C. Quality parameters (fraction of fruit colour surface, fruit firmness, chemical composition), D. Storage parameters (firmness drop during storage, fruit

lost during storage). The effect of Nutrinaft products sequential application is illustrated in figures 3 and 4.

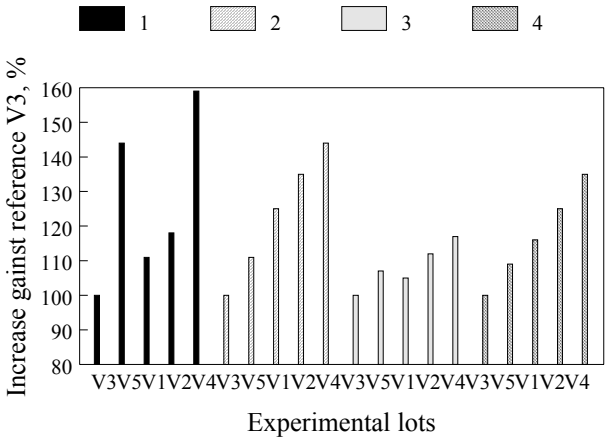

Figure 3. Increase of the annual shoots length (1), fruit production (2), fruit diameter (3) and fruit weight (4), in percent, versus non-treated reference lot V3

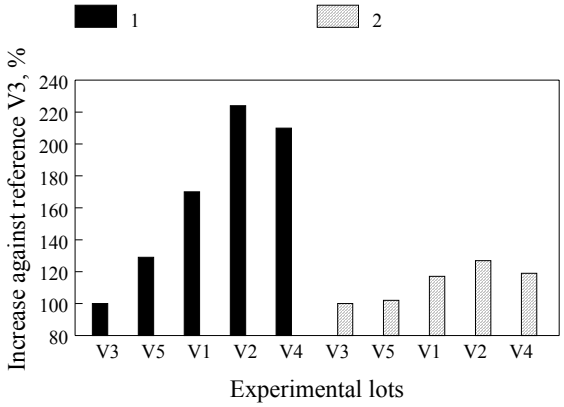

Figure 4. Quality parameter increase versus non - treated reference lot V3. 1-Fraction of coloured surface; 2– Fruit firmness

CONCLUSIONS

1. Nutrinaft products sequential application (A+B and A+C) increases the fruit number harvested per tree demonstrating their fertilizing and growth enhancing activities; 2. Nutrinaft products (A+B and A+C) stimulate the fruit growth at the expense of the annual shoots growth demonstrating their selective growth enhancing activities; 3. Nutrinaft products (A+C and D) provide quality (firmness and colour) and protect crop against postharvest fungi demonstrating their finishing and fungicide activities; 4. Nutrinaft products do not change the chemical composition and, eventually, taste and flavour, of the treated apples.

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PRELIMINARY RESULTS CONCERNING INSECTICIDE ACTION OF SOME PLANT INFUSION

ROXANA CICEOI, PAŞOL P.

Key words: infusion, insecticide action, *Conyza canadensis, Nicotiana tabacum, Melissa officinalis*, aphids.

SUMMARY

Nicotine has been used since time and is the most hazardous botanical insecticide available to home gardeners. Although many books and articles presents the insecticide properties of some plants extracts, infusions, etc. and many recipes are presented, few researches were conducted in aim to demonstrate theirs efficacy.

In this paper we try to establish if infusions made from different plants have the insecticide action that has been presumed. Tobacco and fleabane (*Conyza canadensis*) infusions have an insecticide action. Lemon balm (*Melissa officinalis*) infusion attracts beneficial insects.

INTRODUCTION

Plant derived products have received increased attention from scientists and more than 2000 plant species are already known to have insecticide properties. Natural insecticides (frequently named as "botanicals"), such as pyrethrum, rotenone and nicotine, among others, have been extensively used until recently for insect control [4]. Synthetic pesticides are economically profitable but have some disadvantages: the emergence of resistant insect races, secondary pest outbreaks, problems of pesticide residues and environmental pollution. According to present statistics at least 540 species have developed resistant strains to one or more pesticides [5]. Botanical insecticides have theirs own negatives aspects. For example, the nicotine is six times more toxic than diazinon, a widely available synthetic insecticide sold for control of many of the same pests [3]; we can infect our plants (tomato, aubergine) with *Tobacco Mosaic Virus* if we use tobacco leaf extract [3].

MATERIALS AND METHODS

To verify the insecticide activity of tobacco leaf infusion there were made two tests, one in the laboratory and one in a cold green house.

In the laboratory the aphids (*Macrosiphum sp*.) were grown on potato young shoots. Potatoes were put in a glass jar, in moist sand. When the young shoots exceeded 7 cm, they were artificially infested with aphids. Initial source of aphids was isolated directly from nature. The colonies were multiplied and then used for an artificially infestation.

The insects were counted before and after treatment. The efficacy was calculated with Săvescu – Iacob formula [2], at 24 and 72 h after treatment:

$$E\% = \left(1 - \frac{a_2}{N - M}\right) x100;$$

a_2 = number of living insects after treatment;

N = total number of analyzed insects;

M = total number of insects dead by natural reasons (in approval test).

In the cold green house experiment, the test plants were represented by young grafted apple trees (Starkrimson variety).

The aphid's (*Aphis sp*.) infestation occurs naturally.

The experiment had three variants.

- V_1 – 20 young grafted apple trees treated with tobacco infusion;
- V_2 – 20 young grafted apple trees treated with fleabane infusion;
- V_3 – 20 untreated young grafted apple trees.

After a week all variants were treated with lemon balm infusion.

The number of attacked young shoots and the aphids' colony density were counted.

The attack frequency (F %) and the attack intensity (I %) are calculated with the next formulas [2]:

$$F\% = \frac{n}{N} x100,$$

n = number of attacked plants

N = total number of plants

$$I\% = \frac{\sum(i\,x\,f)}{n},$$

i = attack percent/plant,

f = number of plants with the same attack %

After infusion, the fresh plant material (collected from natural sources) was kept for 24 hours in water.

RESULTS AND DISCUSSIONS

In the first experiment, in laboratory, the average efficacy in 24 hours was 21.7%. After 72 hours 61.1% of insects were dead.

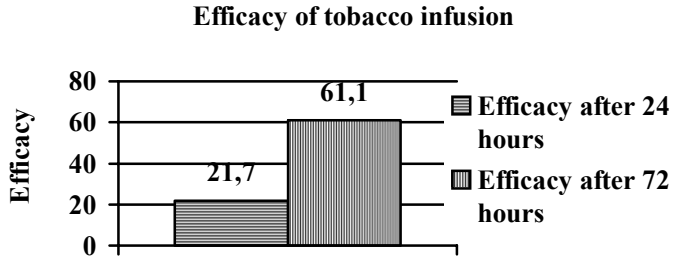
From the table 1 it can be observed that the efficacy/variant vary between 16 and 26% for the first 24 hours and between 49 and 81% for the next 72 hours. These intervals, especially for the 72 hours efficacy, are too large and confirm the fact that the laboratory tests aren't enough to establish the insecticide action of some pesticide, especially insecticide. The result is promising, but the test field must confirm this efficacy. Other test must confirm the absence of secondary effects on the beneficial fauna.

Table 1

The efficacy of tobacco leaf infusion on green aphid, *Aphis spp*

No. of young shoots	Aphids/young shoots before treatment	Aphids/young shoots after treatment		Dead aphids in 24 hours		Dead aphids in 72 hours	
		24 (hours)	72 (hours)	No.	Efficacy %	No.	Efficacy %
1	65	54	31	11	16	34	52
2	71	52	13	19	26	58	81
3	84	69	25	15	17	59	70
4	80	60	35	20	25	45	56
5	54	42	25	12	22	29	53
6	75	51	18	24	32	57	76
7	37	29	19	8	22	18	49
8	79	66	33	13	16	46	59
9	46	37	21	9	20	25	54

Figure 1



In the cold green house test, because the apples infestation occurs naturally, the initial values (before treatment) of the mathematical indicators were very different.

Table 2

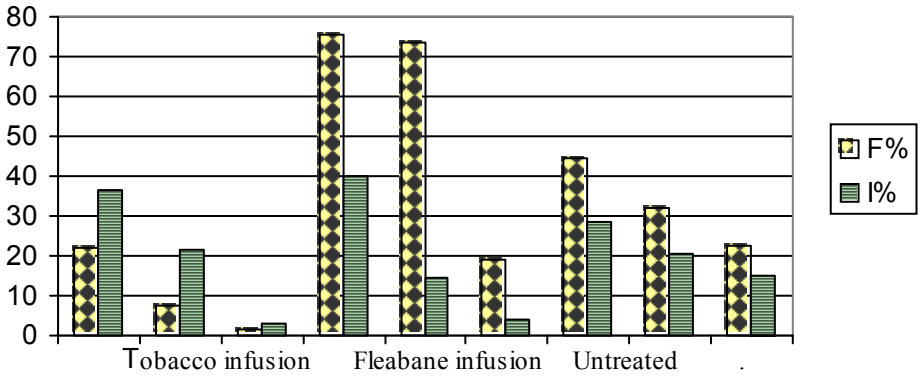
The attack frequency and attack intensity for tobacco and fleabane infusions against *Aphis sp*.

	V_1			V_2			V_3		
	B.T.*	24 h	72 h	B.T.*	24 h	72 h	B.T.*	24 h	72 h
F%	22.25	7.75	1.3	75.55	73.35	18.85	44.35	32.2	22.55
I%	36.4	21.7	3.25	40.15	14.5	4.05	28.5	20.4	14.8

B.T.* - before treatment

Figure 2

The attack frequency and attack intensity for tobacco and fleabane infusions against Aphis sp.



The evolution of these indicators after treatment permits us to establish that the treatments have a useful effect. After 72 hours the frequency in V_1 decrease 17 times, 4 times in V_2 and only 2 times in the approval test. After 72 hours the attack intensity decrease 11 times for V_1, ~10 times for V_2 and only 2 times for V_3.

A week after the treatment with lemon balm, all the insects were dead. On the young apples many beneficial insects were found, especially larvae of *Coccinella septempunctata and Scymnus sp*., adults of *Chrysopa sp.*, and some hymenopterous.

CONCLUSIONS

1. All tests performed in laboratory must be repeated in crop field.
2. Tobacco and fleabane infusions have an insecticide action, but it can be used only at the beginning of an aphids attack.
3. Lemon balm infusions attract the beneficial insects.

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STUDY REGARDING FRUITING PERFORMANCE OF SOME NEWS PLUM TREE VARIETIES GRAFTED ON SOME ROOTSTOCKS, IN ORDER TO IMPROVE THE ASSORTMENT IN OLTENIA HILLS ZONE

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SINA COSMULESCU

Key words: plum tree, assortment, rootstock, variety

SUMMARY

The Oltenia hills zone is characterized through 10.3 – 11.0ºC average temperatures, 500-630 mm rainfall, forest brown – reddish soil, all these conditions being favourable to plum-tree culture.

The results obtained concerning the fruiting precocity, its potential, technological characteristics, chemical composition, fruit organoleptic features, confirm the different value of some new varieties of plum tree grafted on some rootstocks.

The rootstock plays a very important part in growing and bearing fruit-trees. In Oltenia hills zone, plum varieties grafted on Miroval or Pixy rootstocks can be extended.

INTRODUCTION

Plum tree assortment in our country was enriched in last decade through introduction in crop of new remarkable varieties regarding qualitative and production characteristics.

For their extension in Oltenia hills zone, a control is required regarding both biological characteristics, especially fruiting process and productivity, and plant adaptation to the climatic conditions of this area.

MATERIALS AND METHODS

Between the years 1995 – 2001, the control of four new plum tree varieties and two rootstocks was accomplished to S.D.E. Banu Mărăcine, in order to improve and determinate the proper plum assortment for Oltenia hills zone. The trees were grafted on Miroval and Pixy rootstocks, planted to 4 x 4 m distance, lead as vessel - overlap.

The objectives were: finding out fruit precocity, productivity and quality.

RESULTS AND DISCUSSIONS

The results we obtained are discussed in text and shown in table 1. The phases evolution of the generative organs, respective flowering process succession, to achievement among 30 March and 3 April or 22 April and 27 April, (table 1).

The varieties with early flowering were: Valor, Piteştean, and varieties with tardily flowering were Pescăruş and Anna Spath. We observed that Pixy rootstock retarding beginning flowering comparative with Miroval rootstock.

The fruit maturation is differentially, realised between 14 July (Piteştean) and 4 September (Anna Spath).

The varieties group with middle maturation comprehend varieties: Valor, Pescăruş. Tardily maturation registered at Anna Spath variety, the first decade a September month.

Table 1

Mains phenology phases to varieties of plum-tree studies*

No.	VARIANT		Starting flowering	Ending flowering (limits)	Date maturation fruit
1.	MIROVAL	PITEŞTEAN	31.III-22.IV	10.IV-5.V	14.VII
2.		VALOR	30.III-23.IV	11.IV-6.V	17.VIII
3.		PESCĂRUŞ	3.IV-26.IV	15.IV-9.V	20.VIII
4.		ANNA SPATH	2.IV-25.IV	13.IV-8.V	3.IX
5.	PIXY	PITEŞTEAN	1.IV-23.IV	11.IV-6.V	15.VII
6.		VALOR	31.III-24.IV	12.IV-7.V	17.VIII
7.		PESCĂRUŞ	3.IV-27.IV	16.IV-10.V	21.VIII
8.		ANNA SPATH	3.IV-26.IV	14.IV-9.V	4.IX

*1995 – 2001

The fruit production is different from variety at variety and is an indicator determinant.

The verification precocity to registering production in first years, observation like precocious varieties: Piteştean and Anna Spath; again tardily varieties: Valor and Pescăruş.

The very good productions can be obtained at the varieties: Anna Spath, Pescăruş şi Piteştean, and good productions at the Valor variety, (Table 2).

Table 2

The production to some varieties of plum tree grafted on some rootstocks *

No.	VARIANT		PRODUCTION OF FRUIT				
	Rootstock	Variety	1998 Kg/tree	1999 Kg/tree	2000 Kg/tree	2001 Kg/tree	Average 1998-2001
1.	Miroval	Piteştean	3.75	12.65	28.43	32.53	19.33
2.		Valor	4.63	12.50	25.83	30.38	18.32
3.		Pescăruş	4.20	13.25	30.63	34.13	20.54
4.		Anna spath	5.95	17.65	26.65	40.45	22.67
5.	Pixy	Piteştean	2.90	13.05	22.13	29.25	16.83
6.		Valor	2.83	9.50	23.50	26.95	15.69
7.		Pescăruş	2.95	11.13	25.98	31.83	17.96
8.		Anna spath	4.65	10.63	24.33	33.25	18.21

*1998-2001

In general, fruit quality (measure, dry substance, sugar total, acidity and ascorbic acid) is much superior compared to old assortment established in zone.

Great fruit and very great to obtain at the varieties: Valor, Pescăruş and Anna Spath (over 40 g/fruit).

Adding at these elements commercial aspect all-important to fruit, appreciated to Oltenia hills zone are possible as greats production but and fruit of superior quality.

CONCLUSIONS

1. The rootstock influence in directly manner growth rooting system but and an aerial system.
2. The flowering beginning to realize in third decade march or third decade April. The varieties with early flowering it was: Valor, Piteştean, and varieties with tardily flowering were Pescăruş and Anna Spath.
3. The fruit maturation is echeloned to period months July, August and September.
4. Precocity of fructification in order varieties present: Piteştean, Valor and Pescăruş.
5. Anna Spath, Pescăruş and Piteştean are varieties with very good production, proofing adaptability for zone.
6. Correlationing aspects to recommend for Oltenia hills zone varieties: Piteştean, Pescăruş and Anna Spath.

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THE INFLUENCE OF TREE PLANTING DISTANCES ON APPLE FRUITS QUALITY

AURELIA DOBRESCU, DANIELA BĂLAN,
MARILENA IONIŢĂ

ABSTRACT

The purpose of the researches presented in this paper was to reveal the influence of the planting distance in an apple tree orchard on the main quality indicators in the apple fruits: the epicarp content in pigments, the content in dry soluble substance, ascorbic acid and mineral substances, the titrable acidity. The studies were performed on Jonathan apple tree cultivars, cultivated in different orchard types: Classic, Super and Intensive. The results obtained allow us to remark that the planting distance influenced the synthesis and the accumulation of the biochemical compounds in the apples.

INTRODUCTION

This paper is a study of the influence exerted by the planting distance on fruits quality of Jonathan apple tree cultivars cultivated in different orchard types: Classic, Super and Intensive.

There are few researches concerning this issue. So, Gherghi (1983) emphasized that the planting distance influenced both the apples quality and their storage capacity. Generally, the apples harvested from the superintensive orchard had large dimensions and an advanced state of maturity correlated with a lower titrable acidity and a lower ascorbic acid content; these fruits had a lower structural firmness, a higher sensibility to different physiological diseases (senescence breakdown, Jonathan spot, watercore) and a reduced storage capacity.

We performed researches on the apple fruits harvested from the three orchard types in order to establish the differences between the values of theirs main biochemical indicators: the content in pigments of the epicarp, the content in dry soluble substance, the titrable acidity, the content in ascorbic acid and in mineral substances.

MATERIALS AND METHODS

The researches were performed on the fruits harvested from the apple tree of Jonathan cultivar. The samples were taken from the orchards of the S.C.P. Băicoi, Prahova; the apple trees belong to 21 years old plantations with “palmete” culture systems. The planting system of the tree consists in three experimental variants, with different planting distances between the trees: *Superintensive orchard* 2/4 m (**1250 trees/ha**); *Intensive orchard* 3/4 m (**638 trees/ha**); *Classic orchard* 6/7 m (**223 trees/ha**).

The apple fruits were analysed using the following methods:

- For quantitative determination of the epicarp pigments, we used an extract of 1 g material in 50 ml acetone 85% for chlorophyll and carotenes and respectively in

50 ml methanol acidulated 1% with HCl for the anthocyanic pigments. The content in pigments was determined by measuring the absorption at 663, 646 and 470 nm and respectively at 540 nm with a spectrophotometer "Spekol". The results are calculated with the Mackinney formula and exprimed in mg pigments/100 g vegetal material.

- The content in dry soluble substance was determinated with an Abbe refractometer in fresh apple juice. The results were exprimed in percentages (%).
- The ascorbic acid content was determined using the iodomethrical method and was expressed in mg/100 g fresh material.
- The titrable acidity was determinated by titration of the apple juice with NaOH 0.1 N and expressed in g malic acid/100 g fresh material.
- The mineral substances content was gravimetrically determined, by weighing the vegetal material after calcination in a furnance, at 600^{o}C. The results are exprimed per cent (%).

RESULTS AND DISCUSSIONS

The content in chlorophyll of the fruits epicarp (fig. 1) was influenced by the planting distance. So, in June, it reached 12.82 mg/100g in the intensive orchard and 16.35 mg/100g in the classic orchard. At the harvest time, the chlorophyll content registered the minimal value (10.71 mg/100g) in the fruits epicarp from the superintensive orchard and the maximal value (13.91 mg/100g) in the fruits from the classic orchard.

The content in carotenes of the fruits epicarp (fig. 2) varied in June between 0.14 mg/100g in the fruits from superintensive orchard and 0.12 mg/100g in the fruits from intensive and classic orchard. At the harvest time we determined the lowest value in the fruits from classic orchard (1.12 mg/100g), and the highest one in the fruits from superintensive orchard (1.42 mg/100g).

Fig. 1. The chlorophyll content of the fruits epicarp (mg/100 g)

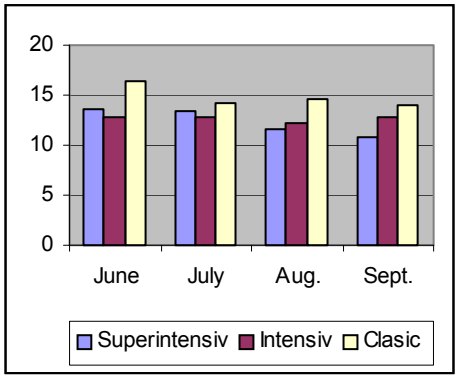
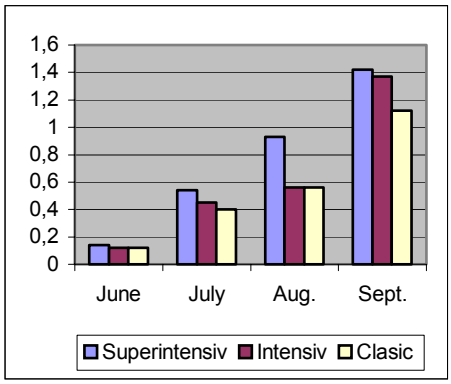


Fig. 2. The carotenes content of the fruits epicarp (mg/100 g)



The analytical data presented in fig. 3 show that the synthesis of the anthocyanic pigments begins at the end of July, so that in August it was determined a value of 3.10 mg/100g as an average of the content in anthocyanic pigments in the fruits epicarp. In September it reached 5.10 mg/100 g.

The classic orchard type stimulated the synthesis and the accumulation of the anthocyanic pigments in the apples epicarp (5.42 mg/100g), while the fruits from the superintensive orchard reached a lower value (5 mg/100g).

Fig. 3. The anthocyanic pigments (mg/100g)

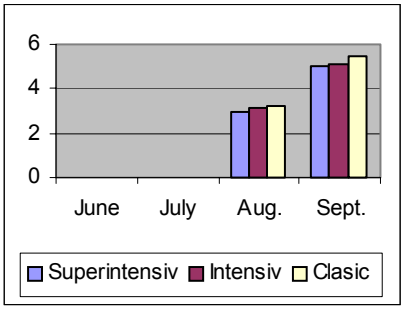
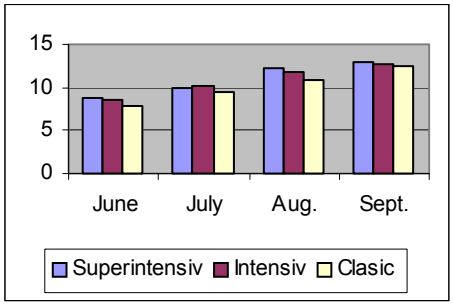


Fig. 4. The content in dry soluble substance



The apple **content in dry soluble substance** (fig.4) registered the maximal value in the superintensive orchard fruits (13%) and the minimal one in the classic orchard fruits (12.4%).

The orchard type influenced also **the titrable acidity** (fig.5): the classic orchard fruits reached a higher acidity compare to the ones from the intensive and superintensive orchards. So, at the harvest time, the titrable acidity of the classic orchard fruits was 0.72% malic acid, while in the fruits from the superintensive orchard it reached at 0.62% malic acid.

Fig. 5. The titrable acidity (%malic acid)

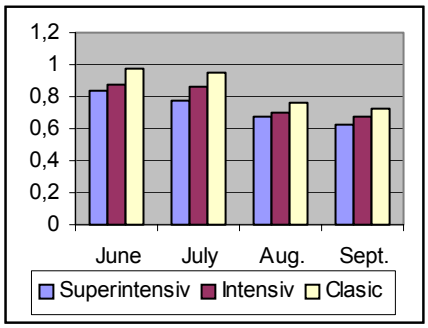
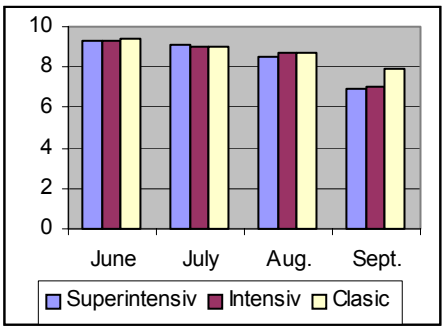


Fig. 6. The content in ascorbic acid (mg/100g)

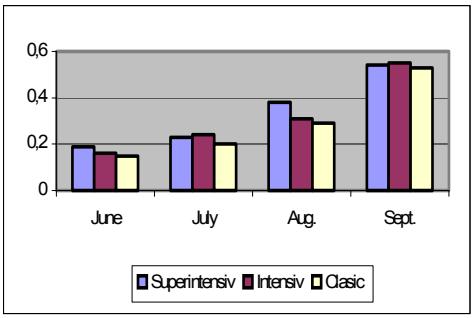


The highest **content in ascorbic acid** (fig.6) was determined in the fruits from the classic orchard: 9.2 mg/100g as the average of the growing and maturation period and 7.90 mg/100g at the harvest time.

The fruits from the superintensive orchard registered the lowest average of the content in ascorbic acid both in the growing period (9.30 mg/100g) and at the harvest time (6.90 mg/100g).

Also, the analyses showed that the fruits from superintensive orchard reached the highest **content in mineral substances** (0.34% on the average), while the ones from the intensive orchard registered 0.32% and 0.29% in the classic orchard (fig.7).

Fig. 7.The content in mineral substances (%)



CONCLUSIONS

The presented analytical data showed differences concerning the biochemical compounds accumulation in fruits depending on the planting distance of the trees, which influences the quantity of the absorbed light. On that account it affected the biochemical indicators biosynthesis in the apples according to the following conclusions:

- The apples from the superintensive orchard had an advanced state of maturity, according to the values of chlorophyll content (lower in the fruits from superintensive orchard and higher in the ones from classic orchard) correlated to the values of the carotenes content (minimal at the fruits from classic orchard, maximal at the ones from superintensive orchard).
- The classic orchard type stimulated the synthesis and the accumulation of the anthocyanic pigments in the apples epicarp. The fruits from the superintensive orchard registered a higher content in anthocyanes compared to the ones from the classic orchard that reached the maximal value.
- The superintensive orchard fruits registered the highest content in dry soluble substance and in mineral substance, while the lowest accumulation was determined in the fruits from the classic orchard. In concordance with these data, the fruits from the classic orchard registered a highest titrable acidity, compared to the ones from the intensive and superintensive orchards.
- The highest content in ascorbic acid was determined in the fruits from the classic orchard; the fruits from superintensive orchard reached the lowest content in ascorbic acid.

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THE FOLIAR FERTILIZATION – TECHNOLOGICAL, UNCONVENTIONAL AND UNPOLUTING ACTION METHOD UPON SWEET CHERRY METABOLISM FOR A LASTING DEVELOPMENT

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SUMMARY

The foliar fertilization through small nourishing quantities during the vegetative period represents a modern method of positive influence upon plants metabolism. Also, it represents a complementary, unconventional and non-polluting source of nourishing for trees.

In the present work, our research emphasizes the significant production increase, statistically assured, as well as high power and photosynthetic efficiency to Sweet Cherry in an intensive orchard at the University of Agronomy of Iasi on a fertile soil (chernozem), where foliar fertilization has been used.

Also, the nourishing reduced the entropic spread at soil and plant level, following in the same time a better correlation between nourishing, ecological and technological factors.

INTRODUCTION

The new foliar fertilizers include a matrix of macro and microelements, essential for tree nourishing, and once with them, different organic substances are also included playing, thus, an important role in assimilation and plant metabolism. The nourishing elements and stimulating substances for growing, blossom and bearing fruits are metabolized immediately, stimulating the clorophylian assimilation and the energetic equation (Chamel, 1990; Franke, 1967; Dorneanu and colab. 976; Bireescu and colab. 2002; Borlan, 1989; Soare and colab. 1999). A new fertilization concept means the adjustment of all the system factors (ecological and technological), so that on the background of trees physiology modification, the nourishing elements should be applied and transported to the economical interest organs (the fruits) (Gradinariu G. 1996, 2000, 2002).

MATERIALS AND METHODS

There were tested three new Romanian liquid foliar fertilizers (Folpant 231, Biodor 05 and Ecofert2) and two foreign products (Nutrileaf and Terrasorb). Three foliar treatments with 1000 l solution/ha were applied during the vegetation period, after blossoming. The interval between the foliar treatments was of 14 days. The leaf's analysis has been made three weeks after the last treatment. The ecological conditions of the experiments (years 2000–2002) permitted a normal development.

The Sweet Cherry orchard (Stella variety) is 14 years old and the graft bearings is *Prunus avium*. The planting distances are 5x4 m.

RESULTS AND DISCUSSIONS

The experimental results concerning productivity and energetically efficiency of the foliar fertilization are presented in table no. 1.

The Romanian foliar fertilizer Folplant 231 is a classic foliar fertilizer, and the Biodor 05 and Ecofert 2 types are new products. The lots foliar fertilized with Folplant 231 have obtained increased productions, comparatively with the control, statistical assured by 7774 Mcal/ha.

Table 1

The productive and energetic efficiency of the foliar fertilization at Sweet Cherry (Stella variety)

Variants	Medium Production Kg/ha	Production efficiency (kg/ha)			Energetic efficiency (Mcal/ha)					
					Output	Input	Energetic Balance			
		Difference	%	Signification			Mcal/ha	Difference	%	Signification
V_1-control unfertilized	9567	-	100	-	6123	2449	3674	-	100	-
V_2-Nutrileaf	13618	4051	142.3	xxx	8716	3486	5230	1556	142.3	xxx
V3-Terra Sorb foliar (0,5%)	13422	3855	140.3	xxx	8591	3436	5155	1481	140.3	xxx
V_4-Folplant 231 (1%)	11583	2016	121.1	xx	7413	2965	4448	774	121.1	xx
V_5-Biodor 05 (1%)	13886	4319	145.1	xxx	8887	3555	5332	1658	145.1	xxx
V_6-Ecofert 2 (0.5%)	13904	4337	145.5	xxx	8897	3559	5338	1664	145.5	xxx

LD 5% - 1667 kg/ha LD 1% - 1945 kg/ha LD 0.1% - 3408 kg/ha
LD 5% - 541 Mcal/ha LD 1% - 724 Mcal/ha LD 0.1% - 1402Mcal/ha

The new Romanian foliar biological (Biodor 0.5–1%) and ecological (Ecofert 2–0.5%) fertilizers have realized a significant production increase (comparatively to the unfertilized control watered with an equivalent quantity of solution/ha applied on fertilized variants, exactly 1000 l/ha) between 45.1–45.5%.

The energetic result achieved comparatively to the control by a foliar contribution was extended between 1658 – 1664 Mcal/ha.

The new foreign foliar fertilizers presented on Romanian market, Nutrileaf (in 1% doze) and Terrasorb foliar (in 0.5% doze) accomplished smaller production increase than Romanian products, exactly between 40.3 – 42.3%. To this increase an energetic increase corresponds, compared with the control, between 1481–1556 Mcal/ha.

Concerning the influence upon photosynthesis, it was observed that foliar fertilizers stimulate in a very intense way both the total content of pigments and the

content of each assimilative pigment (table 2). The assimilative pigments content analyze was performed three weeks after the last foliar treatment.

Table 2

The influence of the foliar fertilization upon photosynthesis on Sweet Cherry

	Assimilative pigments			mg/g fresh substance Total pigments			
	„a" chlorophyll	„b" chlorophyll	carotene	mg/g	Difference	%	Signification
V_1-the control	0.4905	0.4517	0.2831	1.2253	-	100	-
V_2-Nutri leaf (1%)	0.6084	0.5875	0.3506	1.5465	0.3731	131.80	xxx
V3-Terra Sorb foliar (0.5%)	0.6211	0.6011	0.3586	1.5808	0.4074	134.72	xxx
V4-Folplant 231 (1%)	0.5322	0.5241	0.3042	1.3605	0.1352	111.21	xxx
V5-Biodor 05 (1%)	0.6515	0.6188	0.3641	1.6344	0.4610	139.29	xxx
V6-Ecofert2 (0.5%)	0.6408	0.6142	0.3601	1.6151	0.4417	137.64	xxx

LD 5% - 0.0901 mg/g LD 1% - 0.1303 mg/g LD 0.1% - 0.1937 mg/g

The increasing of the chlorophyll "A" and "B" pigments and carotene content as well as the total content of pigments shows the significant role of foliar fertilizers in plant metabolism stimulation with a direct influence upon harvest.

Table 3

The foliar fertilization influence on the mineral metabolism from Sweet Cherry leaves

Variants	N (%)	P_2O_5 (%)	K_2O (%)
V_1-the control	3.65	0.25	2.22
V_2- Nutrileaf (1%)	4.21	0.38	2.71
V3- Terra Sorb foliar (0.5%)	4.32	0.39	2.75
V4- Folplant231 (1%)	3.76	0.34	2.38
V5- Biodor05 (1%)	4.56	0.40	2.64
V6- Ecofert2 (0.5%)	4.67	0.41	2.83

The positive influence of the foliar fertilization upon mineral metabolism of the macro elements N P K at Sweet Cherry leaves is easily observed in table 3.

Concerning the influence of the foliar fertilizers upon fruits quality, in table 4 are presented the fruit sugar content, total acidity and C vitamin content. Bigger fruits with superior quality and commercial aspect are obtained with the help of foliar fertilization, the analyzed indicators values are slightly modified comparatively to the unfertilized control.

Table 4

The influence of foliar fertilization upon chemical composition of the Sweet Cherry fruits

Variants	Total sugar (%)	Total acidity (g% malic acid)	C vitamin (mg/100g fresh substance)
V_1-the control	8.82	1.41	4.53
V_2- Nutri leaf (1%)	7.25	1.01	4.41
V3- Terra Sorb foliar (0.5%)	7.37	1.22	4.17
V4- Folplant231 (1%)	8.31	1.08	4.45
V5- Biodor05 (1%)	7.53	1.18	4.32
V6- Ecofert2 (0.5%)	7.48	1.15	4.21

CONCLUSIONS

The foliar fertilization in small doses, applied three times per every two weeks (using 1000 l solution/ha) after blossom period, determines an increase of plants assimilation capacity, with a positive influence regarding the energetic and photosynthetic efficiency.

As a result, we consider the foliar fertilization an important unconventional and non-polluting measure (by the small dozes applied in vegetation period) for ecological harvest increasing for a lasting development.

By small quantities of applied fertilizers an important harvest increase is obtained, thus being prevented the residual soil pollution and fertilizers spreading in soil and environment which appear in case of a chemical fertilization.

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RESEARCH CONCERNING THE INFLUENCE OF FOLIAR FERTILIZATION UPON THE GROWING AND BEARING OF THE PLUM TREE

D. HOZA

Key words: plum tree, foliar fertilization

SUMMARY

In the actual pomiculture trend, passing from phasial soil fertilization to extraradicular fertilization represents one of the measures taken in order to reduce the negative impact of the chemical fertilizers on the environment and to rectify some elements deficiency, or as phasial fertilization. Five varieties were used: Stanley, Tuleu timpuriu, Agen, Anna Spath and Centenar and 2 complex foliar fertilizers: Agroleaf and Nitrophoska, both having macro and microelements. The fertilizers were applied in the same time with the phytosanitary treatments, three times, at 20 days delayed, starting from 3rd decade of May. It is remarkable that after the foliar treatments the trees becomes more resistant at specific diseases and ensure a bigger tolerance at environmental conditions less favourable. Applying the Nitrophoska product, an average yield of 24 t/ha and a maximum of 29.5 t/ha at Stanley variety is ensured, and using Agroleaf product, it was observed that this was more valorised by early varieties (Tuleu timpuriu, Centenar) on which the yield was slightly bigger.

INTRODUCTION

The fertilization is one of the most important measures having big implications on yield and fruits quality. The way that this measure is used, is important not only on the fertilizer efficiency, but also in soil pollution risk which could appear and also on surface water and/or phreatic water.

In modern pomiculture, there is the tendency to pass from phasial soil fertilization to extraradicular fertilization, in order to reduce the negative impact of the chemical fertilizers on the environment. In the last years a lot of complex specific fertilizers were produced and introduced for leaf application in order to rectify some elements deficiency or as phasial fertilizations in the trees intensive growth period.

In the current paper the results obtained with 2 complex foliar fertilizers are presented, applied as phasial fertilization in the shoots intensive growth.

MATERIAL AND METHOD

The study was carried out in 2003, in a 9 years old plum plantation, with planting distance of 4/3.5 m and trees crown managed free applatizated. The soil was maintained inherbed on the interval and unherbed on the row. In 2001, the plantation was organic fertilized with 27 t/ha and with no chemical fertilizers. We used 5 varieties: Stanley, Tuleu timpuriu, Agen, Anna Spath and Centenar and 2 complex foliar fertilizers Agroleaf and Nitrophoska, both having macro and microelements.

The fertilizers were applied in the same time with the phytosanitary treatments, three times, at 20 days delayed, starting from the 3rd decade of may. In order to see the effect of those fertilizers, observations and determinations were performed regarding the growing, bearing and the disease tolerance of the studied varieties.

RESULTS

The foliar fertilizer has very favourable effects on tree concerning the tree growth and production capacity. So, when Nitrophoska was applied, the trees recorded good growths, materialized in the average length of middle branches and total growth sum (table 1).

Table 1- The influence of Nitrophoska on the growing of some plum varieties

Variety	Tree height (cm)	Crown diameter (cm)	The garnish of semiskeleton with bear branches		The length of middle branches	The total growth sum (cm)
			short	long		
Stanley	4.05	3.75	14.50	2.90	45.7	1860
Tuleu timpuriu	3.95	3.60	12.70	4.20	52.4	2645
Agen	3.70	3.15	3.40	8.50	32.5	2130
Anna Spath	3.75	3.40	7.20	3.10	36.5	2210
Centenar	3.80	3.55	6.60	4.20	41.4	2185
Average	3.85	3.49	8.88	4.58	41.7	2206

From the table 1, it clearly results the fact that all varieties had a different ramification capacity, character genetically determined, Stanley, Tuleu timpuriu, Anna Spath having a preponderant bearing on bouquets and only Agen variety preponderant long branches. The average length of mixed branches was between 52.4 cm at Tuleu timpuriu variety and 32.5 cm at Agen variety. Analyzing the annual growth, it was observed that there is no correlation between the length of the bear branches and the growth sum, because in this case is implicated also the number of long branches, which is different from a variety to another. Valuable, the annual growth sum was between 1860 cm at Stanley variety and 2645 cm at Tuleu timpuriu variety.

When Agroleaf product was applied, the average values of annual branches at variety level was slightly bigger than previous product, but the growth sum at tree level was smaller (table 2).

Table 2 - The influence of Agroleaf on the growing of some plum varieties

Variety	Tree height (cm)	The crown diameter (cm)	The garnish of semiskeleton with bear branches		The length of middle branches	The total growth sum (cm)
			short	long		
Stanley	4.10	3.80	13.70	3.10	46.20	1525
Tuleu timpuriu	4.10	3.75	12.40	4.30	49.50	2469
Agen	3.65	3.25	2.10	8.90	33.40	2085
Anna Spath	3.80	3.45	8.10	2.90	42.90	2205
Centenar	3.75	3.45	6.40	4.10	39.90	2140
Average	3.88	3.54	8.54	4.66	42.38	2085

The foliar fertilization influence on yield was different from a variety to another but also between two used products. With Nitrophoska big fruits were obtained on all varieties, appropriate by the superior limit of their potential, in conformity with the specialty literature. So, Centenar variety recorded an average weight of fruit about 51 g, Anna Spath 50 g and Agen 32 g (table 3). The yield was between 18.9 t/ha at Tuleu timpuriu and 29.5 t/ha at Stanley, this one being the most productive variety, followed by Anna Spath with 27.8 t/ha.

Table 3 - The influence of Nitrophoska fertilization upon the yield on fruit quality of some plum varieties

Variety	The average weight of fruit (g)	Yield		SUS %	Titrable acidity mg/%	C Vitamin mg/%
		Kg/tree	t/ha			
Stanley	39.20	41.40	29.55	18.00	0.820	12.60
Tuleu timpuriu	47.40	26.50	18.90	14.50	1.200	7.02
Agen	32.30	31.80	22.70	18.10	0.500	4.10
Anna Spath	50.90	38.90	27.80	17.20	0.700	9.80
Centenar	51.10	29.80	21.30	14.40	0.870	10.20
Average	44.18	33.68	24.05	16.44	0.818	8.74

The soluble dried substance was smaller at the varieties with early ripening (Centenar and Tuleu timpuriu) and bigger at the later. Valuable, this parameter was supraunitary only at Tuleu timpuriu variety (1.2 mg/100 g p.p.) and the small value was recorded by Agen variety (0.5 mg/100 g p.p.). Regarding the C vitamin content, there were differences between varieties, from about simple to double, with values starting at 4.1 mg/100 g at Agen variety and finishing with Stanley 12.6 mg/100g.

Agroleaf fertilization had a smaller effect on fruit size and obtained yield (table 4). As average value, for all studied varieties, the fruits weight was smaller with 6.4% comparative with the Nitrophoska fertilization. The yield at surface unit

was smaller as average for the studied varieties with 4.4% but at variety level, the yield was bigger for Centenar (with 1%) and Tuleu timpuriu (with 1.5%).

Table 4 - The influence of Agroleaf fertilization upon the yield on fruit quality of some plum varieties

Variety	The average weight of fruit (g)	Yield		SUS %	Titrable acidity mg/%	C Vitamin mg/%
		Kg/tree	t/ha			
Stanley	37.20	38.40	27.40	16.20	0.80	10.9
Tuleu timpuriu	44.50	26.90	19.20	13.80	1.10	7.20
Agen	31.40	31.20	22.30	17.10	0.55	4.05
Anna Spath	47.50	36.10	25.80	16.80	0.70	8.85
Centenar	46.20	30.10	21.50	13.20	0.85	9.80
Media	41.36	32.54	23.24	15.42	0.80	8.16

The average content in soluble dried substance was smaller with 6.2% comparative with Nitrophoska, the same for the C vitamine and the titrable acidity.

It is remarkable that after the foliar treatments the trees becomes more resistant at specific diseases with only 5 treatments by vegetation period thus ensuring a good protection for the trees.

CONCLUSIONS

1. the foliar fertilizers treatments are easily applied in the same time with phytosanitary products, without supplementary costs;
2. the foliar fertilizers increase the trees resistance at diseases and ensure a bigger tolerance at environmental conditions less favourable;
3. applying the Nitrophoska product, ensures an average yield of 24 t/ha and a maximum of 29.5 t/ha at Stanley variety;
4. Agroleaf product was more valorised by early varieties (Tuleu timpuriu, Centenar) on which the yield was slightly bigger.

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THE INFLUENCE OF THE MIXED BRANCHES SHORTEN DEGREE UPON THE YIELD AND PEACH QUALITY

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Key words: peach, mixed branches

SUMMARY

For the peach tree, the pruning operation is a very important and an obligatory measure in order to obtain a good quality of fruits and to ensure good conditions for growing and bearing processes. The bear branches of the flat fruit peach tree are thinner than standard peach, which justify the overcharge with severe consequences upon the tree integrity. So, we used 4 variants represented by mixed branches shorten at different lengths. During the research period, observations and determinations were performed, regarding the growing capacity, fruit-setting percentage, yield and the fruits quality. Regarding the vegetative growth, the pruning reaction was slightly influenced by variety and the shorten degree also. The shorten of the mixed branches on flat fruit peach tree at 50 cm ensures a slightly bigger fruit charge, which could have negative consequences upon the branches integrity in the years with a good fruit-setting percentage. The limitation of bear branches length at 40 cm, ensured a normal charge at branch level but a slightly smaller yield in the long pruning type and the shorten of mixed branches at 30 cm ensured a good rate setting at branch level, but the yield decreased with approximate 15 %, because of the smaller fruit-setting in the basal part of the branches.

INTRODUCTION

The bearing pruning of peach is one of the most important technological operation in orchard exploitation cycle and also very important regarding the yield, fruits quality and trees integrity. The peach tree has to be pruned every year, no matter how much bear buds it has, in order to ensure good conditions for growing and bearing processes.

To reduce the number of the interventions at tree level, is generalized the long pruning type of peach tree by 60 cm length, in this case being necessary the manual thinning of fruits on the branch, in order to ensure them a high quality. Since the flat fruit peach tree, which has smaller and more numerous fruits than the globulous type, is mostly indicated for processing, the manual thinning operation requires a big manpower consumption and is not currently applied. The bear branches are somehow thinner and the ramification capacity of those trees is bigger, facts that lead to overcharge with negative consequences upon the tree integrity. To avoid the branch stroke by the fruits weight and for achieving an uniform yield regarding the fruits quality, a pruning variant it has to be adopted depending on biological specific features.

In this paper are presented the results obtained after the shorten operation in different degrees of the mixed branches without the thinning of fruits.

MATERIAL AND METHOD

The research was carried out in 2001-2003 period on the didactic field of the Fruit Growing Department from the USAMV Bucharest, with 4 varieties and hybrids of flat peach tree. The next variants were used:

V1 – the shorten of mixed branches at 60 cm and manual thinning of fruits;

V2 – the shorten of mixed branches at 50 cm;

V3 - the shorten of mixed branches at 40 cm;

V4 - the shorten of mixed branches at 30 cm.

The pruning has been made early in spring, after the frozen risk passed, in a plantation set up in 1995; the planting distance was 4/3 and the trees managed as vessel-bush with no irrigation conditions. During the research period, observations and determinations were performed regarding the growing capacity, fruit-setting percentage, yield and the fruits quality.

RESULTS

Regarding the vegetative growth, the pruning reaction was slightly influenced by variety and the shorten degree also.

Table 1 - The pruning influences upon the bear branches growth

Variant	Variety	The average length of mixed branches (cm)	The total length of mixed branches (m)	The average length of anticipated branches (cm)	The total growth sum (m)
V1	NJF_2	37.5	69.1	12.1	80.7
	Filip	35.4	60.2	13.5	71.2
	Florin	37.3	64.3	13.9	74.3
	A_{292}	33.6	61.5	11.6	79.3
	Average	**35.95**	**63.77**	**12.77**	**76.37**
V2	NJF_2	43.4	75.4	14.5	84.8
	Filip	45.2	79.1	17.2	91.3
	Florin	41.6	77.3	18.1	88.4
	A_{292}	36.5	72.5	15.9	81.5
	Average	**41.67**	**76.07**	**16.42**	**86.5**
V3	NJF_2	47.3	78.0	18.3	92.8
	Filip	42.6	80.1	24.1	95.0
	Florin	45.5	85.1	22.3	101.8
	A_{292}	38.4	55.7	20.5	74.6
	Average	**43.45**	**74.72**	**21.3**	**91.05**
V4	NJF_2	62.4	86.5	27.2	89.7
	Filip	61.3	83.3	25.3	94.2
	Florin	63.2	90.1	28.4	102.5
	A_{292}	56.4	81.3	26.5	91.9
	Average	**60.82**	**85.3**	**26.85**	**94.57**

So, the average length of mixed branches was pretty small at the variant 1, about 36 cm as average of the 4 varieties and was growing with the pruning intensity at 61 cm on the variant 4 (table 1).

Also the total length of mixed branches is growing with the shorten degree but the difference between the variants is some smaller than the average length of the bear branches. About the annual growth sum, the difference between the control and V4 was 23.8% and smaller from the other analyzed parameters, reducing at 3.8% between V3 and V4, comparative with the first parameter which the difference was 40%. This is explained by the smaller number of branches coming out in correlation with the increase of the shorten degree.

Table 2 - The pruning influence upon the yield and the quality of the fruits

Variant	Variety	The average weight of the fruit (g)	The yield (kg/tree)	SUS (%)	SUT (%)	Titrable acidity (mg/%)	C Vitamin (mg/%)
V1	NJF_2	79	16.0	12.75	16.12	0.56	6.49
	Filip	80	18.5	14.66	17.02	0.33	6.39
	Florin	91	16.3	18.5	19.25	0.52	3.81
	A_{292}	125	12.2	14.56	17.74	0.29	5.67
	Average	**93.75**	**15.75**	**14.69**	**17.53**	**0.42**	**5.59**
V2	NJF_2	70	16.7	12.08	16.01	0.55	6.55
	Filip	74	19.2	14.15	16.80	0.30	6.43
	Florin	83	18.3	15.9	19.20	0.55	3.95
	A_{292}	125	13.4	13.38	17.26	0.30	5.69
	Average	**88.0**	**16.90**	**14.01**	**17.31**	**0.42**	**5.66**
V3	NJF_2	75	14.5	12.40	15.23	0.55	6.45
	Filip	78	18.6	13.25	16.33	0.31	6.45
	Florin	81	15.9	12.30	16.38	0.56	3.85
	A_{292}	129	9.7	13.99	17.88	0.33	5.72
	Average	**92.75**	**14.67**	**12.89**	**16.45**	**0.43**	**5.61**
V4	NJF_2	76	14.9	12.35	15.80	0.54	6.53
	Filip	76	15.3	13.67	16.74	0.30	6.51
	Florin	85	14.1	14.30	17.97	0.54	3.74
	A_{292}	130	9.8	14.02	17.24	0.33	5.65
	Average	**91.5**	**13.52**	**13.58**	**16.93**	**0.42**	**5.60**

Concerning the yield, there were recorded differences between varieties and between variants at the variety level (table 2). The average weight of the fruits was slightly fluctuating on variety level depending on used variant and had bigger amplitude between varieties correlated with the biological potential. Trees from the varieties (NJF 2, Filip and Florin) had smaller fruits that didn't exceed 80 g except two cases and the A292 hybrid had fruits which exceed 125 g in all used variants.

The trees production capacity was influenced by the inconvenient conditions from the last two years, the delayed hydric stress and froze recorded in the winter of 2002 (December 15, 25^0C). A big yield amplitude was recorded between varieties and variants, starting at 9.8 t/ha (A292, V4) until 19.2 t/ha (Filip, V2), which shows that the pruning and the variety influenced the yield obtained.

The average yield obtained by variant for the analyzed variants is pretty bigger at V2 (with 7.3%) and smaller at V3 and V4, with 8.5% respective 14.2% comparative with the control. At the flat fruit peach tree, a good fruit-setting on the medium part of the bear branch was observed, which determined a smaller yield at the variant with increased shorten.

The fruits quality was comparable between variants as average data and slightly different between varieties. The soluble dried substance content is slightly decreasing at variants with no manual thinning, being smaller at V3, same situation for the total dried substance. The titrable acidity and the content in C vitamin are practically equal between variants, the interventions made having no evident influence.

CONCLUSIONS

From the carried out researches, the following conclusions could be drown:

1. the shorten of the mixed branches at flat fruit peach tree at 50 cm ensures a slightly bigger fruit charge, which could have negative consequences upon the branches integrity in the years with a good fruit-setting percentage;
2. the limitation of bear branches length at 40 cm, ensures a normal charge at branch level but a slightly smaller yield in the long pruning type with about 7% as average value but with big differences between varieties. The A292 hybrid, more vigorous reacted worst at this kind of pruning;
3. the shorten of mixed branches at 30 cm ensures a good rate setting at branch level, but the yield decreases with approximate 15%, because of the smaller fruit-setting in the basal part of the branches, requiring the increasing of their number at tree level.

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STUDIES REGARDING THE NEW BLACKBERRY GENOTYPES INTRODUCTION INTO ASSORTMENT

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Key words: cultivar, ripening, yield, winter hardiness, disease resistance

SUMMARY

Seventeen thorny and thornless blackberry cultivars and selections were being assessed in two field trials in order to choose the most valuable ones for the assortment involved in the hilly area of Southern Carpathians and other similar climate zones. The major plant and fruit characteristics have emphasized the thornless cultivars "Chester", "Hull Thornless" and "Loch Ness" and the thorny and early selections "D8-99" and "D24-99". The first ones have overcome or equalled the control cultivar, "Thornfree", regarding the quality, the amount of ripened fruits before the autumn frosts, yield, hardiness and the latter ones as regards the fruit quality and yield. "Triple Crown" cultivar should be also mentioned for its hardiness, berry quality and tolerance to purple blotch of the canes.

INTRODUCTION

Blackberry has always had a great and increasing interest regarding the small fruits, for both commercial planting and home gardens and lately for covered crops in greenhouses, plastic tunnels, etc. Besides yield, the blackberry cultivars should have a good response to stress factors such as the winter colds, the minimal temperatures below -15^0C (very harmful) and below -20^0C (disastrous). Also, the fruits should be suitable for fresh marketing and processing and for easy picking. The present assortment lacks in early ripening cultivars (June-July) or cultivars ripening earlier than the first autumn frosts (October 15, for Pitesti area).

MATERIALS AND METHODS

Fifteen Romanian blackberry cultivars and selections have been studied in two field trials: one, including 6 thorny blackberry cultivars, 2 selections and "Darrow" cultivar as control; the other one, 7 thornless blackberry cultivars and "Thornfree" cultivar as control. The two field trials were established in 1990 and 1997 respectively, the observations were performed during 1999-2003.

The experimental design was in randomized blocks with 4 replications and 4-5 plants/replicate plots. The planting distance was 2.5/2.0 m and the plants were trained on 2 wire wedge.

The observations and measurements were focused on the blooming time, fruit ripening season, bush habit and vigour, cane thornless (0-5 scores, where 0 = thornless, 5 = very thorny canes), minimal temperatures evolution in 1999-2003 winters and their effects on plants, fruit yield, the berry physical characteristics, picking easiness, damage caused by *Septocyta ruborum* (0-5 scores, where 0 = no damage, 1 = very slightly damaged, 2 = slightly damaged, 3 = medium; 4 and 5 severe and very severe damaged).

The entire biological material for this experiment was obtained through micropropagation methods, using the *in vitro* meristem culture.

RESULTS AND DISCUSSIONS

The agronomic traits of plant

The bush habit and vigour represent the major characteristics taken into account for the training system and planting distance. As we can see in table 1, the thorny blackberry genotypes have shown a semi-erect and creeping habit and the thornless ones, a semi-erect habit except "Arapaho' cultivar with upright canes. All the genotypes had a mean or big vigour and "Hull Thornless" cultivar - very big.

The cane thorns have greatly affected the fruit picking. Some of the thorny creeping cultivars, as well as the selections "D8-99" and "D24-99" had less thorny canes versus the control, "Darrow".

The cane resistance to winter colds has directly influenced the annual fruit yield. In 2000, 2001 and 2002 winters with absolute minimal temperature below -14ºC and only one day with a temperature of -21^0C (January 2000), the thorny creeping cultivars were mostly damaged: "Kotata", "Silvan", "Olallie", "Tayberry" and "Tummelberry". The most resistant proved to be "Wilson's Early" cultivar, "D8-99" and "D24-99" selections and "Darrow" control. The thornless cultivars: "Chester Thornless" and "Triple Crown" have shown also a good response.

The blackberry cultivars responded differently to *Septocyta ruborum*, the less damaged being "Triple Crown" and "Kotata", followed by other cultivars "Loch Ness", "Arapaho"; "D8-99" and "D24-99" selections have been slightly-mid damaged. The most severe damages, caused by this pathogen were found with "Thornfree", "Hull Thornless" and "Black Satin" cultivars.

Table 1. Vegetative characteristics, winter hardiness and purple blotch (*Septocyta ruborum* (Lib.) Petrak) resistance, in the climatic conditions of Pitesti (1999-2002)

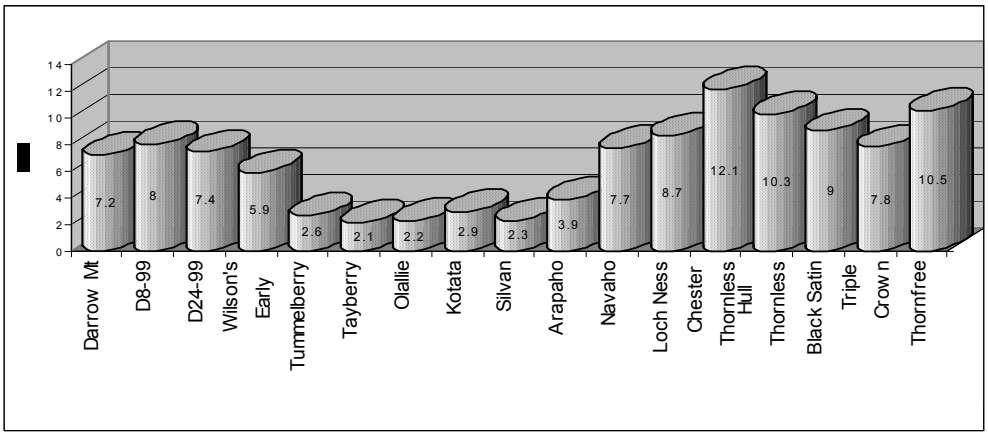
No.	Cultivar-selection	Bush habit	Vigour	Cane thorness	% buds affected by frost	Purple blotch attack on cane (score 0-5)
1	Darrow	semierect	big	5	10.3	2-4
2	D8-99	semierect	big	4	7.7	2-3
3	D24-99	semierect	big	4	7.5	2-3
4	Wilson's Early	semierect	mid	4	5.6	2-3
5	Tummelberry	creepy	big	4	76.3	3-4
6	Tayberry	creepy	mid	3	74.8	1-3
7	Olallie	creepy	mid	3	77.6	3-4
8	Kotata	creepy	mid	3	83.9	1-2
9	Silvan	creepy	mid	4	81.3	1-3
10	Arapaho	erect	big	0	26.1	1-3
11	Navaho	semierect	big	0	28.5	1-3
12	Loch Ness	semierect	big	0	25.3	1-3
13	Chester Thornless	semierect	big	0	19.2	1-4
14	Hull Thornless	semierect	very big	0	27.4	4-5
15	Black Satin	semierect	big	0	29.0	4-5
16	Triple Crown	semierect	big	0	18.0	1-2
17	Thornfree	semierect	big	0	31.7	4-5

Yield (Fig. 1)

The thorny genotypes gave the lowest yields due to their poor hardiness. Among them, the most productive selections were "D8-99" and "D24-99" compared with the control - "Darrow". Among the thornless cultivars, "Chester Thornless" and "Hull Thornless" gave the highest yields overcoming or equalling the control "Thornfree", the most productive cultivar in the Romanian assortment.

"Loch Ness" and "Triple Crown" cultivars recorded mid yields: 8.7 t/ha and 7.8 t/ha respectively.

Fig. 1. The average fruit yield of blackberry genotypes in the conditions of Pitesti (2000-2002)



CONCLUSIONS

1. The most promising cultivars that worth introducing into assortment are: "Hull Thornless", "Chester Thornless", "Loch Ness" as well as the selections "D8-99" and "D24-99".
2. The two selections are recommended for the semi-early ripening season (July), "Loch Ness" and "Hull Thornless" cultivars for the later ripening (August-September).
3. "Triple Crown" has also emphasized some valuable characteristics such as: berry size and firmness, hardiness, a good response to *Septocyta ruborum*, etc. and could also be introduced into assortment.

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RESEARCHES REGARDING THE STORAGE CAPACITY ASSESSMENT IN MICROPERFORATED PLASTIC FOIL ON SOME NEW LETTUCE VARIETIES

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Key words: perishable, storage conditions

SUMMARY

The researches followed the storage behaviour for these lettuce varieties: Piroga, Salad Bowl Carthago, Gringo, Ascona Everest, Iceberg and Little Caesar.

There were two variants for the storage conditions, listed bellow:

V_1: T= 20°C, RH= 75 %;

V_2: T= 4°C, RH= 90 %;

The results depended on variety and storage conditions. Almost all varieties kept their proprieties for about two days in variant V_1. In the second variant (V_2) case, they lasted between 5 and 9 days. Weight loss during storage was between 20.5 % for Ascona –V_1 and 3.7 % for Little Caesar – V_2.

INTRODUCTION

The lettuce is a high perishable postharvest produce. That's why observing the ideal demands during conditioning and storage represents a priority.

Dehydration of the edible part is the first manifestation and it's visible too. From this point of view, the first objective is maintaining a high rate of the relative humidity.

MATERIALS AND METHODS

The experiment was implemented in the Postharvest Technology laboratory from the Faculty of Horticulture in Bucharest. The 7 test varieties proceed from the didactical and experimental sector of the Vegetable Growing Department.

The studied varieties are: Piroga, Little Caesar, Salad Bowl Carthago, Gringo, Iceberg, Ascona and Everest.

Right after harvest and conditioning, the test varieties were analyzed: they were crisp, firm and fresh in appearance; without discolouration; free from damage, pests and disease. They were cut off just below the basal leaves. The physical and biochemical main properties were determined. Then the produces were pre-packed in plastic boxes. Before and after storage the weight loss of the test produces was determined.

There are two variants for the storage conditions, listed bellow:

V_1: T= 20°C, RH= 75 % (environmental conditions);

V_2: T= 4°C, RH= 90 % (refrigerating conditions + produces packed in microperforated plastic foil);

The commercial value of the analyzed lettuce is the indicator used to establish the storage period.

RESULTS AND DISCUSSIONS

The main physical and biochemical properties of the analyzed varieties are listed in the table 1.

Table1 - The physical and biochemical main properties of the analyzed lettuce varieties

Variety	Average weight g	C Vitamin mg/100g	Total titrated acidity % malic acid	Dry soluble matter %	Total dry matter %	Water %	Maineral matter %
Piroga	261	12.10	0.16	1.8	6.2	93.8	0.81
Salad Bowl Carthago	258	8.85	0.19	1.8	6.5	93.5	0.80
Gringo	204	8.57	0.14	2.0	6.8	93.2	0.75
Ascona	183	11.23	0.13	1.7	5.7	94.3	0.73
Everest	260	10.27	0.14	1.7	6.0	94.0	0.77
Iceberg	172	9.40	0.08	1.9	6.3	93.7	0.80
Little Caesar	195	9.01	0.10	1.7	5.9	94.1	0.78

The average weight varies between 172 g (Iceberg) and 261 g (Piroga), also Everest variety has a high value – 260g.

An important food component is C Vitamin. Gringo contains only 8.57 mg/100g but Piroga has 12.1 mg/100 g and Ascona – 11.23 mg/100 g.

The percentage of total acidity (expressed in % malic acid) has the smallest value (0.08%) on Iceberg and the highest (0.19 %) on Salad Bowl Carthago.

The dry soluble matter content varies from 1.7 % (Ascona, Little Caesar and Everest) to 2 % (Gringo).

The storage period using normal and refrigerating conditions depends on variety (table 2).

In the environmental conditions (V_1), the storage period was only 1 day for Ascona and Salad Bowl Carthago. The others lasted for 2 days. The weight loss owing to dehydration (perspiration) was 10.7% (Little Caesar) and 20.5% (Ascona).

In the refrigerating conditions (V_2), the utilization of the microperforated plastic foil determined the storage capacity prolongation thanks to the higher level of the relative humidity (90%). Salad Bowl Carthago lasted for 5 days; Little Caesar and Iceberg were kept for 9 days and the others for 7 days long. The weight loss for V_2 conditions was less than V_1. Little Caesar had 3.7% and Ascona had 6.7%.

Table 2 - The storage capacity of some new lettuce varieties

Variety	Variant	Weight loss %	Storage period Days
Piroga	V_1	14.5	2
	V_2	4.3	7
Salad Bowl Carthago	V_1	17.1	1
	V_2	6.3	5
Gringo	V_1	13.3	2
	V_2	4.8	7
Ascona	V_1	20.5	1
	V_2	6.7	5
Everest	V_1	16.8	2
	V_2	3.9	7
Iceberg	V_1	15.3	2
	V_2	4.1	9
Little Caesar	V_1	10.7	2
	V_2	3.7	9

CONCLUSIONS

The best results regarding the lettuce storage have been obtained in V_2 using the microperforated plastic foil for pre-packing.

The optimum capacity for these lettuce varieties was 1-2 days in case V_1 and 5-9 days in V_2, depending on variety.

Little Caesar and Iceberg had the best period of refrigerating storage (9 days).

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RESEARCH CONCERNING THE CATKINS EVOLUTION ON HAZELNUT

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Keywords: hazelnut, catkins, flower

SUMMARY

The hazelnut's male flowers are named catkins and are willing separated by female flower. They are visible on the plant for a very long period, and their evolution is different than other species.

Before the dormant period the catkins have in average 3-3.5 cm length. After the vegetation beginning at the end of January, they have 9-11 cm length and liberate their pollen needed for female flower fecundation.

The catkins are formed and become visible from anterior liberate pollen year. The catkins are present on the plant about 285-290 days. Formed in summer period, the catkins are growing till the end of the autumn, they pass the winter, and in the spring beginning they set the pollen free.

MATERIALS AND METHODS

The biological material was represented by five hazelnuts varieties from the experimental field of the Fruit Growing Department within Horticulture Faculty. The hazelnut trees were 20 years old and were in complete production. The trees were conducted with one trunk, and were planted on a distance of 4/3 m. Observations were performed, by comparison, regarding the catkins evolution on those five variants.

RESULTS AND DISCUSSIONS

The catkins begin to be visible on the plant on 15 June (when they have 0.1-0.2 mm length) and they grow uninterrupted until they reach the dormant period when they have 26-35 mm length.

Some varieties catkins grow process is very active in the summer period, therefore in the entering to the dormant period half of their length is elongating and frees the pollen, so they may be affected by the winter hardiness.

Eugenia variety has the smallest catkins and the Gentile Romana has catkins of approximately 35 mm length in the beginning of the dormancy. The catkins are disposed in groups of two or more catkins, depending on variety, or they can be solitary. The Red Lambert variety has the highest number of catkins per group.

In Bucharest climatic conditions the catkins growing process starts again after about 3.5 months. Their grow beginning is dependent of air's temperature evolution, and it was registered in Bucharest on 20-25 January. In the beginning, the growth rhythm is very slow (2-7mm/month), but accentuated proportionately with the temperature increasing (47-62 mm/month), so in the end of March the

pollen is totally freed.

Table 1 - The moment of catkins appearance and their dynamic grow

Variety	Catkins length (mm)				
	15.06	**30.06**	**30.08**	**30.09**	**15.10**
Eugenia	0.1	4	14	25	26
Gentile Romana	0.2	6	21	35	35
Furfulak	0.1	9	21	32	32
Merveille Bollwiller	0.2	5	16	32	32
Lambert roşu	0.1	5	15	22	30

Table 2 - The catkins evolution after the dormant period (mm)

Variety	Determination data					
	15.01	**15.02**	**15.03**	**30.03**	**3.04**	**11.04**
Eugenia	26	31	32	45	78	91
Gentile Romana	35	37	40	65	89	dry
Furfulak	32	39	42	73	113	89
Merveille Bollwiller	32	35	35	48	91	97
Lambert roşu	30	35	37	42	88	93

From the grow process restart date until the pollen is completely set free, there are necessary 2.5 months and from catkins appearance 9.5 months must pass.

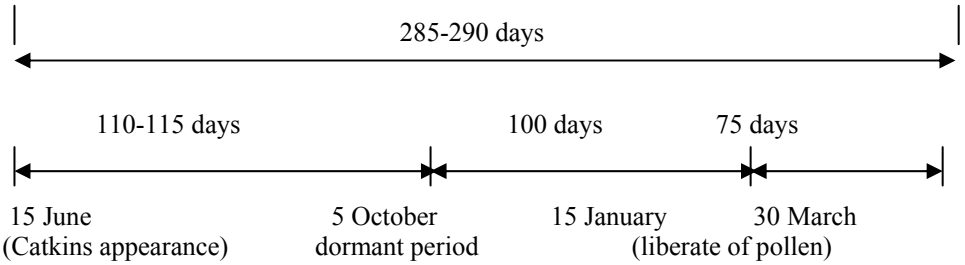


Fig. 1 The period from the catkins formation until the pollen liberation

The catkins were carefully examined both in field and in laboratory in order to determinate the average length, the number of stamens groups, the number of stamens per groups and the total number of stamens situate per one catkin. The determinations were made when the catkins had the specific size and the stamens groups were well differentiated.

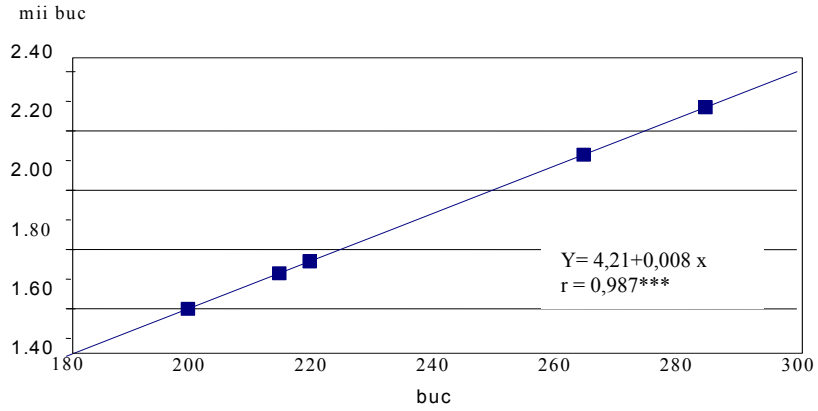
It was noticed that no correlation exists between the catkins length and the number of stamens groups per catkin. The number of stamens per group was 8 in for all varieties. The number of stamens per catkin varied with the variety – 1600 on Furfulak variety and 2280 on Merveille Bollwiller.

A distinct significant correlation was noticed between the number of stamens groups per catkin and the number of stamens per catkin (figure 2).

Table 3 - Number of stamens existed on one catkin

Variety	Catkins length (mm)	Number of stamens groups per catkin	Number of stamens per catkin
Eugenia	35	265	2120
Gentile Romana	38	220	1760
Furfulak	35	200	1600
Merveille Bollwiller	36	285	2280
Lambert roşu	35	215	1720

Fig.2 The correlation between the number of stamens groups and the number of stamens per catkin



CONCLUSIONS

1. The catkins need a long period to become able to bloom and to set the pollen free;
2. There is an outsize stamens per catkin, being thus explained the important pollen amount produced on this species;
3. The catkins are very well distinguished on the plant, during both the vegetation period and the dormancy.

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THE IMPACT OF ENVIRONMENTAL CONDITIONS ON QUALITATIVE CHARACTERISTICS OF THE WALNUT FRUITS

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Key words: walnut, quality

SUMMARY

The national-level major changes of the climatic appearances challenged obvious modifications regarding the vegetation period duration, fruits size, diseases and pests resistance and fruits quality. These modifications were evidenced on an experimental walnut plantation, that beneficiated of minimal agrotechnical condition. Thus, in the year 2002 we noticed that the trees presented a light sensibility to *Xanthomonas juglandis* and *Gnomonia juglandis*, and had a long vegetation period compared with the year 2001 and 2003. In the year 2001 the fruits content in kernel was higher, comparative with previously years. Visible modifications were also registered in the case of colour cores.

MATERIALS AND METHODS

The researches were effectuated in the experimental field of the Fruit Growing Department, University of Agronomic Sciences and Veterinary Medicine in Bucharest, regarding the walnut populations, carefully selected from different country zones. During this period, the climatic conditions were very different from the normal values, being registered very high temperatures in summer, smallest rainfalls, and frosty winters. All trees were grafted on black walnut (*Juglans nigra*). The tree trunk had 0.8-1 m.

The studied populations were compared with Jupâneşti variety, well known because of its productivity and its fruits fine quality.

Trees were derived globular fits, without accomplished important intervention about theirs crowns. The planting distance for walnut trees was 6/3 m. Visible differences were noticed between the studied populations, regarding both crown sizes and fruits quality.

The fruits were analyzed regarding the fruits forms and sizes, percentage in core of fruits, colour cores and the firmness of shell fruits. The fruits contents in core were determined shortly after they were harvested and dried.

RESULTS AND DISCUSSIONS

Annual fruits analysis emphasized the modifications of fruits size, contained of core, firmness of shell fruits and length of vegetation period.

Table 1 - The evolution of structural element of the crown (2001-2003)

Biotype	Total length of skeleton branches (m)			Total length of semi skeleton branches (m)		
	2001	2003	Growth (m)	2001	2003	Growth (m)
CNPC 63	7.4	38	30.6	19.7	108	88.3
CNPC 02	8.6	47	38.4	18.3	118	99.7
CNPC 47	8.2	40	31.8	16.5	97	80.5
Jupâneşti	6.5	36	29.5	14.6	92	77.4

Table 2 - The qualities of walnuts

Biotype	Medium weight of fruit (g)			Medium weight of kernel (g)			Percentage of kernel (%)		
	`01	`02	`03	`01	`02	`03	`01	`02	`03
CNPC 24	8.6	7.2	9.1	5.70	4.5	6.1	67	63	67
CNPC 63	9.4	8.6	9.2	7.52	5.8	6.8	80	67	74
CNPC 36	10.7	9.3	10.5	6.20	5.4	6.0	58	58	57
CNPC 15	9.6	8.2	10.1	6.81	4.7	6.7	71	57	66
CNPC 02	14.2	11.9	14.2	11.9	8.7	9.6	84	73	67
CNPC 14	11.3	10.2	10.9	7.68	6.2	6.8	68	60	62
CNPC 21	10.7	8.6	11.0	7.59	6.3	6.7	71	73	61
CNPC 58	9.8	7.8	10.1	6.46	5.2	6.0	66	67	59
CNPC 47	12.1	9.6	11.8	8.71	6.9	6.1	72	72	51
CNPC 12	12.1	11.1	11.8	8.83	7.6	6.5	73	68	55
CNPC 07	10.7	9.5	11.4	7.06	5.9	6.2	66	62	54

The growth efficiency of permanent and nonpermanent elements registered the high values; from this point of view the control was exceeding all three biotypes. The biotype CNPC - 63 was remarked because of its average size, relative little fruits, but it has a high seeds percentage in fruit and a light lignified endocarp. This is a good pollinator for all biotypes.

Table 3 - The productivity of some walnut biotypes

Biotype	Fruit production (t/ha)			The differences to the witness (t/ha)		
	`01	`02	`03	`01	`02	`03
CNPC 63	2.8	3.5	2.2	+1	0	+0.7
CNPC 02	2.6	4.7	2.4	+0.8	+2.4	+0.9
CNPC 47	1.2	2.3	2.0	- 0.6	- 2.4	+0.5
Jupâneşti	1.8	3.5	1.5	Mt	Mt	Mt

The analyses results regarding productivity emphasized biotype CNPC -02 that proved to be superior to the control and to the other biotypes.

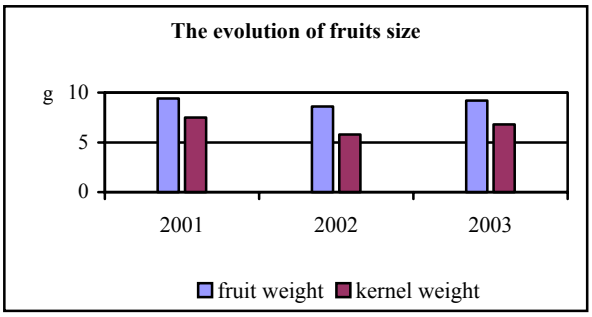
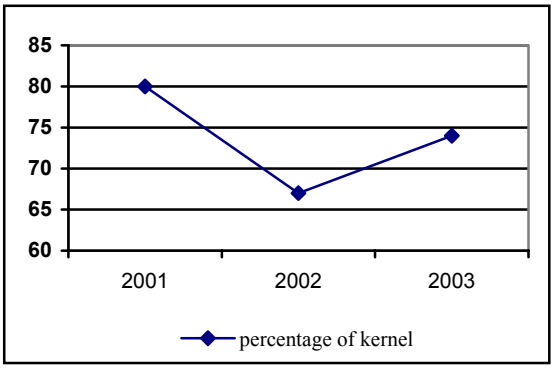


Fig.1 The size fruits modification under the influence of environmental conditions



CONCLUSIONS

The productivity had a fluctuant nature with notable differences from a harvest to another;

The fruits sizes were influenced by the lack of precipitations and because of the high temperatures from the vegetation period;

The fruits content in kernel was influenced by the natural environmental conditions, noticing an accentuated diminution in last years.

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TECHNIQUES FOR A PROPER HERBICIDES APPLICATION ON FRUIT TREES, SMALL FRUITS AND STRAWBERRY

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Paulina MLADIN, M. COMAN

Key words: weeds, preemergent, postemergent herbicide application

SUMMARY

The studies between the years 1993-2003 regarding the influence of new soil management systems on the fruit ecosystem failed to find new technological sequences for the soil management along the tree, small fruit and strawberry.

This paper presents the strategy for weed control with and without herbicides and the key for a proper utilization.

INTRODUCTION

The geographic location, relief and the climate in Romania offer favorable conditions for most fruit species (219 000 ha), but in particular apples (81 025 ha) and plums (99 152 ha), small fruits (1 300 ha) and strawberry (2 100 ha). The dynamics of weed populations in orchards should be at a certain balance, so that the fruit quantity and quality are not lowered. To employ the most beneficial weed control, the weed associations and dominant species have been studied, as well as different management systems, in an experimental program that began in 1993.

MATERIAL AND METHOD

The experimental management system consisted of grass strips between rows and tilled cultivation along the tree rows (manually and/or mechanically) augmented by a range of herbicide or mulch treatments. The number of replicates was 4. The experimental design was a fully randomized block. The treatments along the tree rows were: cultivation; herbicide applications: 1) pre-emergence - simazine, 2) postemergence (glyphosate or glufosinate or paraquat once or twice during the growing season), 3) sequential herbicide applications, pre-emergence simazine + postemergence glyphosate 4) complex herbicide applications, postemergence (terbuthylazine + glyphosate), one/year in association with a pre-emergence herbicide (simazine); and 4 organic mulch applications/year. All these treatments are compared with two controls: I, manual weeding practices and II, non-weeded and unhoed control. The mulch treatment was applied with a preemergent Simanex 500 g/l. There were 11 treatments. Observations on the weed cover level were taken across the plots in spring and summer both by gravimetric and numeric measurements and by a visual approximation method (EWRS scale).

RESULTS AND DISCUSSIONS

Fig. 1 a) and b) show the correlation coefficient between yield and weed control levels related to the soil management system along the tree row. Both the apple crop (R^2 = 0.956***) and the plum crop (R^2 = 0.906***) showed highly significant correlations, demonstrating that the higher the weed control was the higher the yield is.

The weed flora over the whole period consisted of 51 species, of which dicotyledonous flora comprised two subclasses, 12 suborders, 22 families, 40 genera and the monocotyledonous flora included 2 orders, 2 families and 10 genera.

To evaluate the weed control by herbicide applications in case of "key weeds": *Sorghum halepense* (6.7%)*; Elymus repens* (5.4%); *Cynodon dactylon* (4.1%); *Echinochloua crus-galli* (4.0%); *Cirsium arvense* (5.0%); *Sonchus arvensis* (4.1%); *Convolvulus arvensis* (3.9%); *Amaranthus retroflexus* (2.3%) – average frequency of weed occurrence in the untreated control - one must consider not only the costs but also the efficiency over 3 – 4 year period.

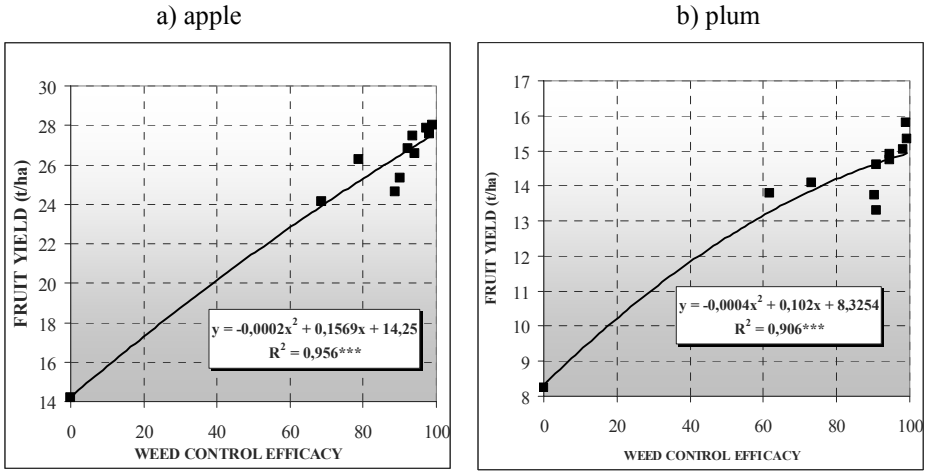
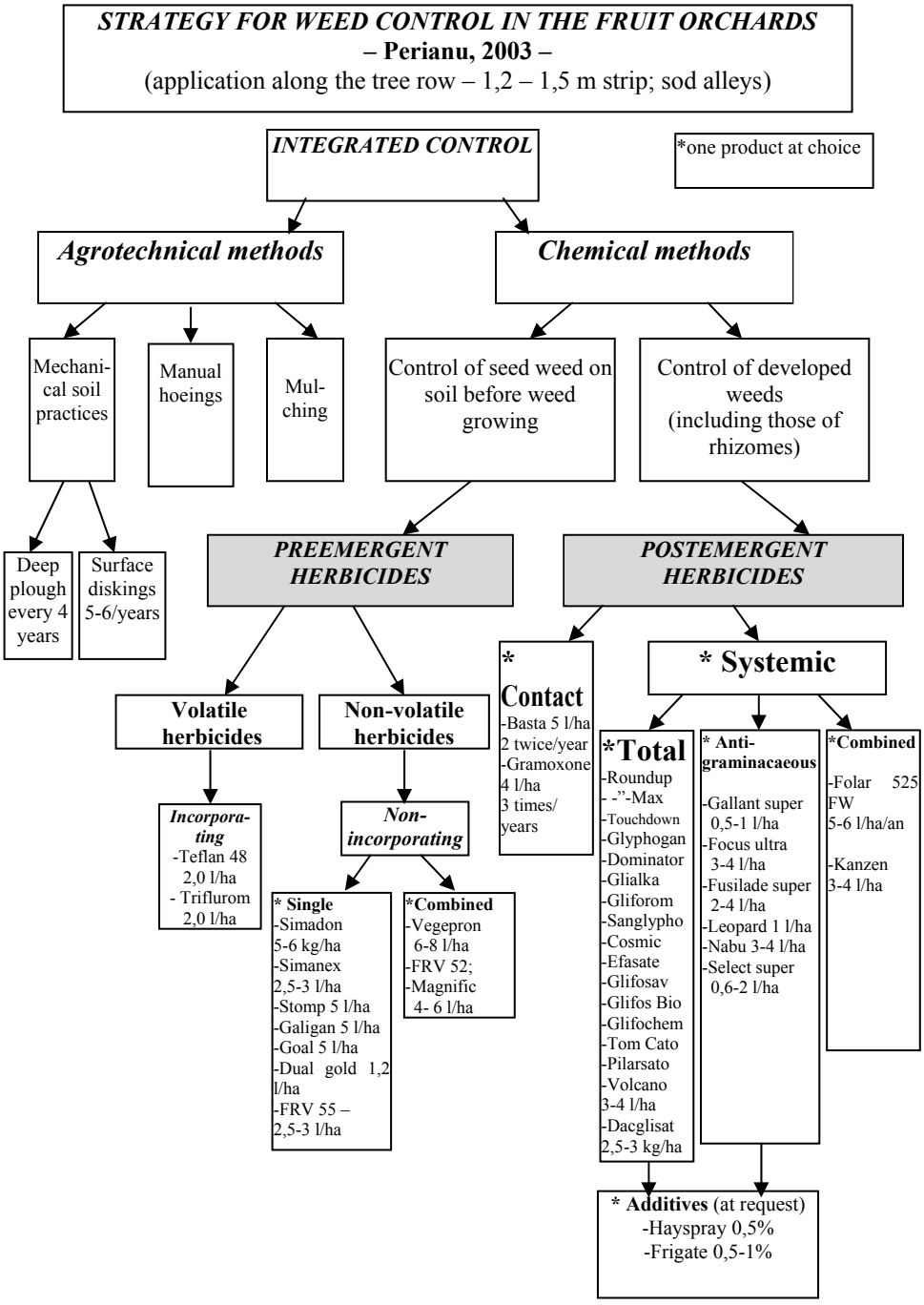


Figure 1. Correlation between the fruit yield and weed control level by soil management techniques for apple (a), plum (b) Piteşti - Mărăcineni, 1993 - 2003


STRATEGY FOR WEED CONTROL IN THE FRUIT ORCHARDS
– Perianu, 2003 –
(application along the tree row – 1,2 – 1,5 m strip; sod alleys)
INTEGRATED CONTROL
*one product at choice
Agrotechnical methods
Chemical methods
Mechani-cal soil practices
Manual hoeings
Mul-ching
Control of seed weed on soil before weed growing
Control of developed weeds (including those of rhizomes)
Deep plough every 4 years
Surface diskings 5-6/years
PREEMERGENT HERBICIDES
POSTEMERGENT HERBICIDES
Volatile herbicides
Non-volatile herbicides
* Contact
-Basta 5 l/ha 2 twice/year
-Gramoxone 4 l/ha 3 times/ years
* Systemic
Incorpora-ting
-Teflan 48 2,0 l/ha
- Triflurom 2,0 l/ha
Non-incorporating
* Single
-Simadon 5-6 kg/ha
-Simanex 2,5-3 l/ha
-Stomp 5 l/ha
-Galigan 5 l/ha
-Goal 5 l/ha
-Dual gold 1,2 l/ha
-FRV 55 – 2,5-3 l/ha
*Combined
-Vegepron 6-8 l/ha
-FRV 52;
-Magnific 4- 6 l/ha
*Total
-Roundup
- -"-Max
-Touchdown
-Glyphogan
-Dominator
-Glialka
-Gliforom
-Sanglypho
-Cosmic
-Efasate
-Glifosav
-Glifos Bio
-Glifochem
-Tom Cato
-Pilarsato
-Volcano 3-4 l/ha
-Dacglisat 2,5-3 kg/ha
* Anti-graminacaeous
-Gallant super 0,5-1 l/ha
-Focus ultra 3-4 l/ha
-Fusilade super 2-4 l/ha
-Leopard 1 l/ha
-Nabu 3-4 l/ha
-Select super 0,6-2 l/ha
*Combined
-Folar 525 FW 5-6 l/ha/an
-Kanzen 3-4 l/ha
* Additives (at request)
-Hayspray 0,5%
-Frigate 0,5-1%

For both apple and plum crops, the highest yield was obtained for an annual postemergence application with a complex herbicide mix (glyphosate 180 g/l + a.i. terbuthylazine 345 g/l), equivalent to 6 l/ha of commercial product. Very good control of 94.6% - 98.3% was obtained for both annual and perennial monocotyledonous and dicotyledonous weeds, giving 26.8 t/ha apple and 15.6 t/ha plum fruit yield. The second best level, 92.8% - 95.9% weed control, was obtained by postemergence I (one application along the tree row; April – May) and II (application on weed spots, in summer only if necessary) herbicide application (spots) with glyphosate at 360 g/l, 4 l/ha dose (1/EWRS scale), giving 25.9 t/ha apple yield and 15.0 t/ha plum yield.

Good results in weed control (95.2% control of annuals – 1/EWRS scale – and 38.8%, representing 5/EWRS scale, for perennials) was obtained for preemergence herbicide application, simazine 500 g (a.i.)/l, 6 kg/ha product + 20 cm-deep mulch applied 4 times a year, giving 25.8 t/ha apple and 15.1 t/ha plum yield.

This economic efficiency represents the key factor for the admitted value of the economical damage threshold, the farmer taking his own decision in choosing the most economic techniques but paying attention to herbicide quality, rate and application timing, as well as climatic factors affecting herbicide efficiency. The weed associations and the dominant "key weed" species were identified as targets for present and future control techniques; herbicide rotations, useful treatment combinations and keeping the weed level under the economic damage threshold were also identified as major concerns.

We recommend to all growers not to kill all the weeds in the orchard, because this is not possible and from a biological point of view, and it is not desirable as a low number of weeds avoids monoculture conditions and was noted to be favorable to the trees, but this aspect was not quantified by now.

CONCLUSIONS

Fruit biotechnologies with weed integrated control management.

Non-poluting herbicides, optimum rates, record/years/plot the 2-nd application / spot

For small fruits and strawberry, the contact and systemic herbicides were applied only with special protection at minimum but effective rates.

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RESEARCHES REGARDING NUTRIENT SOLUTION FERTILIZATION ON ACTINIDIA ARGUTA

PETICILĂ A.G., DAVIDESCU VELICICA

Key words: Kiwi, green cutting, nutrient solution.

OBJECTIVES

- Finding out the optimum substrate for planting the cuttings obtained through green cutting
- Finding out the best nutrient solution type for shortening the necessary time to obtain plants ready for planting in the field
- Studying the effect of the nutrient solutions treatment on the rooted cuttings on *Actinidia arguta*

INTRODUCTION

Actinidia arguta is a liana like kiwi plant (*Actinidia deliciosa*), less vigorous than that. The leaves are simple, with indented edge, smaller and brighter than kiwi's leaves. The leaves' size and shape is common to almost all varieties. The fruit is a berry, hairless, bright and it is consumed without removing the skin. In general it is green and dark green. The fruits' shape varies being prolonged, round or elliptical. The size varies too, depending on the variety and the cultural factors, from 25 g to 30 g.

This specie is considered to be a polymorph one, and in the growth area there are many types differentiated by shape, skin and pulp colour and flavour.

The plant was brought to Russia long time ago because of its resistance to cold. Its alimentary value consists in the high content of C vitamin. The studies done by Miciurin in the 50' (1849) are remarkable; he selected some varieties originated from areas with low temperature (minus 40° - minus 45°C). In New Zealand, the country of commercial kiwi, arguta is treated like a garden plant, and will be soon introduced in culture on large areas.

MATERIALS AND METHODS

In this experimental study there have been used rooted cuttings planted in 14 l containers, in two substrate types: manure, fallow soil, peat and sand. The recipes used were:

- first substrate: 50% manure, 20% peat, 20% fallow soil, 10% sand.
- second substrate: 40% manure, 50% fallow soil, 10% sand.

The components and the substrate obtained were tested from the agrochemical point of view (tab. 1).

The varieties used in this experience were Jumbo (AA5) and Francesca (AA2). These are varieties with very big fruits (10-30 g), with bright green colour, and a maturity period at the mid September. The fruit composition analyzes

pointed out the next values: 9.2-9.5% sugar, total acidity expressed in malic acid 0.281%, dry matter 16.34%, C vitamin 50-70 mg/100g comestible part.

The nutritive solutions were administrated with regularity at a 3 week period, in constant quantities.

These solutions composition is given in the table.

Table 1 - Solutions compositions

Nutrient solution 1		**Nutrient solution 2**	
Macroelements		Macroelements	
Salt	**Concentration (g/l)**	**Salt**	**Concentration (g/ 10 l)**
$(NH_4)_2HPO_4$	0.145	NH_4NO_3	3.0
KNO_3	0.625	KNO_3	5.0
HNO_3	0.350	$(NH_4)_2HPO_4$	3.5
$Ca(NO_3)_2 \times 4H_2O$	0.127	$MgSO_4$	3.0
$Mg(NO_3)_2 \times 6H_2O$	0.18		
Microelements		Microelements	
Salt	**Concentration (g/l)**	**Salt**	**Concentration (mg/l)**
NH_4MoO_4	0.05	H_3BO_3	140
H_3BO_3	1.5	$ZnSO_4$	100
$MnSO_4 \times 5H_2O$	2.0	$FeSO_4$	250
$ZnSO_4 \times 7H_2O$	1.5	$MnSO_4$	100
$CuSO_4 \times 5H_2O$	0.25	$CuSO_4$	100
Fe-EDTA	0.6		

RESULTS AND DISCUSSION

Following the analyses results on the plant and substrate, it is noticed that AA2 on second substrate assimilated in leaves higher quantities of nitrates (382 ppm) compared with the plants on first substrate that had a nitrate content of 176 ppm. The plant fertilization with nutrient solutions on the same second substrate showed positive effects upon NO_3 absorption in plant, in I solution case the content was 488 ppm and at the II solution – 420 ppm.

AA5 on first substrate showed at the control values of 132 ppm PO_4 and a slightly positive reaction at II solution when the leaves content is 192.4 ppm, while at the second substrate, the control showed inferior values (79.6 ppm) and a positive reaction at the fertilization with II solution, when the PO_4 content was 224.4 ppm.

On the first substrate, AA2 registered a high content in potassium for both the control and the fertilized variants, the values being practically equals - 14200 ppm at the variant fertilized with I solution and 14600 ppm at the plants from

control variant and those fertilized with II solution. AA5 variety doesn't show different values regarding the potassium content in leaves, both in the case of culture substrates and in the case of nutrient solution fertilizations, the limits being of 7240 ppm K (control on second substrate) and maximum 9000 ppm K (first substrate fertilized with II solution).

Table 2 - N, P, K content (ppm) unmetabolized forms and dry matter content (%) in kiwi plants – First Substrate

Variety	Variant	Dry matter (%)	ppm content		
			NO_3	PO_4	K
AA2	Ct	20.0	176	104.8	14600
	Sol 1	18.8	213	135.2	14200
	Sol.2	18.6	362	192.4	14600
AA5	Ct	19.6	304	132.0	7880
	Sol.1	20.2	288	93.6	7480
	Sol.2	22.5	253	152.4	9000

Table 3 - **N, P, K content (ppm) unmetabolized forms and dry matter content (%) in kiwi plants – Second Substrate**

Variety	Variant	Dry matter (%)	ppm content		
			NO_3	PO_4	K
AA2	Ct	22.1	382	116.0	11600
	Sol 1	22.4	488	104.8	9000
	Sol.2	19.8	420	92.4	7240
AA5	Ct	21.9	390	79.6	7240
	Sol.1	19.8	422	156.0	8840
	Sol.2	19.5	370	224.4	7760

CONCLUSIONS

- Nutrient solutions fertilization on rooted cuttings of *Actinidia arguta* represents the best results regarding the NO_3 accumulation at the plants fertilized with I solution on second substrate at AA2 and AA5 compared with the first substrate.
- Regarding the PO_4 accumulations it is concluded that both nutrient solutions influenced positively the absorption on first substrate.
- K content proved to be substantial high on the plants from second substrate, fertilized with both nutrient solutions.
- II solution on second substrate showed the best results, and this is recommended in order to obtain vigorous plants in short time, without transplantation problems.

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SELECTION OF SOME HYBRID ELITES OF KIWI (*ACTINIDIA ARGUTA*) FOR THE EXTENSION IN FRUIT PRODUCTION

STĂNICĂ F., GAVRILUȚ CEZARA., NICOLAE D.

Key words: Gooseberry, breeding program, seedlings, physical fruit characteristics, chemical fruit characteristics

SUMMARY

Chinese gooseberry (*Actinidia arguta* Sieb. et Zucc.) is an interesting kiwifruit specie from the *Actinidia*'s genus and it was included since 1993, in our breeding program. Being more frost resistant than the others kiwi and having tasty small fruits, smooth skin with different aroma and flesh colour, *Actinidia arguta*, can be extended in Romania in commercial and amateurs orchards.

More than 1000 hybrid seedlings were planted in 1993 in the experimental field at the Faculty of Horticulture in Bucharest. In 2001, first fruits were obtained and the selection continued in 2002 and 2003.

For each hybrid different plant morphological characteristics were studied: tree vigour, leaves and flowers shapes and aspects like phenological behaviour: date of bud opening, flowering, fruit ripening period and leaves fall.

Fruits were analyzed from the physical and biochemical point of view at the ripening moment and after different periods of storage.

After the first two years of fruit selection, few elites with interesting characteristics were chosen to be multiplied and tested during the next step of the breeding process.

INTRODUCTION

In 1993, a big number of kiwi hybrids (*Actinidia arguta*) obtained by Prof. Giuseppe Zuccherelli, by free and controlled crossing, were brought to Romania from Vitroplant Cesena, Italy. The genitors used were the following genotypes: AA2, AA5, AA6, A8, Francesca, Rosana, Jumbo and ARM.

Since the culture establishment, a lot of researches have been made regarding the kiwi behaviour in the Romanian climate and its physiological and economical evolution in the future.

The kiwi plant (*Actinidia arguta*) has got a lot of points of interest like: the high resistance to low temperatures (-20°C) and diseases, the fruit quality expressed by the size, colour, flavour, soft skin and in the greatest content in C vitamin.

MATERIALS AND METHODS

The trials were carried out on the experimental field of the Faculty of Horticulture from Bucharest during three years (2001-2003). During the research period, there have been made remarks, measurements and determinations, chemical analyses.

As the physical characteristics there have been determined the fruit size using the vernier calliper, the average weight (g) and the fruit colour.

The fruit firmness (kgf/cm²) has been measured with a penetrometer equipped with a piston of 8 mm diameter, right after the harvest.

Concerning the fruits chemical composition the following issues were determined: total dry matter (%) by the drying method at 105°C, soluble dry matter (%) by the refractometer method, the minerals content (%) by calcination method at 600°C, the acidity (g malic acid/100 g f.s.), by titration with NaOH, the ascorbic acid (mg/100 g f.s.), by iodometric method.

RESULTS AND DISCUSSIONS

Fruit physical characteristics

The fruit weight (g) varied between 2.0 g ($R_{10}P_{20}$) and 12.2 g (R_8P_2) in 2002 and between 2.0 g (R_{10} P_4) and 11.2 g (R_8P_2) in 2003 (table 1).

Table 1 Fruit physical characteristics

Hybrid	Weight (g)			Firmness (kgf/cm²)		Colour
	2001	**2002**	**2003**	**17.09**	**01.10**	
R_7P_1	4.50		4.80	3.7	0	red
R_8P_1	7.90	8.50	10.80	5.54	0	green
R_8P_2		**12.20**	**11.20**	5.53	3.50	green
R_8P_3	**9.01**	9.50	10.00	4.22	0	olive
R_8P_6	5.80		7.36	4.15	0	green
R_8P_7	7.25	7.80	9.80	4.23	0	olive
R_9P_1	7.80	8.60	7.60	5.25	0	green
R_9P_2	7.80	8.20	7.60	5.21	0	green
R_9P_4		10.00	8.50	5.80	0	green
R_9P_7			8.70	4.80	0	red
R_9P_{17}			5.60	3.74	0	red
$R_{10}P_3$	4.60		4.70	3.14	0	green
$R_{10}P_{26}$			**2.30**	4.14	0	red
$R_{10}P_{30}$		6.00	5.30	0	0	red
$R_{10}P_{32}$	**3.80**	**3.80**	3.50	4.12	0	red

The pulp firmness indicates the right moment for ripening and also the fruit storage capacity. In 2003, the values measured varied from 3.1 kgf/ cm^2 ($R_{10}P_3$) to 5.8 kgf/cm^2 (R_9P_4).

Most of the fruit selections have green skin and pulp. Some others selections formed olive fruits R_8P_3, R_8P_7 and an important number formed red fruits: R_7P_1, R_7P_4, R_9P_7, R_9P_{13}, R_9P_{17}, $R_{10}P_{20}$, $R_{10}P_{26}$, $R_{10}P_{29}$, $R_{10}P_{30}$, $R_{10}P_{32}$.

Fruit chemical characteristics:

The fruit soluble dry matter content has showed an increasing evolution in 2003 compared to 2002 on the hybrids R_8P_1 (12.30%) and R_9P_2 (19.20%).

Concerning the fruit total dry matter content, high values are noticed on R_8P_3 (15.91%) and R_9P_7 (22.80%), in 2003 (Table 2).

Table 2 - The soluble and total fruit dry matter content of some hybrid elites of *Actinidia arguta*

Hybrid	Soluble dry matter %		Hybrid	Total dry matter %	
	2002	2003		2002	2003
R_7P_1		18.50	R_7P_1		22.25
R_8P_1	15.41	12.30	R_8P_1	17.36	17.12
R_8P_2	13.53	14.20	R_8P_2	18.97	17.22
R_8P_3	13.45	14.20	R_8P_3	13.82	15.91
R_8P_6		14.63	R_8P_6		17.45
R_8P_7	10.23	12.30	R_8P_7	17.14	17.80
R_9P_1	13.66	18.10	R_9P_1	15.42	18.53
R_9P_2	15.23	19.20	R_9P_2	19.69	19.78
R_9P_4	14.11	15.20	R_9P_4	18.53	21.88
R_9P_7		17.50	R_9P_7		22.80
R_9P_{17}		16.32	R_9P_{17}		18.48

The fruit content in minerals (%) varied in 2002 between 0.07 % (R_8P_3) and 1.6% ($R_{10}P_{32}$) and between 0.06% (R_8P_3) – 0.4% (R_9P_{17}), in 2003.

The ascorbic acid content in fruits (mg/100g pp) increased also in 2003 (table 3). The average content varied between 20.95 (R_8P_2) and 65.30 (R_8P_1) in 2002, and between 26.88 (R_8P_2) and 76.70 (R_9P_7) in 2003.

The total acidity expressed in % malic acid, presented a variation from 0.9 (R_8P_2) to 1.7(R_8P_7), in 2002 and from 0.5% (R_9P_2) to 1.1% (R_8P_7), in 2003 (table 3).

A number of 10 elites were selected in order to be multiplied and tested in orchard conditions: R_8P_1, R_8P_2, R_8P_3, R_8P_7, R_9P_1, R_9P_2, R_9P_4, R_9P_7 $R_{10}P_3$ and $R_{10}P_{30}$.

Table 3 - The fruit ascorbic acid and the acidity content of some hybrid elites of *Actinidia arguta*

Hybrid	Ascorbic Acid mg/100g		Total Acidity %		Hybrid	Ascorbic Acid mg/100g		Total Acidity %	
	2002	2003	2002	2003		2002	2003	2002	2003
R_7P_1		70.68		0.7	R_9P_2		47.65	0.9	0.5
R_8P_1	65.30	70.15	1.1	0.6	R_9P_4	45.2	62.50	1.2	0.7
R_8P_2	20.95	26.88	1.4	0.8	R_9P_7		76.70		0.8
R_8P_3	63.20	64.11	1.2	1.0	R_9P_{17}		35.62		0.7
R_8P_6		36.50		0.9	$R_{10}P_3$		86.04		0.5
R_8P_7	30.67	45.50	1.7	1.1	$R_{10}P_{26}$		30.05		0.4
R_9P_1	35.80	39.10	1.3	0.9	$R_{10}P_{30}$	32.8		1.3	

CONCLUSIONS

The first results obtained in the evaluation process of the studied *Actinidia arguta* hybrid selections led to the following conclusions:

1. The biggest fruits belonged to the hybrid R_8P_2.
2. The same hybrid maintained its pulp firmness at high levels during the storage period.
3. The highest productivity between 2002-2003 was noticed at the elites R_9P_1 and R_9P_2 (more than 5 kg/plant).
4. The hybrids R_7P_1, R_8P_1 and $R_{10}P_3$ accumulated the highest C vitamin content (70.68 mg/100g, 70.15 mg/100g and 86.04 mg/100g, respectively).
5. The highest soluble dry matter content was found in the fruits of $R_{10}P_{30}$ in 2002 and R_9P_2 selections in 2003.

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NORTHERN BANANA (*ASIMINA TRILOBA* L. DUNAL) – A NEW FRUIT SPECIE IN ROMANIA

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Key words: Paw-Paw, taxonomy, plant description, ecology, propagation, culture technology

SUMMARY

Northern banana, or asimina, is new fruit specie that incited the interest of both the specialists and growers in the native area – Northern America and also in many European countries. Beside their taste and exotic flavour, the asimina fruits are extremely appreciated for their high content in A and C vitamins, minerals like Ca, Fe, Mg, Mn and amino acids, more over the values found in apples and peaches. Asimina is hardy specie and can be successfully grown in the temperate regions. In winter it resists until -25°, even to -30°C. It needs almost 160 days for the vegetative period and grows well in areas with 700-800 mm rainfalls. The most common propagation method is from seeds, but for a qualitative planting material, that sets fruits rapidly, seedling grafting with valorous varieties scions is recommended. The main varieties cultivated at the moment are Sunflower, Overleese, Davis, Ithaca, Prolific, Taytwo and Prima 1216. The recommended planting distances in the orchard, are: 4.5-5.0 m between the rows and 2.5-3.0 m between the plants on the row. Asimina doesn't require special phytosanitary treatments being a contributing factor to the diminution of the environmental pollution level, and its fruits are naturally free of pests' residues. All these elements, suggest that, northern banana represent one very interesting fruit specie with high chances for extension in the future in Romania.

INTRODUCTION

Northern banana or asimina is new fruit specie that incited the interest of both the specialists and the growers in the native area – Northern America, and also in many European countries.

Northern banana (*Asimina triloba* L.) is specie from the Annonaceae family, being known in America under the name of Paw-Paw, the Indians' banana or northern banana.

The fossil record indicates the presence of pawpaw in North America millions of years before the humans' arrival. The Native Americans were great lovers of the pawpaw and introduced it to European explorers.

In 1540 the DeSoto expedition reported encountering tribes that cultivated the fruits. It was in 1736 when the botanists John Bartram and Peter Collinson arranged for the first specimens to be sent to England.

Only after 1900 numerous individuals, including the renowned botanist David Fairchild, have collected superior clones from the wild and worked at improving the pawpaw. In the same period, the first breeding researches and experimentations regarding plant propagation, growing and fruit use took place on scientific basis.

TAXONOMY

Asimina is included in the order of Magnoliales, Annonaceae Family (Custard-apple Family) and *Asimina* (Adans.) genus.

In this moment, the most part of authors includes 9 different species in the *Asimina* genus (table 1).

Table 1

Species of the Asimina genus

	Scientific name	Common name
1	*Asimina angustifolia Raf.*	slimleaf pawpaw
2	*Asimina incana (Bartr.) Exell*	woolly pawpaw
3	*Asimina ashii Kral*	
4	*Asimina obovata (Willd.) Nash*	bigflower pawpaw
5	*Asimina parviflora (Michx.) Dunal*	smallflower pawpaw
6	*Asimina pygmea (Bartr.) Dunal*	dwarf pawpaw
7	*Asimina reticulata Shuttlw. Ex Chapman*	netted pawpaw
8	*Asimina tetramera Small*	fourpetal pawpaw
9	*Asimina triloba (L.) Dunal*	pawpaw

PLANT DESCRIPTION

Asimina grows like a bush or it could be led as a tree of 3-7 m high. Its foliage is bushy, dark green and shining, and the leaves are big, obovate and similar in form with the horse chestnut tree leaves' folioles.

The single hermaphrodite flowers, formed at the leaves axils, have a brown-reddish colour. The pollination takes place with the help of flies, butterflies and other insect species.

More fruits are formed from each flower, only 1-4 reaching the ripening maturity. The fruits are berries with different shapes and sizes: spherical, elongated, reniform, 50 to 500 g. The fruit skin is thin, smooth, coloured in light green or yellow-green and it is covered with a wax layer.

The fruit pulp is sometime yellowish-orange, fine, creamy and sweet, with taste and flavour combining those of banana, pine-apple and mango fruits. Inside the pulp, there are many brown seeds, with beans like shape, laid on two lines and covered in a whitish, astringent tasted tegument.

Beside their taste and exotic flavour, the asimina fruits are extremely appreciated for their high content in A and C vitamins, minerals like Ca, Fe, Mg, Mn and aminoacids, more over the values found in apples and peaches.

ENVIRONMENTAL REQUESTS

Asimina is hardy specie and can be successfully grown in the temperate regions. In winter it resists until -25°, even to -30°C.

Although it can be very well adapted to different soil types, asimina prefers light soils, well drained, rich in organic matter, with a neutral or slightly acid pH. The rooting at planting and transplanting is difficult; reason for what the bare roots planting is not recommended. This is why the entire technology of planting material production is realized in containers.

It needs almost 160 days for the vegetative period and grows well in areas with 700-800 mm rainfalls. The water deficiency results in leaves fall and it must be overcome through moderate irrigation.

PROPAGATION

The most common propagation method is from seeds. After the seeds extraction, they must be kept in fridge at a temperature of 2-3°C, for 90-120 days, in polyethylene bags, airtight closed.

The seeds are sown at mid-February and they rise up in June. Before sowing, seeds' soaking in hot water for 24 hours is recommended to stimulate the germination process.

The seeds, laid in high pots, are covered with 10 cm soil layer. After the plants rose, they are put under shadow, and transplanted in bigger pots, if needed.

The seedling growth is very weak in the first 2-3 years, first fruits being obtained only after 5-6 years. But for a qualitative planting material, that sets fruits rapidly, the seedling grafting with valorous varieties scions is recommended. The best grafting methods are whip&tongue cleft, bark grafting and Chip Budding. Our first trials on bark grafting indicated that the best period for grafting is immediately after the bud opening.

GROWING TECHNOLOGY

The main varieties cultivated at the moment are Sunflower (used also as rootstock), Overleese, Davis, Ithaca, Prolific, Taytwo and Prima 1216, selected by the Italian farmer Domenico Montanari. In this moment, the Faculty of Horticulture collection has seven varieties.

Sunflower and Prima 1216 varieties are self-fertile. All the others need pollinator, reason for what they cannot be single planted.

It is recommended to plant them in areas free of strong winds, with planting distances: 4.5-5 m between the rows and 2.5-3 m between the plants on the row.

The trees are freely led, but with their natural growing tendency the leading shape will become pyramidal. The vase leading shape could favour an equilibrate growing and fructification. Trees pruning confer an adequate crown enlightening, limits the trees grow and rejuvenates the flowering branches.

The recommended soil maintenance is with grass on the inter rows and clean or herbicided on the row. The trees behave very well when mulching with straws, hay, sawdust, compost or other organic materials.

During drought periods, moderate irrigation is recommended. N, P and K fertilizations are welcomed annually in quantities of 170-200 kg/ha.

Asimina is resistant to diseases and pests and doesn't require special phytosanitary treatments. Being a "clean" specie, asimina reduces the environmental pollution level and its fruits are naturally free of pesticides.

FRUIT HARVESTING AND MERCHANDISING

The asimina fruits are ripen in phases, from August until September. The optimum harvesting time is difficult to be appreciated only by fruits aspect. They are harvested when they have reached the maximum tasting quality and when they are easily detachable off the branches.

Fruits must be carefully manipulated since they are very sensitive to mechanical wounds.

After harvesting, fruits can be maintained in fridge at a temperature of 1-5°C only for 10-15 days. By freezing, the fruit consumption can be prolonged several months. Many consumers prefer to eat the fruits when their skin starts to blacken. Beside the fresh consumption, fruits could be used also in different culinary dishes.

Having all these reasons we are convinced that asimina or northern banana will soon be found in Romanian gardens, rewarding its fans with the delicious fruits and embellishing their gardens with the extremely decorative appearance of the plants.

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INFLUENCE OF TREE SOIL WATER UPTAKE ON FRUIT YIELD IN THE GOLDEN DELICIOUS APPLE CULTIVAR GRAFTED ON MM 106

N. TĂNĂSESCU

Key words: crop evapotranspiration, loamy-clayey soil

SUMMARY

The experiment was carried out at the Research Institute for Fruit Growing, Maracineni-Arges, in an intensive apple orchard during a 7-year period. The trial was organized after the split-plot method, for each treatment: control (non-irrigated), sprinkler, micro-sprinkler and drip irrigation. Irrigation was applied according to the soil water moisture content that was not allowed to decrease below the minimum value of the easily-available threshold in the wetted soil volume. Crop water uptake in the Golden Delicious apple cultivar induced a positive effect on fruit yield. A direct, linear and significant correlation was found between these two parameters. The maximum values of the average fruit mass in the Golden Delicious apple cultivar was obtained at a 500-520 mm of crop water uptake by the tree roots during a growing season under the soil and climate conditions from Maracineni.

INTRODUCTION

Soil water uptake, defined as real evapotranspiration (ET_c) of a crop under certain conditions of growing, is a very complex process. Its deployment and final values depend on both the plant structure and physiology for crop in different stages and soil, climate and technological conditions for trees (Iancu et al., 1999). Consequently, to calculate ET_c specific for each crop, a long period investigations are needed in concrete crop conditions (Tanasescu, 1999). Knowing the tree ET_c value plays a key role in order to determine the irrigation depth assuring an optimum soil air-water regime for a good tree growth and fruit setting (Paltineanu et al., 1999).

Abroad, investigations on ET_c were performed by a number of scientists, as Jensen et al. (1990), Allen et al. (1989), Rossi et al. (1989) and Smith (1992).

The purpose of this paper is to bring more evidence in presenting the role of apple ET_c in fruit growing.

MATERIAL AND METHOD

The soil, a Brown type, had a loamy-clayey texture and the water level is below 5 m depth.

The experiment was carried out at the Research Institute for Fruit Growing, Maracineni-Arges, in an intensive apple orchard during a 7-year period. The trial was organized after the split-plot method, for each treatment: control (non irrigated, NI), sprinkler (SP), micro-sprinkler (MS) and drip irrigation (DI), in 3 replicates. Irrigation was applied according to the soil water moisture content that was not allowed to decrease below the minimum value of the easily-available

threshold in the wetted soil volume. Irrigation depth was differentiated after the irrigation method used. ET_c was covered by the precipitation higher than 5 mm, irrigation depth and soil water reserves.

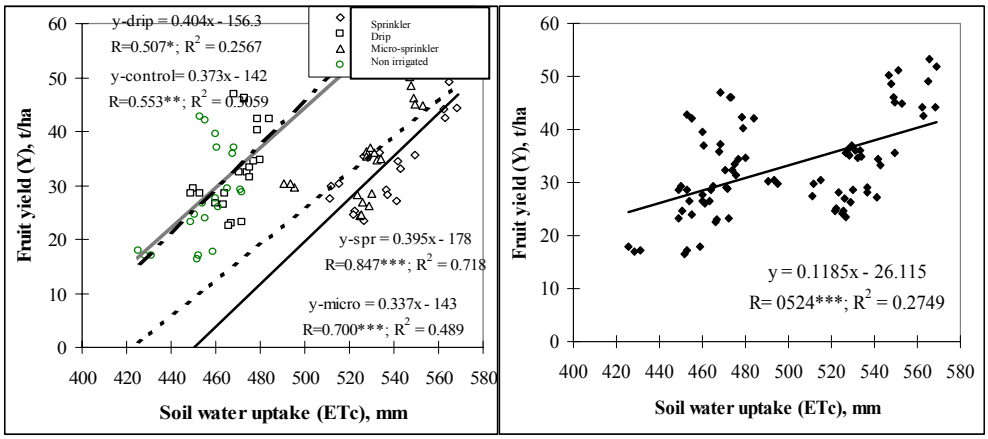
Precipitation taken into consideration in the ET_c calculation was corrected after the USBR method recommended by the Cropwat program (Smith, 1992).

Fruit yield and fruit mass were annually determined for each treatment and all data obtained were statistically processed.

RESULTS AND DISCUSSIONS

Average annual values for ET_c for the 7 years of study ranged between 455 mm in the control treatment and 545 mm in the SP treatment.

Fruit yield was correlated directly and linearly with ET_c in each year studied, and fig 1a shows this correlation computed with the data for all years of experiment and each treatment. The positive influence of ET_c on fruit yield (Y) is revealed by this graph that shows the crop response to soil water extracted by trees.



a) **b)**

Fig. 1. Correlation between fruit yield (Y) and soil water uptake (ET_c) in each treatment studied and all years of experiment (a), and in all treatments studied taken together and all years of experiment (b), Maracineni-Arges

ET_c was lower in the NI treatment and DI treatment and their coefficients of determination were also lower (0.30 and 0.26, respectively). However, the coefficient of correlation was still significant for the DI method. In return, ET_c and Y were higher in the MS treatment and SP treatment with the coefficient of determination of 0.49 and 0.72, respectively, and the correlation were highly significant.

In all the years of experiment and treatments studied, Y and ET_c were linearly, directly and highly significant, with $R^2 = 0.27$, fig. 1b. The DI treatment

data are located over the regression equation line in this graph, showing thus a higher efficiency of soil water on this treatment. This could be attributed not only to the water amount applied over the field but also to the irrigation water way of spreading to the crop. Evaporation, infiltration, deep percolation and crop transpiration were the processes differentiating between the treatments.

ET_c also induced a positive effect on the fruit average mass (M). However, the correlation type found here was parabolic and highly significant for each year of study (data not shown). Taken together from all the treatments and years of study, the M-ET_c correlation had also a parabolic shape and was highly significant ($R^2 = 0.31$), fig. 2.

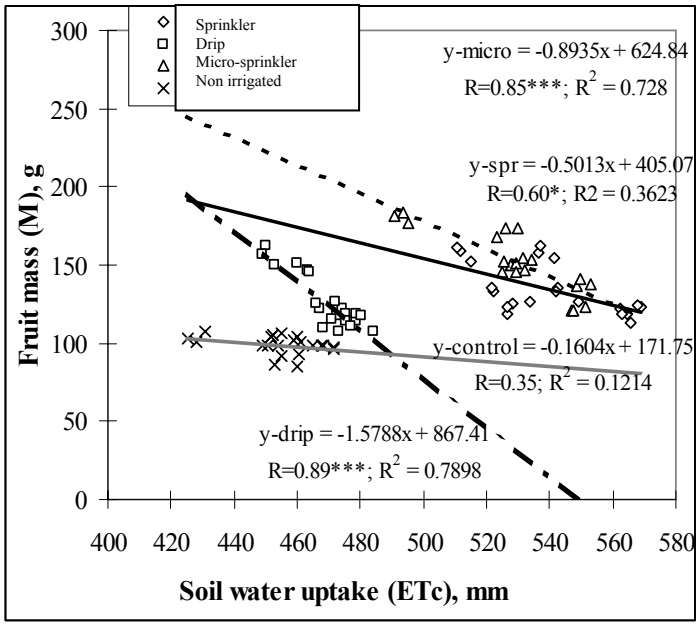


Fig. 2. Correlation between fruit mass (M) and soil water uptake (ET_c) in each treatment studied and all years of experiment, Maracineni-Arges

The maximum point of the parabola was located within the ET_c range of 500-520 mm. At higher ET_c values M decreases due to the losses of water not used by the crop and evaluated as water consume.

The optimum ET_c in apple tree grown under the soil and climate conditions of Maracineni–Arges ranged between 480-540 mm, with the SP treatment showing the maximum values and the DI treatment had the minimum values.

CONCLUSIONS

Crop water uptake on the Golden Delicious apple cultivar induced a positive effect on fruit yield. A direct, linear and significant correlation was found between these two parameters.

The maximum values of the average fruit mass in the Golden Delicious apple cultivar was obtained at a 500-520 mm of crop water uptake by the tree roots during a growing season under the soil and climate conditions from Maracineni-Arges.

From all the irrigation treatments studied in this paper the most recommended for application by farmers under the specific natural and technological conditions of this country are the micro-sprinkler irrigation and the drip irrigation.

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VEGETABLE GROWING

STUDIES CONCERNING THE MAIN CHARACTERS VARIABILITY OF CHANTENAY RED CORE CARROT IN THE CONSERVATIVE SELECTION PROCESS

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MIHU GHICĂ, CRISTEA TINA

Key words: Conservative selection, variability, carrot Chantenay Red Core, authenticity, genotype.

SUMMARY

Maintaining the carrot varieties between the specific lines of variability represents the main objective of conservative selection. (Chira, 1996). The genetic diversity and the influence of the environmental factors over the variability of some characters from carrot varieties were underlined by Kuckuck (1979). His studies showed the fact that the observed variability was determined by the interaction of some genes with discrete effects which are called polygenes.

The variability and the quantitative characters correlation from this species were underlined by Choi and colab. (1994), Sazanana (1977). The genotype, the interaction between the environmental factors and the compulsory allogamy of the carrot plants, determine these species to act like a population with a high level of uniformity (Banga, 1963).

The correlation method used in variability analysis of the characters by Kellner and Varga (1964) and Chira (1995) revealed very interesting results concerning the existence and the meaning of the interactions between the genotype and the environmental factors. The merit of the conservative selection through the annual analysis of characters variability for the carrot varieties is that it avoids the modification of the genetical constitution and valuable features and also the varieties degeneration in time. By annual analysis of the varieties variability, the conservative selection does not allow the modification or loss of the valuable characteristics and feature, avoid the degeneration in time of the variety.

MATHERIAL AND RESEARCH METHOD

The analysis of the main characters variability of the carrot variety Chantenay Red Core, was made at The Vegetable Research And Development Station Bacau in the period of 1998-2002.

The variability study was made on samples extracted from the statistic population. These samples were analysed for the next characters:

- **mother plant**: the length of the roots (cm), the diameter of the colet (cm), diameter of the central cylinder (cm), the weight of the root (g);
- **seed plants**: the plant's height (cm), the flower stems number / plant, the inflorescence number / plant, the seeds / plant.

The characters variability was appreciated with the help of the histogrames variation (Potlog and Velican, 1971).

After the establishment of the coefficient variability and of the variation limits estimated for each character from the selection scheme link, we made three selections on the biological material year by year, in order to maintain the Chantenay Red Core variety in the limits of specificity and authenticity. For knowing the existing connections between the production elements we have estimated the coefficients of simple phenotipical correlation, we have established their signification, we have estimated the equation of linear and not linear regression and we have represented them graphically.

RESULTS AND DISCUSSIONS

The obtained results are presented in the tables1-3.

The analysis of the observations concerning the run through the main phenophases proves the fact that the Chantenay Red Core variety is semiearly, with a vegetation period of 96 - 108 days from rising to the consumption maturity.

Table 1

The vegetation phenophase of the carrot variety Chantenay Red Core 1998 – 2002

Nr. crt.	Phenophase	The duration of the phenophase -days-	The sum of the grades for temperatures (^{0}C)	Total rain -mm-
Mother plants				
1	sown-rising	15	308.7	50.8
2	rising - thicken of the root	18	310.9	47.6
3	thicken of the root- technological maturity	88	1580.0	204.0
Seed plants				
4	Planting-starting of the vegetation	12	142.5	8.0
5	starting of vegetation-initiation of flower stem	50	874.4	100.1
6	initiation of flower stem-all flower blossom	20	370.4	40.9
7	all flower blossom-ripe	25	680.7	68.0
8	ripe-harvest	20	507.8	7.0

Studying the character variability (table 2), expressed in the population of the offspring control in the field (mother plant and seed plants), we can conclude that Chantenay Red Core variety presents a low variability for the next characters (the root length, the collet diameter of the, the seed plants height) and a medium variability for: the central cylinder diameter (cm) (CV =10.066 %); the root weight (g) (CV = 10.075%); the quantity of the seeds/plant (g) (CV =13.66%); the number of the flower stems/plant (CV = 18.45%).

Table 2

The variability of the main characters for the carrot variety Chantenay Red Core - medium for 5 years

Nr. crt.	Character	Arithmetical medium	Standard deviation	Variability Coeff.	The dispersion grade
Mother plants					
1	the root length (cm)	12.74	0.73	5.74	11.0-14.6
2	the collet diameter (cm)	4.24	0.34	8.071	3.4-5.0
3	the central cylinder diameter (cm)	3.0	0.30	10.066	2.2-3.6
4	the root weight (g)	129.56	13.05	10.075	85-150
Seed plants					
5	the plant height (cm)	94.10	6.050	7.25	80-110
6	the quantity of the seeds/plant (g)	14.28	7.090	13.066	10-18
7	No of flower stems/plant	7	2	18.45	4-10

The variability of the main characters of the carrot variety Chantenay Red Core (table 2) is:

low variability has the next characters:	*medium variability:*
- the root length (cm); - the diameter of the collet (cm); - the height of the seed plants (cm). (CV< 10%);	- the diameter of the central cylinder (cm) (CV =10.066 %); - the weight of the root (g) (CV = 10.075%); - the quantity of the seeds/plant (g) (CV =13.66%); - the number of the flower stems/plant (CV = 18.45%)

Table 3

The phenotipical correlation coefficients of the main characters for the seed plants of Chantenay Red Core carrot variety

	Correlated characters	The value of the correlation coeff.	Significance
The mother plant weight	No. of flower stems	0.895	***
The mother plant weight	The plant height	0.069	
The mother plant weight	The quantity of seeds/plant	0.810	***
The mother plant weight	No of .inflorescence/ plant	0.812	***
The mother plant weight	M.M.B.	0.852	***
No. of flower stems	The plant height	0.031	
No. of flower stems	No of .inflorescence/ plant	0.862	***
No. of flower stems	The quantity of seeds/plant	0.843	***

The phenotypical correlation coefficients of the main characters for the seed plants of carrot are presented in table 3. We can observe the fact that the weight of the root is positively correlated with the quantity of the seeds/plant (r1=0.808; r2=0.810), the number of the inflorescence/plant (r1=0.771; r2=0.812).

The number of the seed stems is positively correlated, very significant with the quantity of the seeds/plant (r1=0.842; r2=0.862).

The seed plant habitus influences the seeds quantity and quality, because a nonaxial grow corresponds with a larger number of equivalent stems, so a larger number of I range stems/plant, with a simultaneous blossom at the beginning of the flowering phenophase, followed by a maturation of the seeds in the same time.

CONCLUSIONS

The correct application and the efficient selection in the producing process of the seeds at carrot variety Chantenay Red Core presumed the accomplishment of a large number of observations and determinations over the main characters of the family which compose the population.

In order to obtain conclusive data it was necessary to have a large number of individuals from each family. The genes frequency and the population genotype modifications determine the modification of the medium of characters and so, of the variety features. For this, it is necessary to know exactly the structure of the variety, and after each cycle of selection to compare the results with its initial structure.

The estimation and analysis of this genotype variability showed the fact that:

low variability has the next characters:	*medium variability:*
- the root length (cm) CV = 5.74%); - the diameter of the collet (cm) (CV= 8.071%); - the height of the seed plants (cm) (CV= 7.25%);	- the diameter of the central cylinder (cm) (CV =10.066%); - the weight of the root (g) (CV = 10.075%); - the quantity of the seeds/plant (g) (CV =13.66%); - the number of the flower stems/plant (CV = 18.45%)

The phenotypical correlation coefficients of the main characters for the seed plants of carrot are:

-the root weight is positively correlated with the quantity of the seeds/plant (r1=0.808; r2=0.810) and with the number of the inflorescence/plant (r1=0.771; r2=0.812).

-the number of the seed stems is positively correlated, very significant with the quantity of the seeds/plant (r1=0.842; r2=0.862).

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COMPARATIVE STUDY OF NEW TOMATO HYBRIDS CULTIVATED IN COLD GREENHOUSES, IN ŞTEFĂNEŞTI – ARGEŞ

ANGHEL ADRIAN, MUŞA FLORINA

The present study's object is to compare five new tomatoes hybrids to the Arleta variety which was already cultivated in the greenhouses of our country.

MATERIALS ANDS METHODS

A comparative study was carried out between five foreign hybrids (from France and Holland) and Arleta variety, in cultivating conditions of cold greenhouses from S.C.P.V. – Ştefaneşti Argeş.

STUDIES VARIETY: V_0 – control, Arleta variety; V_1 – Baghera F_1 hybrid; V_2 – Hector F_1 hybrid; V_3 – Marlon F_1 hybrid; V_4 – Crea 5 F_1 hybrid; V_5 – Celaya F_1 hybrid.

Ten plants have been marked for each variety that made the object of this study.

TECHNOLOGICAL MARKS OF THE EXPERIMENTAL

Autumn 2002 – clearing the previous culture and collecting the culture remaining, cleaning the field, followed by fertilizing with decayed manure (400kg /100m^2) and 3 kg of complex fertilizers on each sector.

- profound digging, with spades, at 25 – 30 cm depth.

Spring-summer: 2003 soil preparing by granulating with milling machine;

- soil treatment by incorporating granular Sinoratox; producing transplants in the multiplier greenhouse by sowing in the little bins, at 1.02.2003, followed by replanting in pots of 8 cm diameter when the plants had a real leaf; transplants treatment with Mycodifol 0.2% and Decis 0.05%; manual planting at 20.04.2003 on 4 rows by sector, using the following planting scheme: 40 – 80 – 80 – 80 – 40 cm and 35 cm between plants on a row; transplants watering before and after planting (at each pit); each hybrid was planted on a different sector (five sectors at all) and the Arleta variety was cultivated on a larger area, representing the main culture in the greenhouse;

OTHER TECHNOLOGICAL OPERATION DURING VEGETATION: removing offshoots radically, at all plants, with no exception; removing the top of plants, at the supporting wire height; removing leafs, gradually, as the basic leafs turn yellow; sanitary treatments with: Bravo 500 – 0.3%; Ridomil plus 48 – 0.25%; Topsin M70 – 0,1% to control diseases and Fastac EC – 0.03%; Decis 1.5 CE – 0.05%; Karate 2.5 CE – 0.03% to control insects; there were no treatments to stimulate fruits ripening or increasing yield; pollination

and fruits growing was in normal limits, no chemical stimulation was used; harvest started on 10.06.2003.

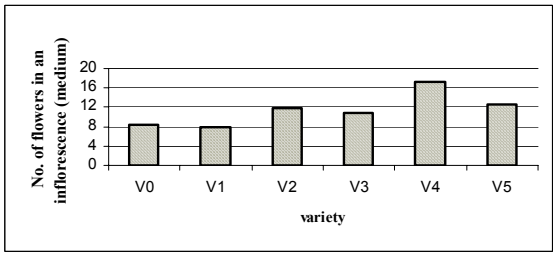
RESULTS

There have been more parameters in view, at all five hybrids, compared to Arleta variety as a control variant (V_0): Number of flowers per inflorescence; Number of bear fruits per inflorescence; Fruits medium weight; Weight of all fruits per plant.

For each parameter several measurements were taken on the ten plants initially marked for each variety.

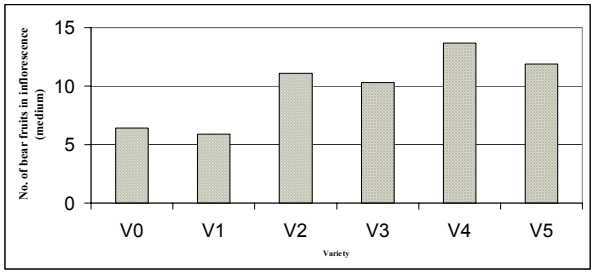
The following results were obtained: It was ascertained that four hybrids had similar behaviour, except Baghera hybrid which had a determined size and it stopped growing at 120 cm. The other four hybrids were limited by removing the top of plants at 2 m height, near the supporting wire. However, Crea 5 – F1 hybrid had a record among the other hybrids.

Number of flowers per inflorescence - medium



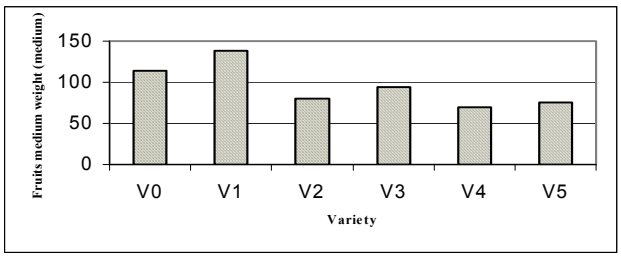
In the graphic above we can observe that Crea 5 – F_1 hybrid is standing out by the flowers number, the inflorescence measuring more than 50 cm length, overlapping one of each other.

Number of bear fruits per inflorescence - medium



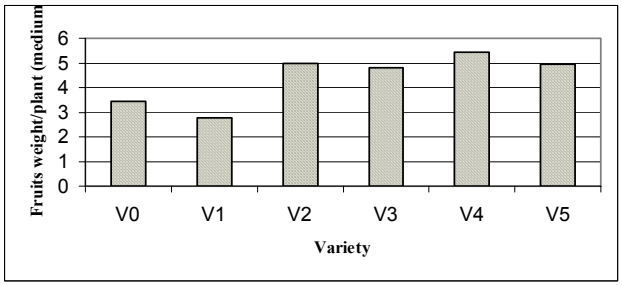
It is ascertained that Crea 5 – F_1 has the most bear fruits per inflorescence, but Marlon F_1 and Hector F_1 had a bigger percentage from all fruits.

Fruits medium weight (g/fruit) - medium



Concerning fruits weight, the record belongs to Baghera hybrid, which has big fruits, very appreciated as fresh consumption. Crea 5 has much smaller fruits in a large number.

Fruits weight/plant (kg/plant) - medium



As it was expected, Crea 5 made the greatest yield, followed by Hector, Celaya and Marlon on almost equal position.

Baghera F_1 hybrid has a less productive potential, but its fruits are very big and high qualitative.

CONCLUSIONS AND RECOMMANDATIONS

After only one year of testing, the results presented the high productive potential of all hybrids studied and also showed that is necessary to continue their study as well as other's new hybrids. We consider that Hector F_1, Marlon F_1, Crea 5 – F_1 and Celaya F_1 deserve a special attention because of their high productive potential.

Baghera F_1 hybrid is recommended for field cultivation because of its determined size but it requires supporting because it is breaking down under the fruits weight. It is also important that Baghera fruits are of high quality, fact that makes them very attractive for consumers.

The fruits colour was uniform at all studied hybrids except Marlon F_1 which presented a small green spot on the stalk area, at full ripen.

Hector F_1 hybrid has also a small shortcoming because of its thick film.

We propose to continue the study of these hybrids in the next few years, having other parameters in view.

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THE BEHAVIOUR OF NEW CARROT CULTIVARS IN EAST PART OF THE DANUBIAN PLAIN

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Key words: carrot, vegetable farm, harvest moments

The carrot is an important species for vegetable production in Romania, used for a fresh consumption and as raw material in the food industry.

In Însurăţei and its surroundings from Brăila County, the horticulture is represented, especially, by great grapevine plantations and various small or middle vegetable farms destined for family consumption and private market of small fresh vegetable products included sometime a low quantity of carrots.

This applicative research paper was initiated to evaluate the possibilities of the carrot growing revival, to increase the local consumption of this species.

MATERIALS AND METHODS

It was studied the behaviour of 4 varieties (table 1), sowing in own field.

Table 1

Experimental variants

Variants	Specification	
	Variety	Biological material source
1	De Nantes	SCPL Buzău Romania
2	Autumn King 2	Daehnfeldt Denmark
3	Merida	Nunhems Zaden Netherlands
4	Bureau	Nunhems Zaden Netherlands

The experiment objectives were to establish the specific productivity and quality parameters of these new varieties by comparison with the traditional variety De Nantes and to determine the harvest moments for the summer and autumn carrot production for covering the fresh consumption.

The experiment was monofactorial type with 4 variants. It was placed in blocks, without the repetition plots random. This placement was chose because of the field known uniformity and the quite small experimental area.

The specific technology applied to experiment

The field was prepared from autumn by performing the specific tilling for carrot growing.

In spring, the culture was manually sown at 10 March. The sowing norm was 45g/100 m^2 because of the very well prepared germination bed.

The culture was sowed in equidistant rows with a 25 cm distance between them and placed perpendicularly in 140 cm width plots, separated by 40 cm paths.

For a 4-5 cm theoretic distance between plants, the experimental culture was planed for a density of 77-62 plants/m^2 crop area.

The mass springing was registered between 1-3 April.

It was applied, carrying on, the specific weed control works (hoeings and one weeding) and 5 wettings with 30-50 l/m^2 norms.

The crop was weeded out by the sprung plants removing in the areas with densities greater as those projected.

The harvesting was differentiated depending on the cultivar, when the carrot edible parts reached their cultivar specific size.

During the vegetative period, at harvesting and after that was performed observations and determinations for the main vegetative stages, the growing rate and rosette vigour, the roots form and weight, the density at harvesting, the sugar and dry soluble matter contents, the vitamin C content and titratable acidity.

RESULTS AND DISCUTION

On the performed analyses basis it was obtained the new and useful results, from which it will be presented only those relating to the total yield.

The plant density at harvesting (table 2) varied between 56.9 plants/m^2 (De Nantes cv.) and 50.9 plants/m^2 (Merida cv.). These values could be appreciated as very good by comparison with those obtained in ordinary production crop.

The average weight of edible parts, which varied from 124g (Autumn King 2 cv.) to 96g (Merida cv.), was situated in the normal limits for this parameter.

Table 2

Densities, average weights and total yield
Carrot cultivars, 2003

Nr. crt.	Cultivar	Density at harvesting	Average weight	Yield
		plants/m^2	G/plant	kg/m^2
1	De Nantes	56.9	115	6.55
2	Autumn King 2	53.0	124	6.57
3	Merida	50.9	96	4.89
4	Bureau	54.9	107	5.88

In these conditions, the total registered yield varied between 6.57 kg/m^2 (Autumn King 2) and 4.89 kg/m^2 (Merida). This production level, which could be appreciated as very good for our country conditions, was relatively easy obtained by the respecting of some minimum agrotechnical conditions as: a soil with a

proper texture and fertility, a total weediness absence, a systematic irrigation's for an adequate soil humidity specific carrot crops and, also, a very good density maintained by the sowing thinness at the most favourable moment and at the needful distances between rows.

From the view point of yield it could be distinguished the cultivars Autumn King 2 and De Nantes, that exceed significant the Bureau cv. yield and very significant the Merida cv. production (table 3).

Table 3

The total yield
Carrot cultivars, 2003

Cultivar	Yield		Yield difference		Significance
	kg/m^2	%	kg/m^2	%	
De Nantes	6.55	100	-	-	-
Autumn King 2	6.57	100.01	0.02	+0.01	-
Merida	4.89	74.65	-1.66	-23.35	000
Bureau	5.88	89.77	-0.67	-11.23	0

DL –5% = 0.24 kg/m^2
DL –1% = 0.69 kg/m^2
DL –0.1% = 1.42 kg/m^2

The biochemical analysis presented in the table 4 emphasise sugar content in normal limits for these new cultivars Autumn King 2, Merida and Bureau. Relating to the total dry matter, the Merida cv. had the smallest value (5.7%), while the Bureau cv. points out a value (6.7%) similar to the De Nantes cv. value. These measured values of Merida and Bureau cvs. emphasise a specific softness and succulence, that are typical for the actual carrot assortment destined to the fresh consumption.

Table 4

The biochemical composition of carrot roots
Carrot cultivars, 2003

Nr.	Variant	Sugar content	Total dry matter	Vitamin C	Titratable acidity
		%	%	mg/100 g s.p.	%
1	De Nantes	4.9	6.8	4.6	0.09
2	Autumn King 2	3.2	8.1	4.9	0.1
3	Merida	3.4	5.7	3.8	0.09
4	Bureau	3.5	6.7	3.9	0.08

The vitamin C content registered the highest value at Autumn King 2 cv. (4.9 mg/100 g s.p.), and the titratable acidity varied very little between variants (0.08%-0,1%).

CONCLUSIONS AND RECOMANDATIONS

The carrot crop destined to the fresh consumption could be successfully applied in small vegetable farms in Însurăței zone.

The carrot yield, greater than 6.5 kg/m^2, obtained for the best variants, could be appreciated very good for this vegetable cultivated in the SE Romania region.

From de viewpoint of the total yield, the best results are obtained for the traditional De Nantes cultivar and the new Autumn King 2 cultivar that belong to the actual European carrot assortment.

The acquired production, appreciated in accordance to the root size and weight, corresponds to the extra and first quality categories characteristic of these cultivars.

On these conclusions, we recommended the cultivation of the traditional De Nantes cv. as well as the new Autumn King cv. by farmers in Însurăței zone.

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THE RELATIONSHIP BETWEEN THE FEATURES OF INCIDENT LIGHT ON PLANT AND THE TOMATO YIELD

LILIANA BĂDULESCU, IOAN BURZO, RUXANDRA CIOFU,
VIORICA LUCHIAN, NICOLAE ATANASIU

Keywords: light, tomato, fruit, yield, photoselective plastics

SUMMARY

The yield increase could have unfavourable consequences on tomato fruit quality because of the inverse ratio between dry matter content and yield (Ho and Hewitt, 1994). The fruit size and its soluble dry matter content are highly influenced by radiance, especially by its influence on total leaf assimilates translocated in this sink organs. The increase of radiance performs the sugar increase (Winsor and Adams, 1976).

The aim of this paper is the yields dynamics studies on tomato cultivated in certain light conditions with a non-polluting technology using photoselective plastics.

MATERIALS AND METHODS

The experiments are performed in 1996-1997 in greenhouses of U.S.A.M.V. Bucharest. The tomato seeds (*Lycopersicon esculentum* Mill.) Işalnița IH 50 sowed according to the specific growing technology. After repication, the platelets were raised in greenhouse in small tunnels covered by photoselective plastics. The transplants produced in these conditions were replanted in big tunnels covered with the same plastics, keeping the conditions of light quality for the growing and fructification periods, too.

The experimental variants that were studied are tomato cultivated in tunnels covered by the following coloured plastics: light yellow (Y1), intermediate yellow (Y2), dark yellow (Y3); light blue (B1), intermediate blue (B2), dark blue (B3); light green (G1), intermediate green (G2), dark green (G3); light red (R1), intermediate red (R2), dark red (R3) and colourless (W) as control.

The tomato fruits were harvested between June-August, 3 times/month and the presented values are the average of 5 repetitions.

RESULTS AND DISCUTION

1. The average fruit number on plant

By table 1 analyse it could be observed the great effect of red radiation, with high intensity, on R1 (29.12) fructification and ripening, that exceeds, as far as the first determinations, the control (W) and the other variants (Y1, G1, B1). By comparison, until middle July, the light enriched with yellow, green and blue radiation inhibited the fruit ripening, the average number/plant being smaller as the control value. Towards the end of harvesting (6-9 harvesting) the average fruit number harvested from control was equalised or shortly outrun by B1, than G1 and Y1. For plants cultivated under intermediate light (B2, Y2, G2, R2) it was observed

a reverse order of variants. Although for first harvesting, the best results was registered also for red variant (R2), but in July-August the variants B2 (29.95) and Y2 (26.96) exceed by far the control (23.64).

Table 1

Dynamics of the average tomato fruit number on plant, harvested in June - August.

Variant	Harvesting number									Total
	1	2	3	4	5	6	7	8	9	
Y1	0	1	2.66	6.32	8.98	15.64	17.64	20.64	23.64	23.64
Y2	2.3	4.3	7.63	11.63	14.63	15.63	20.63	24.63	26.96	26.96
Y3	1.33	3.99	5.99	8.99	12.99	15.32	17.32	20.65	23.98	23.98
B1	0	0.66	3.99	8.65	11.98	17.98	19.31	20.97	23.97	23.97
B2	1.33	4.99	8.65	11.98	15.64	21.3	23.63	26.29	29.95	29.95
B3	0	2.33	3.33	6.66	8.99	15.29	16.62	19.62	22.28	22.28
G1	0	3	4	7.3	10.63	15.13	17.73	22.39	24.05	24.05
G2	0	1	3	8.33	11.83	17.49	20.49	23.49	25.49	25.49
G3	0	2.66	3.66	6.66	9.32	14.65	17.65	20.31	22.31	22.31
R1	1.66	4.66	8.16	10.82	13.82	18.82	22.82	26.12	29.12	29.12
R2	2.66	5.32	7.98	11.31	14.64	17.94	20.24	22.54	25.87	25.87
R3	1	4	5.33	8.33	10.66	14.32	15.98	19.28	21.94	21.94
W	0.66	4.66	5.99	8.99	12.65	15.31	16.97	20.3	23.3	24.3

For tomato cultivated under small intensity radiation (B3, Y3, G3, R3), the fruit ripening was stimulated by yellow radiation, probably because of the light intensity, higher as the other (R3, G3 or A3). For this variant the great fruit number was determined (23.98), similarly with control. For the others – R3 (21.94), V3 (22.31) and B3 (22.28) – it was observed an inhibitory effect on fructification, the values being in most cases below control value.

2. The average fruit weight on plant

Fruit size and total soluble solids are strongly influenced by light, especially by its action on synthesis and partitioning of total assimilates from leaves in fruits (Ho and Hewitt, 1994). In the table 2 could be observed that for B1, Y1, G1, R1, the tomato yield/plant is smaller as the control (W), therefore the early production was forwarded by this experimental variants.

Table 2

Dynamics of the average tomato fruit weight on plant, harvested in June - August.

Variant	HARVESTING NUMBER									Total (G)
	1	2	3	4	5	6	7	8	9	
Y1	0	44	174	526	771	1344	1532	1712	1919	1919
Y2	160	276	575	825	1082	1149	1459	1704	1865	1865
Y3	116	364	548	749	1096	1280	1422	1652	1884	1884
B1	0	45	327	657	902	1386	1464	1556	1743	1743
B2	45	298	557	813	1098	1400	1550	1729	1976	1976
B3	0	184	274	485	655	1084	1156	1343	1523	1523
G1	0	152	228	411	678	982	1169	1446	1543	1543
G2	0	50	194	591	788	1196	1361	1550	1673	1673
G3	0	140	178	394	606	951	1147	1346	1451	1451
R1	95	247	468	640	845	1155	1421	1654	1804	1804
R2	188	380	590	789	980	1183	1356	1512	1717	1717
R3	70	262	380	591	753	1009	1132	1315	1472	1472
M	43	235	383	588	813	994	1149	1352	1542	1782

In July-August it was observed the great influences for Y1 (1.919 kg/plant), R1 (1.804 kg/plant) and B1 (1.386 kg/plant). Although the plastics were removed in the second half of June, because of excessive temperature, the results show that their effect on fructification induced in first part of growing, is kept also in harvesting period. As previously it was showed, at high intensity (B1, Y1, R1, G1), the fruit number was great for R1, but the total yield was highest for Y1. This proves that the lightening used type influences especially the fruit weight and therefore its production.

For variants cultivated in light with intermediate colour intensity (B2, Y2, G2, R2), the lightening effect on yield dynamics is very similarly with those on fruit number dynamics. The best results were obtained for B2 (1.976 kg/plant) and Y2 (1.865 kg/plant), that have the greatest early and total productions, because of both the influence of fruit number and fruit weight.

The same situation there is also for variants cultivated under low light intensity (B3, Y3, G3, and R3). The greatest values about yield dynamics were obtained for Y3 (1.884 kg/plant) and control (1.782 kg/plant).

CONCLUSIONS

- The red radiation with high intensity (R1) increased highly the fruit number/plant, but a little their weight, while the yellow (Y1) and blue (B1) radiation stimulated especially the fruit weight instead of the fruit number.

- The green radiation, at any intensity, inhibited the tomato fructification, the average fruit number/plant and the average plant yield. As a consequence, the green plastics are not recommended for tomato culture protection.
- The tomato yield was stimulated by following plastics:
- first, the yellow plastics (1.86-1.92 kg/plant), with the best results for high intensity (Y1);
- second, the blue plastics (1.52-1.97 kg/plant), with the best results for intermediate intensity (B2);
- and, also, the control (colourless plastic), with 1.78 kg/plant.
- The yellow plastics, especially with low colour intensity, are recommended for tomato culture protection in tunnels, their great yield being associated with a excellent fruit quality.

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EXCEL – A FALSE FRIEND FOR POLYNOMIAL REGRESSIONS ? USER REMARKS

BUDOI GH., BERCA M.

Key words: Excel, polynomial regressions

SUMMARY

Based on a data set, polynomial regressions have been calculated using the EXCEL trendline command. By other mean, a parallel set of polynomial regressions has been calculated on the same data set. Evaluations y = f(x) have been done (not with Excel) using both sets of regressions, then they have been graphically represented and compared to each other and to the testing data. The paper illustrates that *Excel correctly calculates the polynomial regressions* (proved by the fact that the curves in the graphs are correctly plotted), *but the trendline displays them with (sometimes) not enough decimal fractions for coefficients*. So, when using such an equation (published in a paper, for ex.) in order to predict y = f(x), sometimes the predicted y values can be very different from those obtained with an equation with sufficient displayed decimals (SDD equation), and far from the curve of the graph. The y errors (deviations) increase by the increase of the equation degree and by the increase of the independent x variable. *The paper suggests that, in a new version of Excel, the trendline automatically displays the polynomial regressions with so many decimals* for each coefficient *so that the equations* displayed and presented in publications *be rigorous for predictions, but (if the user does not want otherwise) no more than that for not to be difficult to handle with.*

INTRODUCTION

The subject was inspired and imposed for debating by published papers, PHD theses and personal experience. The paper presents points of view of ordinary Excel users – specialists in agrochemistry and plant protection (neither mathematicians, nor statisticians), who use Excel in order to be helped in statistical computations in such a way so they can focus the attention mainly on the research subjects in their speciality.

This paper tries, as much as possible, to prevent false interpretations of the text that can be speculated because the authors do not handle English like their native language. In such false interpretations can be interested persons who published inaccurate regressions and/or have been PHD coordinators.

MATERIALS AND METHODS

Based on the xy data set: (35, 4.08); (40, 4.35); (45, 4.63); (50, 4.88); (55, 5.12); (60, 5.28); (65, 5.41); (70, 5.49); (75, 5.57); (80, 5.68); (85, 5.9); (90, 6.25); (95, 6.91); (100, 7.87), polynomial regressions have been calculated using EXCEL trendline command (let's name the automatically displayed eqs **IDD eqs** - with **i**nsufficient **d**isplayed **d**ecimals). By other mean, a set of **SDD eqs** (with **s**ufficient **d**isplayed **d**ecimals) has been calculated. Predictions y = f(x) have been calculated using the EXCEL IDD eqs and the SDD eqs, and then they have been graphically represented and compared to each other and to the testing data.

RESULTS AND DISCUSSIONS

EXCEL is one of the most friendly software for data processing and graphics. *The EXCEL trendline command correctly calculates the polynomial regressions and builts the curves, but displays the coefficients with (sometimes) too few decimal fractions* (table 1). *Using such equations* (published in papers, for example) *for predictions y = f(x) can lead to errors.*

In the above hypothetical data set, y for test increases in a sigmoidal manner by the x increase (fig. 1). The curves built using the y = f(x) values predicted based on the displayed IDD Excel eqs instead of being increasing, as the original data are, at 5-th and 6-th degree the curves even have a converse sense, that are decreasing (fig. 1). The deviations of predicted Excel based y from y predicted with SDD eqs increase by the increase of eq. degree and x value (fig. 2), both as absolute and as relative values. The same evolution have the deviations of Excel based y from the y for test. However, when using SDD eqs, the y deviations from y for test decrease by the increase of equation degree. *Remark:* SDD eqs have unuseless decimals.

Table 1

EXCEL polynomial regressions* automatically displayed by trendline command (IDD eqs - with insufficient decimal displayed coefficients), in comparison with SDD equations - with sufficient decimal displayed coefficients**

Eq. degree	Type of eq.	Equation	Correctness* for predictions
1	EXCEL	$y = 0.0452x + 2.4769$	practically correct
	SDD	$y = 0.0452307692x + 2.4769230769$	correct
2	EXCEL	$y = 0.0005x^2 - 0.0186x + 4.4402$	rather wrong
	SDD	$y = 4.730769E\text{-}04x^2 - 0.0186346154x + 4.4401923077$	correct
3	EXCEL	$y = 4E\text{-}05x^3 - 0.0075x^2 + 0.4937x - 5.7938$	wrong
	SDD	$y = 3.95859E\text{-}05x^3 - 0.0075430687x^2 + 0.4937059509x - 5.7937535993$	correct
4	EXCEL	$y = 9E\text{-}07x^4 - 0.0002x^3 + 0.0167x^2 - 0.5111x + 9.1208$	very wrong
	SDD	$y = 9.204717E\text{-}07x^4 - 2.089415E\text{-}04x^3 + 0.0166751988x^2 - 0.5110546414x + 9.1208463595$	correct
5	EXCEL	$y = 8E\text{-}10x^5 + 6E\text{-}07x^4 - 0.0002x^3 + 0.0143x^2 - 0.4383x + 8.2594$	extremely wrong
	SDD	$y = 8.446456E\text{-}10x^5 + 6.354038E\text{-}07x^4 - 1.715659E\text{-}04x^3 + 0.0143020088x^2 - 0.438257658x + 8.2594323324$	correct
6	EXCEL	$y = -1E\text{-}10x^6 + 5E\text{-}08x^5 - 8E\text{-}06x^4 + 0.0005x^3 - 0.0188x^2 + 0.3684x + 0.3114$	incredibly wrong
	SDD	$y = -1.232886E\text{-}10x^6 + 5.077653E\text{-}08x^5 - 7.595512E\text{-}06x^4 + 5.341003E\text{-}04x^3 - 0.0188305032x^2 + 0.3683995669x + 0.311381671$	correct

*The Excel polynomial regressions are correctly calculated by the trendline, but they are displayed with (sometimes) insufficient decimals for coefficients; ** This SDD eqs are correct for predictions, but they have unuseless decimals at some coefficients.

Rules. ***1)*** Concerning the xy coordinates of the points (on the basis of which the regression equations are established), ***the larger the range of x variation is and the higher the x values are and the narrower the range of y variation is, the higher the errors (deviations) are*** in using the IDD Excel equation in order to calculate

(predict) y = f(x) values, both as absolute values and as relative values of erroneous predicted y from correct y estimated (predicted) with SDD equation. The relative values are very suggestive from this point of view (fig. 2).

2) The errors of predicted y = f(x) increase by the increase of the equation degree. The further from a straight line the points tend to be placed, forming a more curving or a more sinuous trendline – requiring a higher degree equation for a better fitting to the data, the higher the deviations of predicted y are.

One can claim that the number of decimal fractions displayed by Excel for coefficients can be increased by user. This is true, ***up to 30***, at wish, and this can be done in two ways: a) clicking on the displayed regression and then using the icon "Increase Decimal"; b) double clicking on the displayed regression and, in category "Number", specifying the number of decimals.

Comments: ***1) On which bases the ordinary Excel user can establish how many supplementary decimals to be added: 1? 20? 30?*** This "dilema" can be easily solved by specialists in mathematics or in Excel programming, but not by *ordinary users* (specialists in chemistry, biology etc), and this is proved by the fact that ordinary users have confidence in the equations automatically displayed by the trendline command and publish them as they are displayed and printed (there is neither space (only 4 pages!), nor the purpose of this paper to present examples).

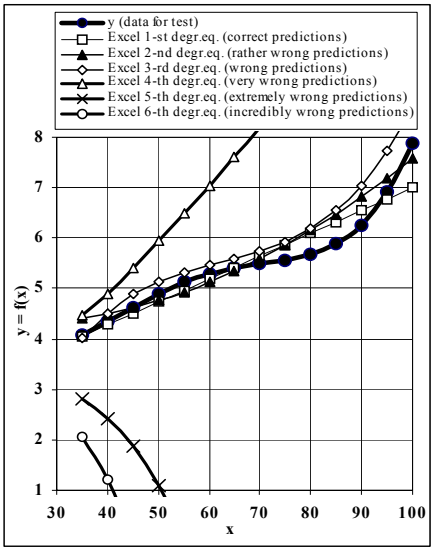

Fig. 1 - Graphical representation of the predicted y = f(x) calculated on the basis of the IDD EXCEL equations - displayed by the trendline with insufficient decimals (eqs established based on xy data set presented in Materials and methods)

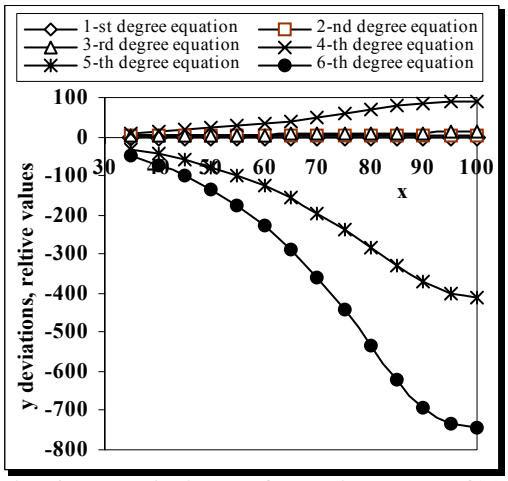

Fig. 2 – Deviations of predicted y = f(x) calculated based on IDD EXCEL eqs. (displayed by the trendline with insufficient decimals) – relative values from y calculated with SDD eqs (with sufficient displayed decimals), depending on the x value and degree of polynomial regression (the deviations increase by the increase of equation degree and x value)

3) When increasing the number of decimals, they are uniformly increased for all coefficients, and for those that do not need to be increased, making it sometimes difficult to manage and use such an equation.

Moreover, clicking 1 time (for ex.) on the *icon "Increase Decimal",* in order to increase 1 decimal in eq. $y = 0.0003x^2 + 0.003x + 28.7$, leads to (at least formally) erroneous eq.: $y = 0.00x^2 + 0.00x + 28.70$, equivalent to $y = 28.7$ (y looks as being independent of x!); clicking 2 times (wishing to increase 2 decimals) gives $y = 0.000x^2 + 0.003x + 28.700$, that means $y = 0.003x + 28.7$; clicking 3 times gives practically the initial displayed eq. $y = 0.0003x^2 + 0.0030x + 28.7000$; one needs to click 4 times (as for 4 decimal increasing) in this case to obtain some more precision: $y = 0.00026x^2 + 0.00300x + 28.70000$, but with unuseless 0 at x coefficient and at free term. *There is no need for all coefficients to have the same number of decimals*, but just the number that the eq. and predictions based on it be accurate and the eq. be easy to manage with in graph and calculations.

4) Decreasing the number of decimals, formally erroneous eqs. can be obtained. Decreasing 1 decimal (clicking 1 time) in eq. $y = 3E\text{-}05x^2 – 0.0005x + 0.0873$ gives $y = 0.000x^2 – 0.000x + 0.087$, equivalent with $y = 0.087$ (y is independent of x!). *Excel should warn the user that increasing or decreasing decimals leads to falsely displayed eqs.*

The source of errors of predictions based on EXCEL polynomial regressions displayed by the trendline. This comes from the reduced number of coefficient decimals automatically displayed by the trendline; this goes in papers.

CONCLUSIONS

The purpose was to *draw attention to Microsoft* (one of the most impressive software producer) and users that, when using EXCEL trendline command, the *polynomial regressions automatically showed on display* sometimes can *have not enough decimal fractions*, *and when* such equations (from published papers) *are used to predict y = f(x) they can lead to errors* that increase by the increase of the equation degree and by the increase of the independent x variable.

The opinion and *suggestion*, as ordinary Excel users, *is that, in a new Excel version, the trendline should automatically do a (such) sensitivity analysis of coefficients and display* the polynomial regressions with *so many decimals for each coeff. so that the eqs displayed* and presented in publications *could be accurate for predictions, but no more than that* for not to be difficult to handle with.

The authors did not intend to offend anybody – neither Microsoft, nor people who published inaccurate equations. *Science is a field of debates and continuous improvements*, even if there might be people who, having occult interests, do not understand or do not accept this simple truth.

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Lucrări U.Ş.A.M.V.B., Seria B, Vol. XLVl, 2003

RESEARCHES REGARDING HARMFUL AND USEFUL FAUNA IN CUCUMBER CROPS

MARIA CĂLIN

Key words: cucumber, fauna, useful, harmful, diversity, intensive agriculture, trial.

SUMMARY

During 1995 - 2003 a series of trials, were performed in the experiments filled at Vegetable Research Station Bacău, regarding the setting up a intensive agriculture under the particular condition of the Moldova.

Because the number of chemical treatments for diseases and pests was high, our observances signalled only 2 classes, 9 orders, 20 families and 39 species.

Among they were: **useful fauna -** the species were in: 2 classes, 4 orders, 7 families, with: a specie in order *Opistophora* (4%); 19 species in 4 family of order *Coleoptera* (76%)*;* 4 species in a family of *Hymenoptera* order (16%); a specie in a family of order *Diptera (*4%*);* **harmful fauna -** the species were in: 2 classes, 4 orders, 7 families.

INTRODUCTION

The 35 pest insect species live in cucumber crops as a pest complex (Rogojeanu and Perju, 1979).

The integrated pest control requires knowledge environmental and crop management practices (Baicu and Săvescu, 1986).

Pest-parasite and predatory relationship are an important role in maintaining pest population below the economical damage threshold (E.D.T.), (McLeod et al., 1986).

Among the crop and soil management practices contributing to prevention of the pest outbreaks and hindering their reproduction the following measures: agricultural works, cropping varieties, resistant to diseases and pests and the on (Apponyi et al., 1996, and Lopez, 1995). Thus damage to cucumber foliage did not increase with increase N content of the crop. Instead a weak negative correlation between tissue N and pests were detected (Letourneau et al., 1996).

MATERIALS AND METHODS

During 1995-2003 a series of trials, were performed in the experiments filled at Vegetable Research Station Bacău, regarding the setting up of an intensive agriculture under the Moldova particular condition.

The results obtained through direct observance collecting insects with "Barber" traps. The fauna was identified by the researchers of Chisinau Biological Plant Protection Institute. The following aspects have been mainly examined range

of the useful, harmful and indifferent fauna in the cucumber crops and size of population and fluctuation in time and space.

RESULTS AND DISCUSSIONS

The range of useful, harmful and indifferent fauna in the cucumber crops is shown in table 1.

Table 1

The range of useful, harmful and indifferent fauna in the cucumber crops

Nr. crt	Useful fauna - Class, order, family, specie	Nr. crt	Harmful fauna - Class, order, family, specie
1	2	3	4
	OLIGOCHAETA		***GASTEROPODA***
	Opistophora		***Stylommatophora,***
	Lubricidae		***Limacidae***
1	*Lumbricus terrestris* L.	1	*Deroceras agreste* L.
	INSECTA		***CRUSTACEA***
	Coleoptera		***Isopoda***
	Carabida	2	*Porcelio scaber* Latr.
2	*Broscus cephalotes* L.		***ARACHNIDA***
3	*Calathus erratus* C. Sahlb		***Acari***
4	*Carabus cancellatus* III.		***Tetranychidae***
5	*Cicindela germanica* L.	3	*Tetranychus urticae* Koch
6	*Harpalus saxiloca* Dej.		***INSECTA***
7	*Harpalus distinguendus* Duft.		***Orthoptera***
8	*Ophonus diffinis* Dej		***Gryllotalpidae***
9	*Poecilus cupreus* L.	4	*Gryllotalpa gryllotalpa* L.
10	*Pseudophonus rufipes* Deg.		***Gryllidae***
11	*Pseudophonus griseus* Pz.	5	*Gryllus campestris* **L.**.
12	*Pterostichus melanarius* Gll.		***Coleoptera***
13	*P.ovoideus* Sturm		***Chrysomelidae***
14	*Stomis pumicatus* Pz.	6	*Phyllotreta nigripes* F.
15	*Stomis pumicatus* Pz.		***Homoptera***
16	*Trechus* sp.		***Aphrophoridae***

0	1	2	3
	Coccinellidae		***Cicadelliade***
17	*Coccinella septempunctata* L.	7	*Cicadella viridis* L.
	Staphylinidae		***Aphididae***
18	Philonthus spp	8	*Cerosipha gossypii* Glov.
19	Oxythelus insectatus Grav.		***Diptera***
	Cicindelidae		**Anthomyidae**
20	*Cicindela germanica*	9	*Pegomia* spp.
	Hymenoptera		
21	***Formicidae***		**Indifferent fauna - Class, order, family, specie**
22	*Lasius niger* L.		
23	*Myrmica rubra* L.		***INSECTA***
24	*Ponera* spp.		***Coleoptera***
	Atetramorium sp.		***Anthicidae***
	Diptera	1	*Anthicus hispidus Rossi*
25	***Syrphidae***	2	Anthicus antherinus L.
	Sphaerophoria scripta L.		***Diptera***
			Muscidae
		3	*Fannia* sp.
			Sarcophagidae
		4	*Sarcophaga carnaria* L.
			Calliphoridae
		5	*Lucillia caesar* L.
	No. classes 2		**No. classes 4 - 1**
	No. orders 4		**No. orders 7 - 2**
	No. families 7		**No. families 9 - 4**
	No. species 25		**No. species 9 - 5**

Because the number of chemical treatments for diseases and pests was high, our observances signalled only 2 classes, 9 orders, 20 families and 39 species. Among they were:

- useful fauna - the species were in: 2 classes, 4 orders, 7 families, with:

- a specie in order Opistophora (4%);
- 19 species in 4 family of order *Coleoptera* (76%);
- 4 species in a family of *Hymenoptera order* (16%);
- a specie in a families of order *Diptera (*4%*)*;

- harmful fauna - the species were in: 2 classes, 4 orders, 7 families, with:

- a specie in a family *Limacidae* of order *Stylommatophora* (11.1%);
- a specie in family *Porcelionidae* of order *Isopoda (*11.2%);
- a specie in a family *Tetranychidae* of order *Acari* (11.1);

- a specie in a family *Gryllotalpidae* of order *Orthoptera* (11.1%);
- a specie in family *Gryllidae* of order *Orthoptera (*11.1%);
- a specie in a family *Chrysomelidae* of order *Coleopterai* (11.1%);
- a specie in a family *Cicadellidae* of order *Homopterai* (11,1%);
- a specie in a family *Aphididae* of order *Homoptera* (11,1%);
- a specie in a family *Anthomyidae* of order Dipter*a*i (11,1%);

A few numbers of species were indifferent fauna **-** the species were in: a class, 2 orders and 4 families.

CONCLUSIONS

During 1995 - 2003 a series of trials, were performed in the experiments filled at Vegetable Research Station Bacău, regarding the setting up of an intensive agriculture under the particular condition of the Moldova.

Because the number of chemical treatments for diseases and pests was high, our observances signalled only 2 classes, 9 orders, 20 families and 39 species. Among they were: **useful fauna -** the species were in: 2 classes, 4 orders, 7 families, with: a specie in order *Opistophora* (4%); 19 species in 4 family of order *Coleoptera* (76%) *;* 4 species in o family *Hymenoptera* (16%); a specie in a family of order *Diptera (*4%*);* **harmful fauna -** the species were in: 2 classes, 4 orders, 7 families, with: a specie in a family *Limacidae* of order *Stylommatophora* (11.1%); a specie in family *Porcelionidae* of order *Isopoda (*11.2%); a specie in a family *Tetranychidae* of order *Acari* (11.1); a specie in a family *Gryllotalpidae* of order *Orthoptera* (11.1%); a specie in family *Gryllidae* of order *Orthoptera (*11.1%); a specie in a family *Chrysomelidae* of order *Coleopterai* (11.1%); a specie in a family *Cicadellidae* of order *Homopterai* (11,1%); a specie in a family *Aphididae* of order *Homopterai* (11,1%); a specie in a family *Anthomyidae* of order Diptera (11,1%).

A few numbers of species were indifferent fauna the species were in: a class, 2 orders, 4 families.

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THE STUDY OF THE PREDATORY SPECIES IN CABBAGE CULTURE

MARIA CĂLIN

Key words: organic agriculture, diversity, intensive agriculture, trial.

SUMMARY

During 1991-2002 a series of trials were performed in the experiments field at Vegetable Research and Development Station Bacău, regarding predatory fauna of cabbage in intensive and organic agriculture movements under the particular condition of the Moldova.

Our observances signalled 2 classes, 5 orders, 11 families, with predators of: 35 species in 4 family of order *Coleoptera* (77.8%)*;* a specie in a families of order *Diptera* (2.2%); a specie in a family Formicidae of order *Hymenoptera* (2.2%); 5 species in family *Chrysopidae* of order *Neuroptera* (11.1%); a specie in a family *Nabidae* of order *Heteroptera (*2.2%); 2 species in a family *Lycosidae* of order *Araneae* (4.5%).

INTRODUCTION

The cabbage crops are a special ecosystem of complex interrelationships between plants, animals and cultural technologies (Baicu and Săvescu, 1986).

Any specie of beneficial fauna and especially the predatory species may cause mortality to specific pest of cabbage and often maintain a satisfactory control of the phytophagous (Voronin K.E., 1986; Perju et al., 1989). Transposing this concept in practice depends on the knowledge of the factors composing the agroecosystems. These factors are divided into two categories.

The first category encloses also beneficial fauna with the predatory species (Varis Anna Luisa, 1987) and second category encloses also the type of culture: intensive or biological cabbage crops (I.F.O.A.M., 1993).

The predatory species of the fauna cabbage crops has been analyzed in this paper.

MATERIALS AND METHODS

During 1991 - 2003 a series of trials, were performed in the experiments filled at Vegetable Research Station Bacău, regarding the setting up a intensive and organic agriculture movements under the particular condition of the Moldova.

The results were obtained through direct observance collecting insects with "Barber" traps. The fauna was identified by the researchers of Chisinau Biological Plant Protection Institute. The following aspects have been mainly examined range of the predatory fauna in the cabbage crops and size of population and fluctuation in time and space.

RESULTS AND DISCUSSIONS

Range of predatory fauna of the cabbage crops in the organic agriculture movements and in the intensive agriculture is shown in table 1.

Table 1

Range of predatory fauna of the cabbage crops in the organic agriculture movements and in the intensive agriculture

Nr. crt	Class, order, family, specie	Nr. crt	Class, order, family, specie
1	2	3	4
	ARACHNIDA		***Coleoptera***
	Araneae		***Carabidae***
	Lycosidae	24	*Carabus cancellatus* Illig.
1	*Pardosa agrestis* W.	25	*Harpalus affinis* Fabr.
2	*P. agricola* Th.	26	*H. distinguendus* Duft.
	INSECTA	27	*H. meridianus* L.
	Neuroptera	28	*Lebia humeralis* Dej.
	Chrysopidae	29	*Poecilus cupreus* L.
3	*Chrysopa carnea* Steph.	30	*P. serriceus* Fw.
4	*C. perla* L.	31	*Pseudophonus rufipes* Deg.
5	*C. formosa* Brauer	32	*P. griseus* Panz.
6	*C septempuncatta* Wes.	33	*Pterostichus macer* Marsh.
7	*C. prasina* Burm.	34	*P. melanarius* Ill.
	Heteroptera	35	*P. vernalis* Panz.
	Nbabidae	36	*Zabrus spinipes* Fabr.
8	*Nabis rugosus* L.		***Staphylinidae***
	Coleoptera	37	*Oxytelus rugosus* F.
	Carabidae	38	*O. rugifrons* Hoch.
9	*Abax ater* Vill.	39	*Lethrobium fulvipene* Grav.
10	*Agonum dorsale* Pont.	40	*Aleochara biliniata* Gyll.
11	*Amara bifrons* Gyll.		***Cicindelidae***
12	*A. consularis* Duft.	41	*Cicindela germanica* L.

13	*A. eurinota* Panz.		***Coccinellidae***
14	*A. similata* Gyll.	42	*Coccinella septempunctata* L.
15	*Anisodactylus signatus* Panz.	43	*Adalia bipunctata* L.
16	*Bembidion lampros* Hrbst.		***Formicidae***
17	*B. quadrimaculatum* L.	44	*Formica rufa* L.
18	*B. quadripustulatum* Serv.		***Diptera***
19	*Brachynus crepitans* L.		***Syrphidae***
20	*B. elegans* Chand.	45	*Sphaerophoria scripta* L.
21	*Broscus cephalotes* L.		
22	*Calathus halensis* Sch.		
23	*Clivina fossor* L.		
	No. classes	**2**	
	No. orders	**5**	
	No. families	**11**	
	No. species	**45**	

Our observances signalled: 2 classes, 5 orders and 11 families, with predators of:
- 35 species in 4 family of order *Coleoptera* (77.8%)*;*
- a specie in a families of order *Diptera (*2.2%*);*
- a specie in a family *Formicidae* of order *Hymenoptera* (2.2%);
- 5 species in family *Chrysopidae* of order *Neuroptera (*11.1);
- a specie in a family *Nabidae* of order *Heteroptera* (2.2);
- 2 species in a family *Lycosidae* of order *Araneae (*4.5), figure 1;

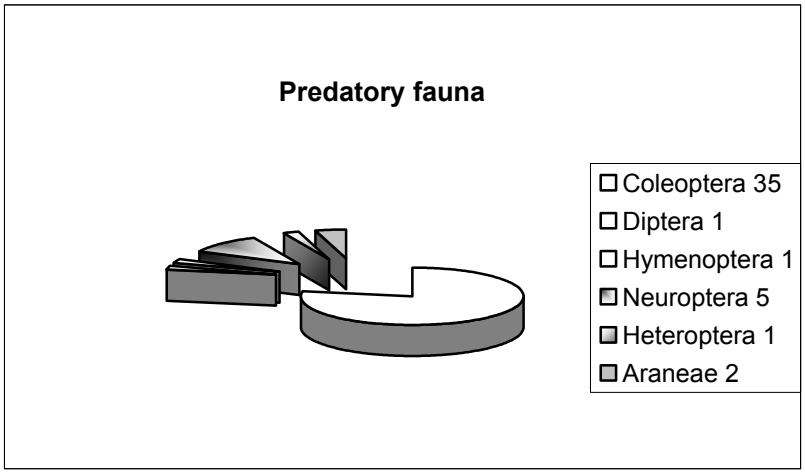

Figure 1 – Predatory fauna

CONCLUSIONS

During 1991 - 2002 a series of trials, were performed in the experiments filled at Vegetable Research and Development Station Bacău, regarding predatory fauna of cabbage in intensive and organic agriculture movements under the particular condition of the Moldova.

Our observances signalled: 2 classes, 5 orders, 11 families, with predators of: 35 species in 4 family of order *Coleoptera;* a specie in a families of order *Diptera*; a specie in a family *Formicidae* of order *Hymenoptera*; 5 species in family *Chrysopidae* of order *Neuroptera*; a specie in a family *Nabidae* of order *Heteroptera*; 2 species in a family *Lycosidae* of order *Araneae.*

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VARIABILITY OF THE MAIN CHARACTERS IN GREEN PEA (VARIETIES AFILA SC AND GEROLA) DURING THE PROCESS OF CONSERVATIVE SELECTION

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Key words: green pea, variety, variability, morphological traits, conservative selection.

SUMMARY

In contrast with the selection process carried out during the breeding programme, aiming to create a more favourable balance in the genetic structure, in the frame of the process of seed multiplication, selection gets a specific content and goal in order to keep up an established structure and is called *conservative selection.* In order to increase effectiveness and quality of the selection works carried out in the different stages of the process of the seed multiplication, it is necessary to know in detail the main characteristics specific to the variety and which assure its individuality. Characters and traits differentiate the varieties among them by their specific expression in the frame of amplitude covering the manifestation of these characteristics. AFILA SC and GEROLA are two new green peas varieties obtained in the Research Institute for Vegetable and Flower Growing Vidra that were certified in 2000 and that were subjected to a process of conservative selection beginning with 2002 at the R.I.V.F.G. Vidra. On the base of the phenological observations and biometrical measurements, by statistical methods the intervals of variability of the main characteristics were computed.

INTRODUCTION

Permanent supplying of the seed amounts belonging to the valuable varieties which are able to maintain their initial characteristics and traits requires (after variety certification) applying of a series of measures and techniques aiming to this goal and carried out on scientifically bases according to the specific biology of every species and variety, in a well structured system that is known under the term of *production of selected seed and planting material.* It follows that, the plant breeding is not finished by the creation and certifying of a new variety, its task is to maintain its biological value, at a high value, all the time required for cultivation. A *variety* is defined as being an ensemble of grown individuals, characterized by a number of characteristics and traits (morphological, physiological, cytological and biochemical) point of view, which are valuable for horticulture and that is able to keep up yearly these characteristics by a process of controlled multiplication (Barbier, 1970). From genetic point of view, such individuals are not identically, they representing a "population" with a specific genetic structure expressed by a specific frequency of the genotypes and genes, assuring thus their individuality, homogeneity and stability of the variety. The variety genetic structure deterioration is caused by the simultaneous actions of the evolution and growing factors: mutations, genetic infiltration, way of multiplication (autogamy, allogamy), natural

and artificial selection, genetic drift (by which some genotypes can be favoured or disfavoured), environmental and growing factors and space isolation. In varieties belonging to autogame species (like pea), theoretically speaking does not exist the possibility for the pollination with alien pollen, but taking into account that this phenomenon is not absolute, there are necessary measures for the space isolation among the varieties of the same species. After several generations there is possible to appear some segregations caused by the complex hereditary background of these varieties. Being easily noticeable by their phenotype, they can be avoided when the elite plants are chosen and removed permanently by negative selection during the process of the biological links production for the commercial seeds.

MATERIALS AND METHODS

Field of individual selection was set up in the first cycle with the biological material supplied by the variety breeder. During the period of January-February 2002 the biological material was sorted out. Physiological particularities of the seeds harvested in the year 2001 from the breeder's field were analysed and the samples of seeds were prepared for sowing. The trial field was placed according to the isolation distances among varieties and crop rotation was considered. The field was ploughed in spring by two passings with the combinator and was shaped with by TU 650+MMS 4.5. Sowing was performed when the soil temperature reached 3–4ºC at 5 cm depth by TL 445+MELO. In this field the plants were sown at higher distances, by comparison with a standard crop, so that all the plants could express equally all their characters and traits. The field was herbicized immediately with Prometrex-3.5 l/ha and later one mechanical and two manual hoeings were carried out. During this period a single irrigation was necessary. Favourable conditions for the attack of *Peronospora pisi* were created due to wet season and lower temperatures and it was necessary to apply a treatment with fungicide Dacmancoz 80 WP–0,2 %. In order to control the pea weevil (*Bruchus pisorum*), two treatments with Sinoratox 35 CE-0.15 % stage were carried out, during the flowering, at 10 days interval of time.

In the process of seed production, selection can be used in several variants, according to the biological particularities of the species and varieties as well as according to the stage of this process. In order to maintain and build up the basal material of the varieties, always an individual selection is applied (a single choice) but the elite plants choice respects exclusively the specificity characteristics of the variety subjected to multiplication. Individual screening in the elite' offspring plants depends on the biological particularities of the species and especially by the action intensity of the factors causing hereditary variations. In varieties belonging to autogame species, individual selection lasts up to 3 years, due to lower frequency of the hereditary variations. At the end of the last stage of individual selection, the material is homogenized and by successive multiplications some biological categories of seeds results. To obtain phenological data as a research

method was used *"observation"*, and for morphological and yield traits *"biometrical measurements"* and *"determinations"* were performed in order to compute the interval of variability. Bulk selection according to negative traits was used aiming to remove the plants/lines characterized by deviations from the interval of variability for the main characters computed, as well the alien ones, sick, undeveloped plants or having a later-flowering. Knowing specific characteristics for identification from this field were picked up plants having the highest degree of variety specificity, a great yielding ability, good phytosanitary status (free of viruses like *Pisum virus* 1, *Pisum virus* 2; or *Ascochita pisi* and *Peronospora pisi*), others morphological and physiological characteristics (the size and shape of the pod, the leaves colour, the shape of the leaflet). From such plants (elite) seeds were harvested separately. Taking into account the limits of variability of each variety 2500 elite plants were chosen, identified and harvested. In order to establish the variability of the main characteristics of the biological material and to establish the rank of variability of each characteristic under the soil and weather conditions of the R.I.F.V.G. Vidra the arithmetic mean (x), standard deviation (s) and coefficient of variability (s%) were computed.

RESULTS AND DISCUSSIONS

Our observations investigated the following phenological stages: *the sowing date, the sprouting date, the beginning of mass flowering, the pod setting, the physiological ripening date* (Table 1).

Table 1

Phenological dates of the green pea varieties-RIVFG - Vidra, 2002

Variety	Sowing date	Sprouting date	Flowering date	Date of the appearance of the first pod	Date of technological maturity	Date of physiological maturity
Afila SC	8.03	14.04	18.05	27.05	3.06	8.07
Gerola	6.03	9.04	10.05.	19.05	10.06	2.07

Concerning the vegetative period, this was registered as the number of days from the sprouting to technological maturity and by phenological stages (Table 2).

Table 2

Phenological stages (number of days) of the green pea varieties

Variety	Sowing-sprouting	Sprouting-flowering	Sprouting-pod setting	Sprouting–grain appearance	Sprouting–technical maturity	Sprouting–physiological maturity
Afila SC	24	26	31	36	59	81
Gerola	30	39	47	52	60	86

In order to investigate morphological characteristics and productivity were

recorded the biometrical measurements, for the interval of variability of the following traits was computed: *the plants total height, number of nodes up to the first pod, number of pods per plant, number of grains per plant* (Table 3).

Table 3

The main morphological and yielding characteristics of the green pea varieties

Variety	Plant height after flowering (cm)	Number of nodes up to the first pod	Number of pods per plant	Pod length	Number of grains per plant	Grains weight	1000 grains weight (in dried stage)
Afila SC	38.8	11	5	6	24	4.8	200.6
Gerola	46	9	7	8	33	7.8	236.6

By the variability analyse for the plants total height (cm) one could find that the varieties under investigation presented a low coefficient of variability. The number of nodes up to the first pod recorded also a low coefficient of variability for the Gerola and medium for the Afila SC variety.

Among the elements that assure the yield on the surface unit, the number of pods per plant recorded a high coefficient of variability. Considering the number of grains in the pod, the coefficient of variability has an average value (Table 4).

Table 4

Variability of the main characteristics of the green pea varieties - RIVFG – Vidra, 2002

Variety	Total height of the plants (cm)			Number of nodes up to the first pod			Total number of pods per plant			Average number of grains in the pod		
	x	s	s%	x	s	s%	x	s	s%	x	s	s%
Afila SC	38.8	3.7	9.5	11.3	1.7	15.0	4.8	1.3	27.1	5.1	0.8	15.7
Gerola	47.1	4.7	9.9	9.5	0.8	8.4	6.5	2.3	35.4	5.2	0.8	15.4

CONCLUSIONS

Taking into account the experience of the countries with an advanced agriculture as well the own experience gained by our country in this field, the R.I.V.F.G. Vidra drew up schemes with adequate links and working methodology for each species or species group having a similar biology.

The morphological and yielding characteristics of the biological material studied in the year 2002 proved to be very much influenced by the growing technology as well as by the environmental factors.

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INVESTIGATIONS CONCERNING THE USE OF SOME FERTILE-STIMULATING PRODUCTS AT TOMATOES CULTIVATED IN THE FIELD

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Key words: tomatoes, fertile-stimulating, treatment.

SUMMARY

The researches fulfilled at the early tomato culture from the field, Ioana F1 had as a goal the influence of some fertile-stimulating products upon the growth and fructification processes.

One treatment with Cycogan 0.15 % or Cropmax 0.25 % has been effectuated at the seeds and other treatments with fertile-stimulated Cropmax 0.5 % or the fertilizing Terra – sorb 1 % at the plants culture.

The best production results were obtained in the case of treatment combinations: Cropmax + Terra-sorb; Cropmax + Cropmax; Cycogan + Cropmax, the untreated control being exceeded up to 46.2%.

METHOD AND MATERIAL

The investigations were effectuated at S. D. Banu Mărărcine, to early field cultivated tomatoes, as part of bifactorial experience (Table 1) using Ioana hybrids.

Table 1

The specific of variants

Factor A (Treatments of the seed)	Factor B (Treatments in the culture of plants)
a_1 – untreated seed	b_1 – untreated plants
	b_2 – treated plants with Cropmax 0.25 % x 3
	b_3– treated plants with Terra-Sorb 1.0 % x 3
a_2 – seed treated with Cycogan 0.15 %	b_1 – untreated plants
	b_2 – treated plants with Cropmax 0.25 % x 3
	b_3– treated plants with Terra-Sorb 1.0 % x 3
a_3 – seed treated with Cropmax 0.25 %	b_1 – untreated plants
	b_2 – treated plants with Cropmax 0.25 % x 3
	b_3– treated plants with Terra-Sorb 1.0 % x 3

RESULTS AND DISCUSSIONS

2.1 **Growth elements at seeds and plants culture.**

The values of the determinations and of the measurements effectuated are represented in tables 2 and 3.

At seeds (table 2) the two products used have influenced differently the morphological elements (H and ø), the Cycogan retardant manifesting its reduction action of the waste and diameter growth, this way making the most balanced seeds.

Table 2

Morphological elements at seeds

Factor A	Specific	H		Ø		Leaves	
		cm	%	cm	%	Nr.	%
a_1	Untreated seeds	36.0	100.0	0.70	100.0	10.2	100.0
a_2	Seeds treated with Cycogan (0.15%)	24.0	66.7	0.98	140.0	9.8	96.1
a_3	Seeds treated with Cropmax (0.5%)	34.0	94.4	0.86	122.8	10.6	103.9

In the culture of plants the retardant action of Cycogan is maintained especially in combination with the action of Cropmax, the waist of the plants maintaining itself reduced to 5.7% and the diameter of these to 33.0%

Table 3

Morphological elements at tomatoes cultivated in the field

A	B	H (cm)		Ø (cm)		Leaves (no.)		The internodes length (cm)
a_1	b_1	150.0	100.0	1.10	100.0	24.0	100.0	6.25
	b_2	142.0	94.7	1.24	112.7	25.2	105.0	5.63
	b_3	158.6	105.7	1.18	107.3	25.4	105.8	6.24
a_2	b_1	138.0	100.0	1.18	100.0	25.2	100.0	5.47
	b_2	119.8	86.8	1.57	133.0	25.0	99.2	4.79
	b_3	140.2	101.6	1.32	111.9	25.8	102.4	5.43
a_3	b_1	146.0	100.0	1.16	100.0	25.2	100.0	5.79
	b_2	130.4	93.3	1.45	125.0	24.8	98.4	5.26
	b_3	148.2	101.5	1.46	125.9	26.0	103.2	5.70

The medium number of leaves did not register significant differences between variants.

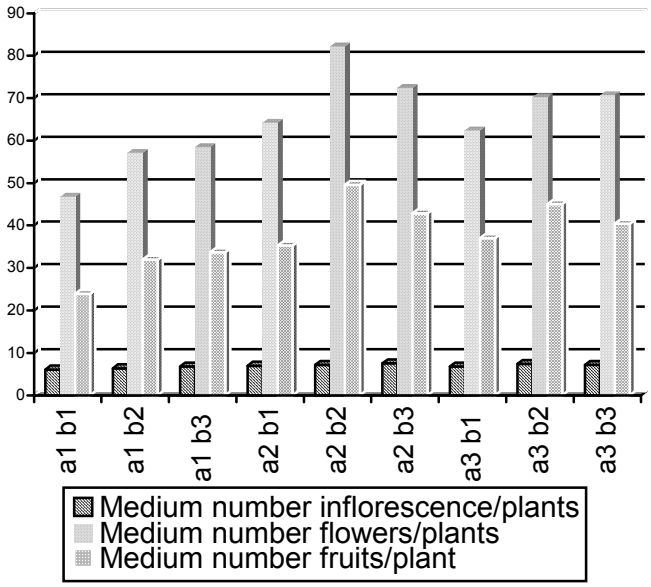
2.2 Elements of fructification

Determinations were effectuated on the main fructification elements (the number of inflorescences, new flowers appeared, bounded fruits) at plants on variants in the moments of mumping, and the diagram 1 shows the values obtained and the existing differences.

The best values have been obtained at a2b2, a2b3, and a3b2, and concerning the fructification coefficient at a3b2, a2b2.

Diagram 1

The number of inflorescences, flowers, plant fruits and the percent of bounding at the tomato plants cultivated in the field

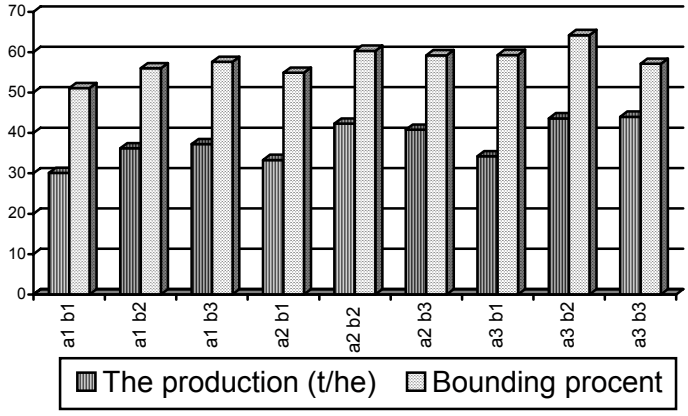


2.3 The production obtained

The results of production, calculated and interpreted statistically have pointed out values of 33.3 – 44.0 t/he. At the variants treated opposed to the witness of 3.2 –13.9 t/he (10.6 – 46.2 %) – diagram 2.

Diagram 2

The fruits production (t/he) and the percentage coefficient (%) at the tomatoes cultivated in the field



There have been pointed out the combinations a_3b_3 (Cropmax + Terra – sorb), a_3b_2 (Cropmax + Cropmax) and a_2b_2 (Cycogan + Cropmax), variants which the spores have exceeded 40%.

Within the same diagram we can notice the correlation between the bounding coefficient and the productions obtained on the variants.

CONCLUSIONS

1. The growth elements of seeds and the culture of seeds have been positively influenced.
2. The elements that define the fructification have registered considerable values with the bounding coefficient up to 64.2 %.
3. Productions is up to 44.0 t/he with differences in comparison with the witness of up to 46.2 % pointing out the combinations of treatment: Cropmax + Terra – sorb, Cropmax + Cropmax, Cycogan + Cropmax.

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THE INFLUENCE OF IMPROVING OF AUBERGINE SEEDLING PHYSICAL CHARACTERISTICS OF NUTRITIVE SUBSTRATE USED FOR TRANSPLANT

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Key words: aubergine, transplant, nutritive substrate

SUMMARY

In this study we followed the influence of Fitpol C product on improving of physical characteristics of nutritive mixture used for aubergine transplant.

We seized that adding Fitpol C product to nutritive mixture the quantity of water used was the biggest at variant applied to 1% product. Meanwhile, number of cubs was biggest with 28% to control. Physical characteristics (apparent density, permeability, porosity) of pressed cubs were improved. The rooting system volume was bigger with 18-127% than the control variant

The height of plants in pressed cubes physical characteristics was bigger with 9-82% than transplant plants in cubes of control variants.

INTRODUCTION

Aubergine has an important place in vegetables production not only for eating them fresh but also for tinned. The level of productions conditioned by the nurseling quality of transplants produced, generally, through transplanted in pressed cubes or pots. There is a big variety of recommended mixtures; there are ensured depending on supply possibilities, on cost price, characteristics and local traditions. In the practice of vegetable cultivators we can find mixtures composed of follow soil, peat, manure and sand.

Most often, the physical characteristics of nutritive cubes don't ensure the best conditions for getting a nurseling of good quality. For improving the nurseling medium we can use some chemical products such poliacrilamides.

The objectives were: the improving of some physical characteristics of pressed cubes adding in nutritive mixture some doses of FITPOL C; the improving of aubergine nurseling quality.

MATERIAL AND METHODS

In order to realise the objectives, we manufactured pressed cubes of 7/7/7 cm size made of a mixture composed of 50% follow soil, 20% peat, 25% manure and 5% sand. To improve the physical characteristics of pressed cubes in the nutritive mixture we added our product with commercial name Fitpol C. The following experimental variants were studied:

V1- control (pressed cubes without Fitpol C); V2- 0,25 g Fitpol C at 100 g nutritive mixture; V3- 0.50 g Fitpol C at 100 g nutritive mixture; V4- 0.75 g Fitpol C at 100 g nutritive mixture; V2- 1.00 g Fitpol C at 100 g nutritive mixture.

The distinguish the effect of Fitpol C product on the physical characteristics of pressed cubes and a quality of aubergine transplant, many realised measurements and observations regarding: the quantity of water used for realising of cubes; the number of cubes realised of 10 g mixture; the apparent density (g/cm^3) of pressed cubes; the total porosity (% v/v); the rooting system volume nurseling (cm^3); and the diameter of plants (mm); the height of transplant (cm).

The primary dates were statistically processed through the analysis of variant and Tukay test of multiple comparisons.

RESULTS AND DISCUSSION

The quantity of water used for watering of a quantity of 1 kg nutritive mixture, till the touch of consistence of the nutritive cubes realisation was of 2.65 l at control variant and between 3.35 and 5.1 l at mixture with addition of Fitpol C. We observe the use of water quantity bigger with 26-92% regarding the control variant (table 1).

Table 1

The Fitpol C influence to some physic characteristics of nutritive cube

Variants	The studied indicator						
	Water quantity	Water quantity used in 40 days	No. of cubes from 10 kg mixture	Rooting system volume	Apparent density	Saturated hydraulic conductivity	Total porosity
	l/kg mixture	l	No.	cm ^{3}	g/cm^3	mm/h	% (v/v)
V1	2.625	41.500	71	5.325	0.90	35	56
V2	3.413	38.000	78	8.575	0.80	45	61
V3	4.637	36.000	82	12.525	0.68	56	64
V4	4.987	32.000	86	11.525	0.56	70	66
V5	5.325	30.000	93	6.875	0.54	82	70
DL 5% (Tukey)	0.265	2.931	4	0.516	0.05	18	4
DL 5% (Tukey)	0.337	3.730	5	0.657	0.07	24	6
Fischer significance	xx	xx	xx	xx	xx	xx	xx

In the period of 40 days for watering the transplanting 41.5 l for control variants while at variants with Fitpol C the quantity of water lower progressively with the used doses, the smallest quantity (30 l) being met at the variant with 1 g Fitpol C at 100 g mixture.

If we take into account that the product Fitpol C has the capacity of absorption of 80-g water and of growing of volume with 80 percents, we also see the number of pressed cubes resulting from 10 kg nutritive mixture. If at variant

control appeared 71 pressed cubes, their number increased 8-28 % at variants with addition of Fitpol C, and the biggest number (93) being recorded at the maximums doses of 1 g/100 g of nutritive mixture.

The improvement of crop medium contributed to a maximum grown of the rooting system. Thus, if at control variant the rooting system volume was 5.325 cm^3, at variants with Fitpol C in doses between 0.25 and 0.75 g it has the volume of 8.575 and 12.525 cm^3.

Regarding the apparent density of pressed cubes the results of laboratory analysis emphasise the fact that the presence of Fitpol C product contributed to the realisation of a better state of breaking up. In the case of control variant, the apparent density of pressed cubes was of 0.90 g/cm^3, while at the variants of improving the crop medium the values are between 0.8 and 0.54 g/cm^3, and the best physical state is met at the doses of 1 g/100 g nutritive mixture.

Adding the Fitpol C product to the nutritive mixture contributed to the growing of pressed cubes show that at control variant the saturated hydraulic conductivity was of 35 mm/h but at Fitpol C variants with addition the values are growing with applied doses and they are included between 45 and 82 mm/h.

As the values of apparent density are increasing, the growing of total porosity was recorded; the growing of total porosity was recorded at the pressed cubes, which also contain Fitpol C. At control variant, the total porosity was of 56 % but at variants with improved characteristics the values are included between 61 and 70%.

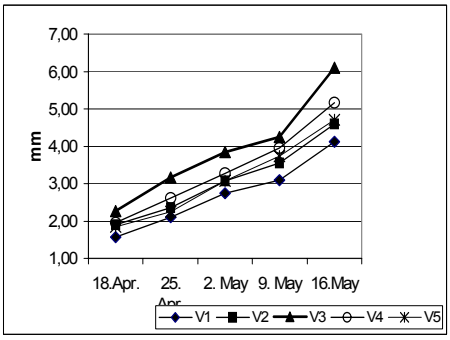

Fig. 1 The dynamic transplant height

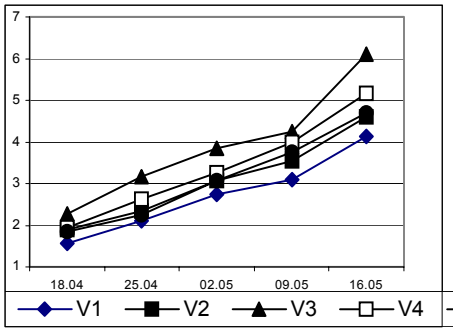

Fig. 2 Stalk diameter

If we want to know how plants benefited by the improving of pressed cubes physical characteristics where the transplant was we made some measurements regarding the dynamics of plant growing. The results showed that in the first days after transplanted we didn't find any differences between variants regarding the plant size. After this period of time clear differences appeared so that when the transplants was planted, the average height of plants from pressed cubes

with addition of Fitpol C was bigger with 9-82% than the plants in cube of control variants (figure 1).

The observation and the realised measures regarding the diameter of the stalk of aubergine plants shows that we improved the physical characteristics of pressed cubes the plants benefited by better growing conditions. The observations were made in dynamics but the results realised show the obtaining of more vigorous plants. The values of plants diameter in pressed cubes with improved physical characteristics are bigger with 12-43% than the plants in cubes of control variant (figure 2).

CONCLUSIONS

1. If we add the Fitpol C product in nutritive mixture contributed to the improving of pressed cubes physical characteristics (apparent density, permeability, porosity);
2. We recorded an increase of 8 and 28% of the number of cubes realized from 10 kg of nutritive mixture;
3. The rooting system volume was bigger with 18-127% than the control variant;
4. The average diameter of plants had bigger values with 13-40% than variant;
5. The height of plants in pressed cubes physical characteristics was bigger with 9-82% than transplant plants in cubes of control variants.

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RESEARCHES REGARDING THE INFLUENCE OF FERTILIZATION ORGANIC ON GREENHOUSE TOMATOES

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Key words: tomatoes, greenhouse, fertilization organic

SUMMARY

Unreasonable pesticide usage in agriculture leads to a lost of nutritive elements from the soil, an interruption of natural circuit of nitrogen from nature. In this research we pursued the influence of some organic fertilizer in tomatoes culture: garden compost, a mixture of peat and forestry compost, a substratum resulted from mushroom compost, a recycled substratum made from peat and pearlite.

This experiment was developed between 2002-2003 years, in USAMV Bucharest, at the green houses sector. Five variants were fertilized with organic materials, in doses of 2.5 hg/m^2 and one unfertilized (control variant). The best results were obtained at the tomatoes fertilized with substratum resulted from mushroom compost (98.5 t/ha) and in the one with peat and pearlite (97.2t/ha).

INTRODUCTION

In the last decades, the researches in the organic fertilizer field become more and more important and frequent, because of the negative impact of chemical fertilizers on the environment, because of the energy crisis, and the upper prices. Using urban waste we can make some substratums, cheaper, more efficient and safer.

In our country, good results were obtained using this kind of materials and others: swine-compost, slime-compost from water purification, waste compost [1]. Results obtained with the swine-compost were promising and encourage us to continue the research, studying new aspects of organic fertilization in tomatoes cultures [4].

MATERIALS AND METHODS

The culture was started in March 2003. For the experience we use different organic fertilizer: garden compost, a mixture of peat and forestry compost, a substrate resulted from mushroom compost (with a major part of equine manure), a recycled substrate made from peat and pearlite used in 2000, 2001 and 2002 years in soil less culture. The variants were:

V_{1Mt} – control variant, unfertilized;

V_2 - substrate used in 2002, in a soil less culture (forestry compost 50% + peat 50%);

V_3 - substrate used in 2000, in a soil less culture (peat 60% + pearlite 40%);

V_4 - substrate used in 2001, in a soil less culture (forestry compost 50% + peat 50%);

V_5 - substrate resulted from mushroom compost;

V_6 - garden compost.

Biological material used was represented by the tomato hybrid Trident F_1.

The seedlings were planted in 18 March, at age of 55 days, in a density of 42 000 pl. per hectare.

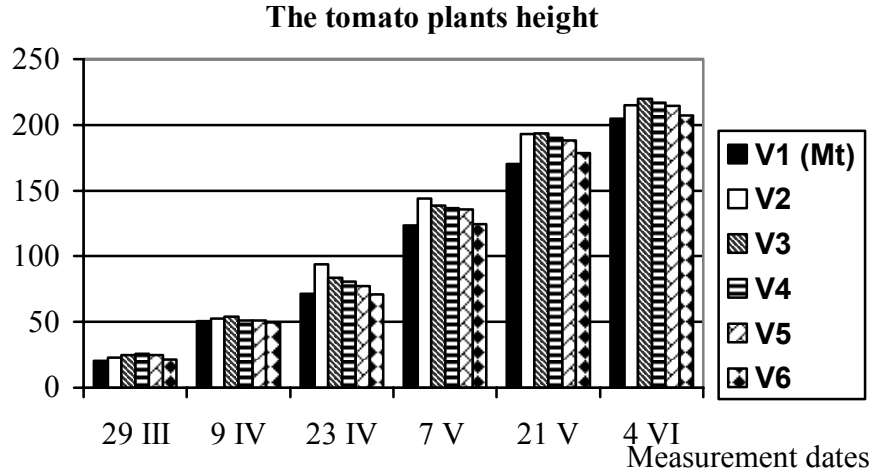
Doses used for the basis fertilization were 2.5 kg/m^2.

Agrochemical analyses were made for each type of compost (nutritive elements concentrations). Another determination were made: the plants height, number of leaf, number of flowers and fruits, and obtained yield

RESULTS AND DISCUSSIONS

As it can be observed in figure 1, all the variants fertilized with organic materials, except V_6, had a major height in comparison with control variant. V_3 has a height of 2.2 m and $V1_{mt}$ only 2.05 m. These results may be explained by the high concentration of nitrogen in V2, V3, V4 and V5 variants. As it is know the nitrogen is an element that stimulates vegetative growth.

Figure 1



From the agrochemical analysis of the used substrates, it can be observed that the C/N proportion is favourable for all variants, except the V_5 (garden compost) were this proportion is higher. We must specify that at a value of C/N proportion under 20 – 25 the nitrogen mineralization it become higher and higher.

Beyond the value of 25 the mineral nitrogen from the soil is completely blocked out. Because of this fact, in organic maters decomposition can appear one phenomenon, known as "nitrogen hunger".

In V_6, which has the value of C/N proportion of 26.4, the plant growth was smaller.

In table 1 are presented the agrochemical analysis for ashes content, organic matter, organic carbon, total nitrogen.

Table 1

The agrochemical analysis for humidity, ashes content, organic matter, organic carbon, total nitrogen

Fertilizer	U (%)	Ash (%)	MO (%)	$C_{organic}$	N_t	Rapport C/N
Garden compost	35.36	64.37	35.63	19.79	0.75	26.4
Mushroom substratum	44.93	68.58	31.42	17.45	1.40	12.5
Substratum recycled from 2000	45.06	66.34	33.66	18.70	1.43	13.1
Substratum recycled from 2001	42.51	66.13	33.87	18.82	1.17	16.1
Substratum recycled from 2002	47.10	72.66	27.34	15.19	1.15	13.2

U% - humidity percent;
MO% - organic matter percent;
$C_{organic}$ – organic carbon percent;
N_t - total content of nitrogen
C/N – carbon/nitrogen proportion.

Registered yield in experimental variants was higher than in control variant, but the differences weren't so important.

The higher yield was registered in V_5 variant, 9.85 kg/m^2. In variant control the production was only 8.8 kg / m^2 (table 2)

All these productions are smaller than usual because of the unfavourable climatic condition from this year.

Table 2

Yield indicators in organic fertilization at tomatoes

No of variant	Yield	Yield	Medium weight (g/fruit)	Fruit number	
	Kg/m^2	Kg/plant		On plant	On m^2
V_{1Mt}	8.8	2.09	97.5	24.8	104.4
V_2	9.37	2.23	108.41	26.72	112.24
V_3	9.72	2.3	99.83	28.2	118.44
V_4	9.63	2.29	103.58	27.7	116.34
V_5	9.85	2.34	106.75	28.6	120.12
V_6	9.17	2.18	104.32	25.5	106. 72

CONCLUSIONS

1. Plants fertilized with organic materials grown better than the one unfertilized.
2. The obtained yield was bigger in fertilized variants in comparison with the unfertilized variant.
3. In the next years the experience will continue, with higher doses of organic matters.

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THE VARIABILITY OF NITRATES CONTENT IN SOME VEGETABLES FROM SOME BUCHAREST MARKETS

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Key words: nitrates content, vegetables, maximum admitted limits

SUMMARY

The fertilization with nitrogen, phosphorus and potassium in balanced rates directly influenced by specific needs of plants could determine the increase of the crop quantity and quality.

The application of nitrogen fertilizers without control could affect the nutritive balance and lead to the lowering of quality for each crop, the nitrate accumulations above the maximum admitted level being a real danger for human health.

The research of Agrochemistry Department was initiated as a consequence of arguments concerning the excessively high nitrates contents of some vegetables, debates published in mass media during the spring of 2003 year.

INTRODUCTION

Agricultural product quality has represented, as to agricultural and horticultural experts, one of the main objectives together with quantitative production per hectare. The use of fertilizers in culture technology has represented and still keeps representing a responsible link for the growth of crop per hectare. Nitrogen belonging to N, P, K fertilizers is the main element which made the crop increase per hectare (15-40 %).The nitrates ingested by man and animals are reduced to nitrites forming nitrosamines, which in reaction to hemoglobin, element which forms the methaemoglobin that determines nonoxygenised blood phenomenon, causing thus duodenal or stomach ulcers to adults and a well-known illness called "baby blue" to children.

Soil organic matter represents the main nitrogen source for plants. The total of nitrogen varies in our soils from 0.1 to 0.4% out of which 80-90% found as organic compound elements and the percent of 10-20% is represented by the mineral nitrogen found as ammonium salts, nitrates and nitrites salts form. These mineral forms are forms that plants could assimilate from the soil. Fertilizers completed the differences in plant needs. The use fertilizers for nitrofile plants must be strictly made, especially in case of some vegetables such as: lettuce, spinach, celery, turnip cabbage, radish, cucumber and cabbage. Nitrogen needs of vegetable culture are different with the species, cultural technology, and nutritive factors. For a tone of main produce, the

vegetables consume per kilo for the fresh substance, the following quantities: radish 5kg N, lettuce 2.8kg N, celery 6.5kg, spinach 3.6kg N, cucumber 1.6kg N, and for cabbage 3.0kg N. The level of nitrate accumulation is different in the case of these plants too. So, lettuce could accumulate 2500ppm or more, turnip cabbage preserves the same content not surpassing the limit and cucumber could accumulate nitrates under the level of 500ppm (Lacatus, V., 2003).

These levels depend upon the fertilization technology too, but also upon the cultivation year period and cloudy sky. Cold periods with high nebulousness and cloudy sky prevent the reduction of nitrates, which consume a high level of energy level supplied by the photosynthesis produces and which in the absence of sun energy stops forming. This way, the nitrates remain unmethabolised, accumulating themselves and producing the nitrates toxicity.

Although during the last 14 years, the chemical fertilizers consume decreased (40-50 kg/ha were applied) the problem of nitrates accumulation in fresh vegetable remains the object of discussion among experts, farmers and responsible factors for the quality of products.

MATERIAL AND METHOD

The objective of this study was determining nitrates contents in some vegetables bought in March 2003 from some Bucharest markets; these vegetables were produced in different greenhouses and glasshouses of different regions.

The agrochemical analysis was made on fresh material, the extraction was made with acetic acid 2%, and the nitrates were determined using colorimetric method with phenoldisulphonic acid and natrium hidroxidum20%. The determinations were made with spectrophotocolorimetry Cecil 2041.

RESULTS AND DISCUSSIONS

Table 1

The nitrates content in lettuce (18.03.2003)

No	Market	Producer	Nitrates content - ppm
1	Rahova	Glasshouse Popeşti Leordeni	3703
2	Gorjului	Glasshouse Popeşti Leordeni	3283
3	Pantelimon	Glasshouse Vitan Bărzeşti	2903
4	Matache	Glasshouse Pipera	**1282**
5	Obor	GreenhouseGiurgiu	3302
6	Crângaşi	Glasshouse Berceni	**4493**
7	Domenii	GreenhouseCojasca Dâmboviţa	2544

The nitrates content varied between 1282 ppm (lettuce from Glasshouse Pipera) and maximum 4493 ppm (lettuce from Glasshouse Berceni).

The highest admitted limits stipulated by present standards of 3000 ppm have been exceeded as it is shown in the table 1 by 4 from 7 lettuce producers.

Table 2

The **nitrates content in turnip cabbage (18 March 2003)**

No	Market	Producer	Nitrates content – ppm
1	Domenii	Glasshouse Codlea	1631
2	Crângaşi	Glasshouse Pipera	2093
3	Obor	Glasshouse Codlea	**1272**
4	Gorjului	Glasshouse Pipera	**2103**

In turnip cabbage the nitrates content varied between 1272 ppm (Codlea) and 2103 ppm in turnip cabbage produced in Pipera Glasshouse.

The highest admitted limits stipulated by present standards of 1500 ppm have been exceeded as it is shown in the table 2 data, in the same measure by the producers of Pipera greenhouse but also in a farm of Codlea glasshouse.

Table 3

The nitrates content in cucumber (18 March 2003)

No	Market	Producer	Nitrates content - ppm
1	Domenii	Glasshouse Codlea	565
2	Crângaşi	Glasshouse Pipera	**287**
3	Obor	Glasshouse Codlea	379
4	Gorjului	Glasshouse Codlea	605
5	Rahova	Glasshouse Codlea	615
6	Rahova	Glasshouse Berceni	**1097**

In cucumber the nitrates content varied between 287 ppm (Pipera Galsshouse) and 1097 ppm in cucumber produced in Berceni Glasshouse.

Table 4

The nitrates content (ppm) in epicarp and mesocarp of cucumber -18 March 2003

No	Market	Producer	$N\text{-}NO_3$ (epicarp)	$N\text{-}NO_3$ (mesocarp)
1	Domenii	Glasshouse Codlea	266.76	92
2	Obor	Glasshouse Codlea	379.62	179
3	Rahova	Glasshouse Codlea	615	194
4	Matache	Glasshouse Pipera	1005	759
5	Rahova	Glasshouse Berceni	1077	359

The nitrates content in cucumber (table 3) produced in Codlea and Berceni Glasshouse was higher than maximum standard limits admit (400 ppm).

In cucumber the nitrates content was determined separately in epicarp and mesocarp; the results are presented in table 4.

The nitrates content of cucumber epicarp is 1.3 -3.1 times higher than nitrates content of cucumber mesocarp, fact unknown by consumers.

CONCLUSIONS

1. The nitrates content varied between 1282 ppm and maximum 4493 ppm. The nitrates content in lettuce which has cultivated in Popesti Leordeni, Berceni Glasshouse and Giurgiu Greenhouse exceeded the maximum standard admitted limits (3000 ppm).
2. The chemical and organical fertiliser applied without agrochemical control influenced directly the nitrates content in plants.
3. In different growing stages, the fertilisations must be correlated with light intensity nebulosity and temperature. The results point out that during February-March these factors weren't assured in optimum conditions in the Glasshouses where the vegetables were produced.
4. The fertilisation systems must be controlled by agrochemical analysis during the vegetation period.
5. It is imposed a certain review of L.M.A. and STAS standards concerning the determination method of nitrates by the factors which control the producers quality.

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THE INFLUENCE OF CULTURE MEDIUM ON *IN VITRO* CLONAL REGENERATION ON WITLOOF CHICORY (*CICHORIUM INTYBUS* L.)

OANA DIACONESCU

Key words: F_1 hybrids, hormonal balance, regeneration rate, plantlets length

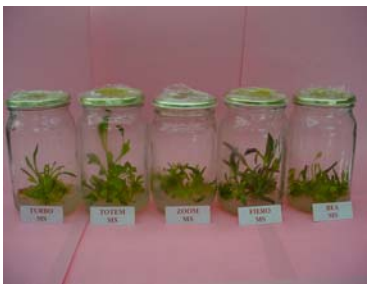
SUMMARY

Generative propagation on witloof chicory has an important drawback since the self-incompatibility is never 100% and there are 10-20% self-compatible plants among the F_1 descendent. *In vitro* culture systems and especially *in vitro* vegetative propagation could overcome this problem by maintaining the heterozis effect and cloning regeneration of the witloof hybrids. The aim of this experience was to establish an optimum culture medium for each hybrid studied ('Bea', 'Turbo', 'Zoom', 'Totem' and 'Fiero'). The starting material consisted in young plantlets obtained by *in vitro* sowing on sterile culture medium, transferred afterwards on two different culture media: Murashige&Skoog (1962) and Quoirin&Lepoivre (1977) with different concentrations in salts and hormones. The final results of this work showed the influence of culture medium and hormonal balance upon the witloof chicory regeneration rate and length, pointing out the best combination for each hybrid studied.

INTRODUCTION

Witloof chicory traditional varieties were mainly replaced by F_1 hybrids since they have excellence adaptability to new forcing techniques (like hydroponics). Modern techniques for industrial production of witloof chicory are based on the chicory roots uniformity and heterogeneity.

Therefore, this paper aims to bring into operation a rapid technique for *in vitro* clonal regeneration on *Cichorium intybus* L., studying the optimum culture medium and hormonal balance regarding both the regeneration rate and the plantlets growth on *in vitro* culture.



MATERIALS AND METHODS

The starting material consisted in chicory plantlets obtained *in vitro* by sowing *Cichorium intybus* hybrids on sterile culture medium. The plant material

originated from France – Vilmorin (‘Bea’, ‘Turbo’, ‘Zoom’) and U.S.A. – Johnny’s selected seeds (‘Totem’ and ‘Fiero’).

For the multiplication rate two different culture media were tested: Murashige&Skoog (1962) with 0.7% agar and Quoirin&Lepoivre (1977) with 0.5% agar. The first one had a high salts concentration (4561.93 mg/l) and the latest a medium one (4045.71 mg/l). The vitamins added were Walkey’s vitamins (1972) for QL medium and MS vitamins for MS medium.

During the first subculture, the chicory plantlets were grown under the influence of 0.1 mg/l indolylbutyric acid (IBA) and 0.1 mg/l benzilaminopurine (BAP), and in the second subculture the citochinine concentration was ten times higher (1.0 mg/l BAP).

RESULTS AND DISCUSSIONS

The regeneration rate

In the first subculture the regeneration rate was twice higher on QL medium compared with MS medium for all the studied hybrids, with one exception, ‘Fiero’, that behaved better on MS (fig. 1).

‘Bea’ had the smallest rate of regeneration (3) and ‘Totem’ the highest (4.5) on QL medium, but on MS medium ‘Turbo’ and ‘Bea’ registered the smallest (1.5) and ‘Fiero’ the highest regeneration rate (5.5).

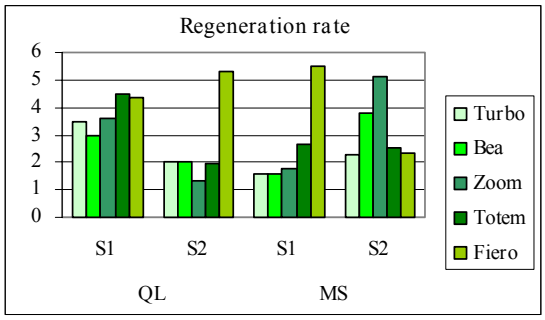


Fig. 1 – The chicory hybrids regeneration rate on both subcultures

When the citochinine concentration was increased, in the second subculture (BAP = 1 mg/l), all the chicory hybrids behaved better on MS medium, with one exception (‘Fiero’).

The smallest regeneration rates were registered by ‘Turbo’ (2.8) and ‘Zoom’ (1.3) on MS, respectively QL medium, while ‘Zoom’ regenerated better (5.1) on MS and ‘Fiero’ (5.1) on QL.

Therefore, it comes out that the *Cichorium intybus* hybrids regenerated better on QL when small concentration of citochinine were added to this medium and on

MS medium when this one was supplemented with higher citochinine concentrations.

The exception of this rule was represented by 'Fiero', for this hybrid being best the association of MS medium with small concentration of BAP (0,1 mg/l) and QL medium with higher BAP concentrations (1 mg/l).

Also, it is evident the remark that at the same citochinine concentration (1 mg/l BAP) 'Zoom' registered the smallest regeneration rate on QL medium and the highest on MS (reported to all chicory hybrids).

The plantlets length

It was noticed that the new plantlets grew better on QL medium, the smallest values being recorded by 'Turbo' (3.6 cm) in the first subculture and by 'Bea' (2.7 cm) in the second. On the same medium, 'Bea' (5.6 cm) and 'Fiero' (4.8 cm) had the highest values in the first, respectively the second subculture (fig. 2).

On MS medium, first subculture, 'Turbo' registered the smallest values (2.1 cm) and 'Fiero' the highest (3.6 cm), and in the second subculture 'Totem' had the smallest length (1.8 cm) and 'Fiero' the highest (2.6 cm).

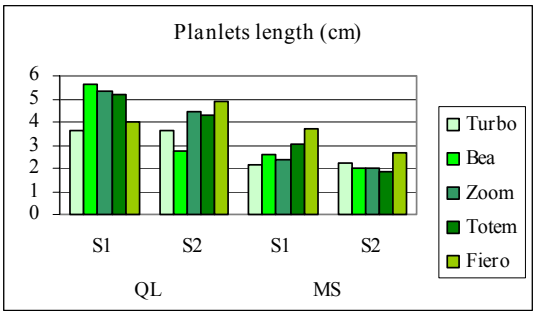


Fig. 2 - The chicory plantlets length on both subcultures

Comparing the two media (MS and QL) it was easily remarked that all the hybrids with one exception ('Turbo') behaved better, regarding the new plantlets length, on Quoirin & Lepoivre medium on both subcultures.

'Turbo' behaves alike on both subcultures, not being influenced by the increased concentration in BAP added to QL medium, but 'Bea', 'Zoom' and 'Totem' showed an influence, their length having reduced values once with the increasing of citochinine concentration.

'Fiero' behaviour was however different: on QL medium this hybrid registered 3.9 cm length on 0.1 mg/l BAP and 4.8 cm length on 1.0 mg/l BAP.

On Murashige & Skoog medium, increasing the BAP concentration from 0.1 mg/l to 1.0 mg/l leads also to small lengths of the *Cichorium intybus* explants.

Finally, it is recommended that small BAP concentration must be added to the basic medium for a better growth of 'Bea', 'Zoom' and 'Totem' hybrids, and higher concentrations for 'Fiero'.

CONCLUSIONS

1. The best culture medium for the plant regeneration on witloof chicory (*Cichorium intybus* L.) is represented by Quoirin & Lepoivre medium, less concentrated in mineral salts, supplemented with 0.1 mg/l BAP.
2. The regeneration rate for 'Turbo', 'Bea', 'Zoom' and 'Totem' is optimum when QL medium is supplemented with small concentration of citochinine (0.1 mg/l BAP) and MS medium has higher concentrations (1.0 mg/l BAP).
3. 'Fiero' had the highest regeneration rate on MS medium + 0.1 mg/l BAP (5.5) and on QL medium + 1.0 mg/l BAP (5.3).
4. Totem registered the best regeneration rate (4.5) on QL medium + 0.1 mg/l BAP, and Zoom (5.1) on MS + 1.0 mg/l BAP.
5. All the hybrids grew better on QL medium compared with MS medium, indifferent of the citochinine concentration added.
6. The highest growth value was registered by 'Bea', 'Zoom' and 'Totem' (over 5 cm length) in the first subculture and 'Fiero' (almost 5 cm) in the second subculture.
7. MS medium presented the smallest growth values, for all chicory hybrids, on both subcultures, increasing BAP concentration showed no positive influence whatsoever.

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THE BENEFICENT ASSOCIATIONS OF HORTICULTURAL PLANTS

PAUL DOBRE, NINA MUSAT, MADALINA IVASCU

Key words: ecological culture, repellent plants, Colorado roach, chrysanthemum.

As part of our experiments, we tested the repellent effect of the chrysanthemum species upon the potato culture. During the vegetation there was no attack of the Colorado roach in this culture.

The general trend that one can notice in the last decays of economic activity in countries with different standards of life is the decrease of investments, while the quantitative and especially the qualitative performances are well kept end even improved. Such trends are implemented in certain practical activities, among them - agriculture playing an important role from many points of view. Concretely, the new approach of the agricultural practice refers to the implementation of alternative integrated and ecological technologies, by means of which people can fight against the pollution of the environment and of the agricultural products. Thus one guarantees a higher standard of life and of ecosystems' health.

In order to maintain the plants' health, the alternative and especially the ecological technologies reject any chemical, synthetic substances that alter the interdependence relations between the environmental elements giving a certain doze of toxicity to the agro-alimentary products.

Some ecological technologies propose a change in the approach of the problems related to the plants' health. That means emphasizing not so much the application of the treatments, even if they are ecological, as the implementation of preventive measures. As far as these measures are concerned, there are two basic ways of preventing the pests:

a) by a good organization of the farm and the right application of the ecological technologies, the cultivated plants achieve a higher biological resistance.
b) one can avoid the insects' attack by creating the adequate conditions for the respective culture.

The implementation of these two methods of protecting the cultures requires a very good knowledge of the general and specific agriculture, which leads to a good evaluation of the existent concrete conditions and possibilities, in order to choose the best solutions.

The objective of the present work is the use of the preventive measures proposed by the ecological agriculture, against the pests' attack. This work refers to the use of information related to the interdependence relations between the living

elements in the cultivated ecosystems, in which every component part of the ecosystem is included in the inter-relation of mutual influence.

MATERIALS AND METHODS

The mutual influence of the living elements of the ecosystem results from the fact that species have their own metabolism, and some substances synthesized by the plants during the metabolic process are eliminated in the soil, at the level of the roots, or in the air, at the level of the aerial parts. The emanations through the plant's leaves are usually represented by volatile oils that have certain positive or negative influences over the neighbouring plants of others species. But the effects of these emanations are differently received by the insects that are attracted or rejected by some species. The rejection of the pests by such plants is very common in the ecological cultures, where these plants, called repellent, grow near the cultivated plants and thus keep the pests at a distance. The repellent mechanism of such plants is due either to the fact that the insects cannot resist to some volatile oils, or to a misleading effect, because the volatile emanations of the accompanying plants superpose upon the volatile emanations of the cultivated plant, thus rejecting the pests.

The data referring to the repellent effects of some plants were gathered after having all the necessary information during the production. This sufficient information allowed us to make a list of species that are recommended in order to reduce the number of some pests' attacks. Nevertheless the repellent species used today represent only the beginning in the process of discovering the whole vegetal arsenal created by nature in order to favour the self-adjustment mechanisms in the natural ecosystems, mechanisms that can be taken over by the cultivated ecosystems, also. That is why the results of our researches are meant to contribute to the database related to this problem.

During our researches we tested the influence of the repellent plants over the potato's culture.

The main problem, which most of the time is the reason for failure in the case of this culture, is the attack of the Colorado roach.

Practically speaking, when there are large areas that need protection against the pest people resort to different chemical treatments. Besides the well known negative effects, these treatments can also lead to the following troubles:

- the treatment is not efficient or it hasn't the expected effect;
- the tubers which result from the treated culture have a special taste that modifies the initial one;
- the price of the substances used for the treatments is quite high;
- the use of the insecticidal substance implies a physical or mechanical energetic consumption, which makes the final product more expensive.

All these troubles forced us to find another way of solving this problem, by eliminating the Colorado roach from the potato culture and also from other cultures.

Thus we thought of associating the potato with a repellent plant, which can be rendered profitable, one way or another. At the beginning, we picked up the plant *piretrum* from the list of species, which are recommended for killing the insects. As we could not get planting materials, the potato plants were associated with another species of the same botanic family, whose effect had to be tested though, that is the chrysanthemum (a mixture of species)

RESULTS AND DISCUSSIONS

In the spring of 2002 (in April) the chrysanthemums were planted in one row. The distance between the plants on the row was 35-40 cm. Then we planted two rows of potato tuber picked up from the species Ostara and Désiré, at the distance of 70 cm between the rows and 30 cm (fig.1) between the plants of one row (we couldn't plant several potato rows for lack of space).

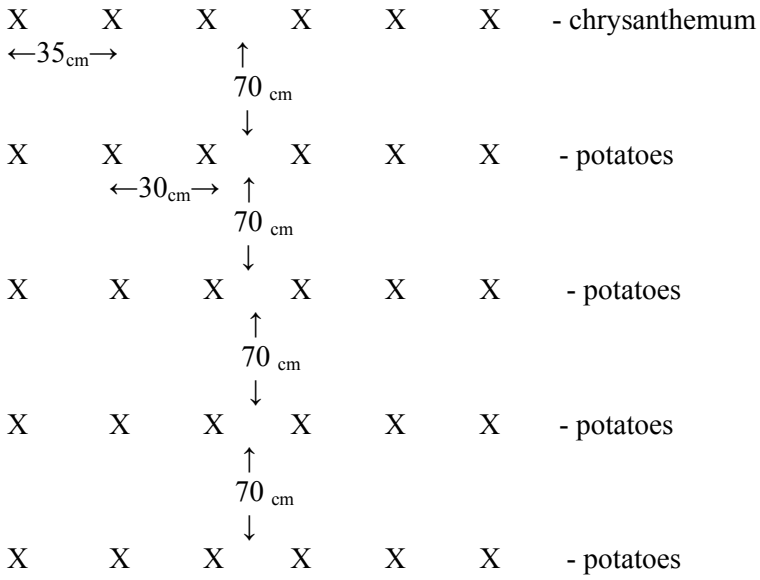

Fig. 1. Planting scheme

During the vegetation we wet and manually weeded the plants each time that was necessary. We have made the fertilization before creating this culture, using chicken faeces compost, 3 kg/m^2. We didn't apply any chemical treatment against the Colorado roach. During the whole vegetation we didn't notice any

insect in the respective culture. In order to make a better test of the repellent effects of the Chrysanthemum species, we made the same experiment in 2003, on the same ground, in the same conditions. The chrysanthemums were kept in that ground over the winter. If one does not apply the crop rotation, then the possibility of an attack of the Colorado roach is higher. Nevertheless, during the latter year there was no insect either, although among the Solancaceous families the potato is the favourite plant of this pest.

Outside the area protected by the chrysanthemums, there were pests even in the cultures where we used chemical synthetic products.

CONCLUSIONS

1. By planting chrysanthemums near the potato cultures, one can prevent the Colorado roach's attack.
2. In order to emphasize the best chrysanthemum-potato relations it is necessary to continue the experiments, to get the optimum formula economically and technologically speaking.
3. In order to distinguish the species or the varieties the most efficient against the Colorado roach attack, one can test a larger range of the existent biologic material. The main purpose is associating the chrysanthemum with the cultivated plants frequently attacked by this pest.

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THE BEHAVIOUR OF NEW SALAD CULTIVARS IN ASSOCIATED TOMATO CULTURE, IN TUNNELS

ELENA DOBRIN, N. ATANASIU, LILIANA BĂDULESCU

Key words: salad, cultivars, tunnel, associated culture

The salad is a very used species in human alimentation, especially in cold period, when the fresh vegetable assortment is poor represent.

The aim of this paper is to establish the behaviour of 6 new salad cultivars – commercialized by the Clause Co. – in associated culture with tomato. The experimental cultivars – Lollo rossa, Amelia, Martina, Kendo, Clx 1201, Saladin – belong to different salad types and hold a good position in the respective world assortment.

In the last years, there is an international tendency to cultivate new salad forms and sorts, with a great variety of forms, colours and fineness.

Therefore, the local assortment must be diversified by new salad sort cultivation.

MATERIAL AND METHODS

The 6 experimental variants were placed in 4 unrandomised repetitions. The real experience area was 120 m^2.

The studied cultivars were V1Mt –Lollo rossa, V2 – Amelia, V3 –Martina, V4 –Kendo, V5 – CLX 1201, V6 Saladin.

The main technological elements were:

- the basic fertilization: 80 t/ha fermented manure;
- the sowing for transplants producing: 25th February in hotbed, directly in 7 cm pots, with dragged-seeds;
- the rising en masse: after 8-11 days, depending on the cultivar;
- the transplant fertilization: 15th March, with 0,2% KNO_3 solution, 4 l/m^2;
- the planting: 29th March, simultaneously with tomatoes, among the main culture rows, at 35 cm plant distance, with a 8 plants/m^2 density;
- the harvesting: the first half of May.

RESULTS AND DISCUTIONS

The results of **phenological and morphological transplant parameters**, at the planting moment (table 1), emphasize some differences between the 6 studied cultivars:

- the transplant age was 24 days for Lollo rossa, Amelia, Martina, Kendo, CLX 1201, and 21 days for Saladin;
- the smallest leaf number was registered for Lollo rossa (4.75), and the greatest leaf number for CLX 1201 (9);
- the transplant total average mass had the best values for Kendo (7.7 g) and the lowest values for Lollo rossa (2.9 g);

- the tallest transplants was registered for Martina (14.5 cm), while the Saladin had the shortest height (9.2 cm).

Table 1

The salad transplant parameters

Cultivar	The planting age (days)	Leaf number	Total mass (g)	Transplant height (cm)
$V_{1\ Mt}$ – Lollo rossa	24	6.2	2.90	9.2
V_2 - Amelia	24	4.8	3.25	13.3
V_3 - Martina	24	8.0	7.30	14.5
V_4 - Kendo	24	8.1	7.70	11.7
V_5 - Clx 1201	24	9.0	7.40	14.1
V_6 - Saladin	21	5.8	2.52	11.3

Regarding to **the phenological and morphological plant parameters**, at harvesting, it was registered that:

- the plant height varied between 22 cm (Saladin) and 13 cm (Amelia);
- the rosette with the largest diameter was measured for Clx 1201 (35.1 cm), while for Lollo rossa the rosette diameter was only 23.3 cm;
- the total weight varied between 320 g (Saladin) and 186.6 g (Martina cv. with the smallest biomass);
- the heaviest aerial plant part was measured for the Saladin (303 g), while for the Martina was registered 170 g, only;
- the ratio aerial part/total plant weight varied between 94.8% (Amelia and Saladin) and 90.7% (Kendo);
- from the viewpoint of the vegetation period, the all variants take part of the half-late cultivar group (70 days old), except the Saladin, that is a late cultivar (77 days old).

Table 2

The salad mature plant parameters

Cultivar	Plant height (cm)	Rosette diameter	Weight			Vegetation period	Earlyness class
			Total (g)	Aerial part (g)	%		
$V_{1\ Mt}$ - Lollo rossa	15.0	23.3	201.6	188.3	93.4	70	half-late
V_2 - Amelia	13.9	33.9	225.0	213.3	94.8	70	half-late
V_3 - Martina	18.9	26.6	186.6	170.0	91.1	70	half-late
V_4 - Kendo	17.3	25.7	216.6	196.6	90.7	70	half-late
V_5 – Clx 1201	19.6	35.1	220.0	206.6	93.9	70	half-late
V_6 - Saladin	22.0	24.1	320.0	303.3	94.8	77	late

Relating to these **new cultivar quality and** their carried out **yield** (table 3), it was noticed the following aspects:

- the heaviest salad heads was registered for the Saladin (303.3 g/head), and the lightest salad heads for Martina cv. (170 g/head);

- the Amelia and Saladin cvs. achieved a high quality production, with the high quality heads extra only;
- the achieved yield values varied between 2.426 kg/m^2 for Saladin and 1.360 kg/m^2 for Martina, being significant influenced by their aerial part weight.

CONCLUSIONS AND RECOMMENDATIONS

- The salad assortment diversification becomes, in the last years, a necessity because of the market economy development and the new requirements of the external market.
- The salad, as a well-known and requested species, with its short vegetation period (35-75 days), a short height and relatively a simple technology, represents one of the foremost cultures that could be cultivated in tunnels with early tomato, as an associated system.

Table 3

The salad yield quality parameters

Cultivar	Total yield (kg/m^2)	Rosette mass (g)	Total STAS %	Extra quality (>200g)	First quality (180-200g)	Second quality (150-180g)	Under STAS %
$V_{1\ Mt}$ – Lollo rossa	1.506	188.3	100	100.0	-	-	-
V_2 - Amelia	1.706	213.3	100	33.3	33.3	33.3	-
V_3 - Martina	1.360	170.0	100	-	33.3	66.6	-
V_4 - Kendo	1.573	196.6	100	66.6	33.3	-	-
V_5 - Clx 1201	1.653	206.6	100	66.6	33.3	-	-
V_6 - Saladin	2.426	303.3	100	100.0	-	-	-

- Saladin is a late cv., with a long vegetation period (77 days) that is recommendable for the cultivation in our country, with high production (330.3 g /head).
- The Amelia and Saladin cvs. are recommended for extension in culture because of their highest quality (100% Extra quality).
- The others (Martina, Kendo, Clx 1201, Lollo rossa), although their high productive potential, are cultivated especially in order to the diversification of the salad assortment, particularly at the market demand.

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RESEARCHES REGARDING BROCCOLI IN DIFFERENT FIELD CROP SYSTEMS

ELENA DOBRIN, RUXANDRA CIOFU

Key words: broccoli, assortment, culture systems

SUMMARY

Broccoli is a less known and cultivated species in our country, but in the future it could become an important species inside the assortment from Romania because of the special nutritive qualities and ecological plasticity. The paper is presenting results about the settling of culture periods in order to assure a better phasing of harvestings and consumption at broccoli.

INTRODUCTION

The diversification of the current assortment represents one of the future objectives in vegetable growing goal, which must be fulfilled by the studying and the extension in field of some new species likewise some valuable sorts and hybrids under the aspect of production and economic efficiency.

MATERIAL AND METHOD

- In 2001, Fiesta Dutch hybrid, that demonstrated in previous researches a special production capacity (Elena Dobrin, Ruxandra Ciofu, 1998), was cultivated in the field in three systems of culture:
  V1 – early culture; V2 – summer culture; V3 – autumn culture
- Setting the experiment:
  - the method of linear blocks with four repetitions;
  - total area of the experiment / culture system: 150 m^2 ; analyzed no. of plants / repetition: 20
- The technology that has been used has respected specialty advises regarding early and autumn cauliflower culture in the field, it has been used summer cabbage technology culture.
- During the vegetation period there have been done observations and determinations on transplants and culture plants.
- The results were interpreted according to existing data in specialty literature.

RESULTS AND DISCUSSIONS

Results regarding ***the phenophases*** unfolding (table 1).

- cultivated in different systems of culture and hence in different conditions of temperature and photoperiod, Fiesta hybrid modifies its phenophases period;

- the age of the transplant good for planting (in 5-6 true leaves phase) is 61 days at early culture, 50 days at summer culture and 42 days at autumn culture.
- the beginning of harvesting has been done after 72 days from planting for early culture, after a long period 75 and 81 days for summer and autumn cultures.
- the period for harvestings was 35 days for early culture, 38 days for summer culture and 37 days for autumn culture.
- vegetation period for Fiesta hybrid is 116-128 days with the highest values for early culture as a result of the transplants age and the different conditions of temperature and photoperiod.

Table 1

The phenophases unfolding for Fiesta F_1 in different systems of culture

Var./ Culture	Transplant production			Planting data	The harvesting			Veget. period (days)
	Seeding data	Springing data	Transpl. age (days)		Period	No. of days		
						From planting	Total	
V1 – early	25. I	04.II	61	27.III	08.IV-13.VI	72	35	128
V2 – summer	08.III	16.III	50	25.IV	10.VII-17.VIII	75	38	125
V3 – autumn	23.V	29.V	42	03.VII	23.IX-28.X	81	37	116

Results regarding plants growing (table 2) show the different behaviour of Fiesta hybrid in different systems of culture.
- under the aspect of plants height, the highest plants (64.05 cm) were in autumn culture, while for summer culture were obtained the smallest growing (61.32 cm).
- the capacity of formation secondary sprouts, after harvesting the main flower, was influenced a lot by the system of culture, so that, while at early culture 50% of plants formed cropping secondary sprouts, for summer culture. They were formed for 100% of plants, and for autumn culture on 89.4% from plants.
-number of cropping secondary sprouts plants was also different: 2.54 for early culture; 6.57 for autumn culture and rose at 8.08 for summer culture. These results explain production differences (main one and second one) obtained further in the three culture systems.

Table 2

Morphometric characteristics for broccoli plants at harvesting

Variety/Culture	Plants height (cm)	Sprouting capacity (%)	No. of cropping sprouts /plant
V1 – early	62.71	48.6	2.54
V2 – summer	61.32	100.0	8.08
V3 – autumn	64.05	89.4	6.57

Harvesting dynamics and production results are presented in figures 1, 2 and 3.

- For *early culture*, harvesting lasted 35 days and total production was 16, 423 t/ha (68.28% were main production, and was concentrated in the second half of June.
- For *summer culture*, harvesting lasted 37 days obtaining a total production of 14,462 t/ha (29.38% was main production), and was concentrated in the last decade of July (when all main production was harvested) and first decade of August.
- *Autumn culture* obtained a total production of broccoli (25,244 t/ha), with a main production weight of 64.25% (16,220 t/ha). Inside this system, harvesting was focused on the last decade of September (38.2%) and on first decade of October (40.82%) and lasted 39 days.

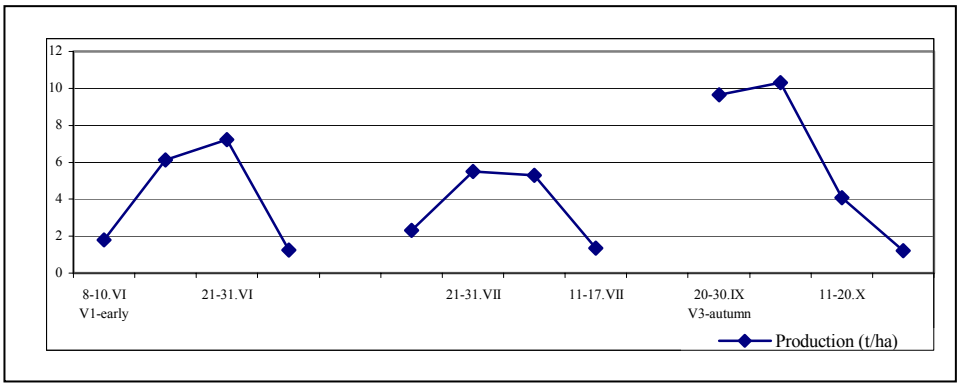
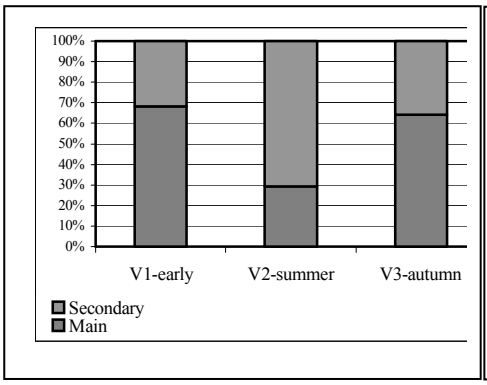


Figure 1 **Harvestings dynamics**



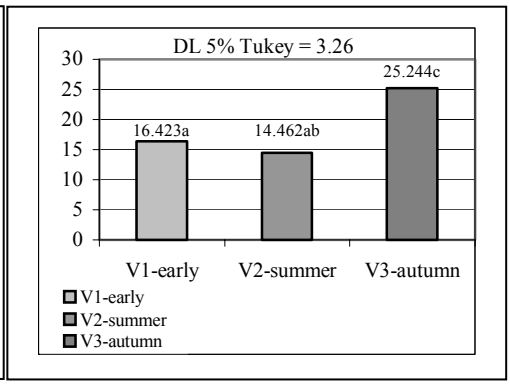


Figure 2 Production structure **Figure 3 Total production (t/ha)**

Values followed by the same letter are not significantly between them (the method of multiple comparisons Tuckey – significant prognostique – 0.05)

CONCLUSIONS AND RECOMMENDATIONS

Regarding the cultivation of Fiesta broccoli hybrid there are the following aspects to underline:

1. Different conditions of temperature and light have shortened the vegetation period from 128 days for early culture to 116 days in autumn culture, but they rose the period from planting to harvesting from 72 days (in early culture) to 81 days in autumn culture.
2. The characteristics of the plants were different for three systems of culture under the aspect of height, sprouting capacity (48.6% for early culture and 100% for summer culture) and harvesting sprouts number (2.5 for early culture; 6.6 for autumn and more than 8 for summer).
3. The biggest broccoli productions were obtained for autumn culture (25.24 t/ha) with significant differences from other systems, and the smallest (14.46 t/ha) for summer culture. There are not significant differences between early and summer cultures.
4. The main production had the highest weight from total production, for the early culture (68.23%) and for the autumn one (64.25), while for summer culture the main production represented only 29.38% from total number.
5. The secondary production was prevalent at summer culture representing 70.61% from total production.
6. Excepting for a short period (the end of August – the beginning of September), the harvestings and hence broccoli consumption can be assured from July to the end of October through practicing the three systems of field culture: early, summer and autumn.
7. Having in our view the therapeutically properties, the nutritive qualities mentioned by authorized literature and the big productions (14-25 t/ha) we recommend to extend broccoli cultures in our country.

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COMPARISON BETWEEN SOME BRUSSELS SPROUTS CULTIVAR

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Key words: assortment, Brussells spouts, cultivars, cultivation

SUMMARY

The Brussels sprouts is one of "less known"` species, but it can be considerate as a species which will be well integrated on the Romanian market in the near future. The aim of the present paper was to analyze a number of cultivars, especially in respects with their behaviour in production and the yield level.

INTRODUCTION

In the last years some valuable species but less known in our country were introduced in the autochthonous vegetables assortment not only for its diversification but also for covering the increasing request of these species on the market. The edible part, the sprouts are remarkable through their high content in soluble solids (14.82%), vitamin C (112.6 mg/100g) and minerals (Prodan Ghe., Mihalache M., Ruxandra Ciofu, 1974). The whole plant has a high resistance to the low temperature which allows the harvest in phases and a long period for fresh consume (sometimes during the whole winter).

MATERIALS AND METHODS

The experiment, with four variants was carried on a total area of 320 m^2, with 80 m^2 for each variant and was organized using the linear blocks method.

- The cultivars studied were:
  V1 – Diablo F1; V2 – Groninger; V3 – Spring F1; V4 – Roodnerf
  Each variant was in four repetitions, and each repetition contained 12 plants.
- Statistical analysis of the results were made using J.M.P. program, which is a component for the S.A.S.
- The main technological moments were:
  - sowing: 12 of April
  - pricking out (transplanting): 28 of April
  - planting: 29 of May at 70/70 cm; plant density: 20408 plants/ha
  - cutting: 4 of September
  - first harvest: 9 of November; the last harvest: 14 of December

RESULTS AND DISCUTIONS

- Regarding the ***morphological characteristics of the seedlings*** (table 1), respectively the height and the number of leaves formed, we can appreciate

that the best results were obtained by Diablo F1 plants, with a height of 24.4 cm and 7 leaves, comparing with the Spring F1 plants, which presented the lowest parameters: 18.2 cm and 6 leaves.

- The results about the ***plants characteristics at the harvest*** (table 2) showed differences among the four cultivars studied:

- regarding the *height* of the plants, from the Roodnerf cultivar was obtained the highest plants (126.5 cm) and from the Groninger cultivar the shortest plants (84.5 cm). The Spring F1 plants were 118.8 cm high and the Diablo F1 plants were 111.0 cm high.
- the Spring F1 plants formed the highest *number of leaves* (85,5) and the Roodnerf plants the lowest number 64,8.
- the *total mass of plants* was also influenced by the cultivars in the point of this aspect Roodnerf realized the biggest mass 3,907 kg and the Groninger the lowest mass (2,821 kg).

Statistical analysis of the results concerning the total mass formed (figure 1) showed that the cultivar factor determined a significant difference among the four cultivars used in this experiment.

Table 1

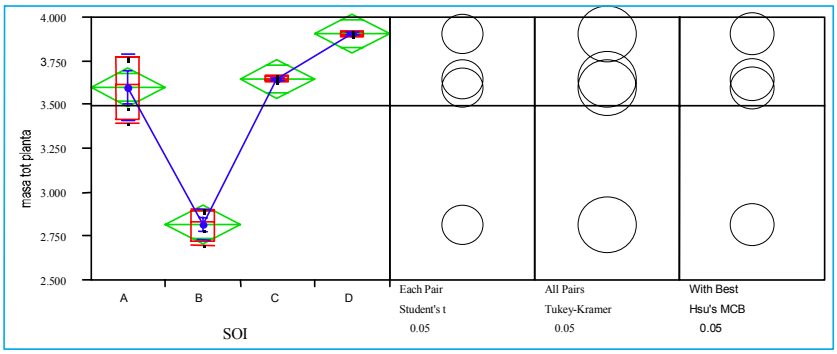
The morphological characteristics of the seedlings

Variant	Cultivar	Height of plant (cm)	Number of leaves
V1	Diablo F1	24.4	7.0
V2	Groninger	20.6	6.8
V3	Spring F1	**18.2**	**6.0**
V4	Roodnerf	18.8	6.6

Table 2

The plants characteristics

Variant	Cultivar	Height of plant (cm)	Number of leaves	Total plant	mass sprouts (kg)	Sprouts mass (% from total)
V1	Diablo F1	111.0	76	3.604	**0.770**	21.36
V2	Groninger	**84.5**	71.8	**2.821**	0.752	**26.66**
V3	Spring F1	118.8	**85.5**	3.652	0.692	18.95
V4	Roodnerf	**126.5**	64.8	**3.907**	**0.547**	14.00



Rsquare 0.950243
RSquare Adj 0.937804

Figure 1 - **The influence of the cultivar to the total mass of plants (kg/plant)**

Each circle has the centre ranged with the mean of the group, its diameter orresponding to the 95 % confidence. The intersection of two circles suggest that the mean of the two group are not significant different. Rsquare Adj allows the evaluation of every model, despite the number of analyzed parameters, the program and the processor used.

- the *total mass of the sprouts per plant* was also different; for Diablo F1 was harvested 0,770 kg/plant (the highest value) comparing with Roodnerf which was 0,547 kg/plant.
- as regarding the *percentage of sprouts mass from the total mass* of plant, the Groninger cultivar realized 26,66 % comparing with Roodnerf with 14 %.

- The results concerning the ***sprouts characteristics*** showed that although the Groninger cultivar formed the smallest number of sprouts per (57.3), the weight of the sprouts was big (13.1g), with large diameters (4.3 cm) and they had globoid form. The Spring F1 cultivar realized the biggest number of sprouts per plant (80.3), but they were very light (8,6 g), with small diameter (3 cm) and ovoid form.

Table 3

The sprouts characteristics

Variant	Cultivar	Number of sprouts/ plant	Sprouts mass (g)	Sprouts diameter (cm)	Observations
V1	Diablo F1	66.3	11.6	3.9	ovoid
V2	Groninger	**57.3**	**13.1**	**4.3**	globoid
V3	Spring F1	**80.3**	**8.6**	**3.0**	ovoid
V4	Roodnerf	64.5	8.5	3.4	ovoid

- ***The sprouts yield*** (figure 2) was remarkable by the high level realized for the all cultivars (over 11 t/ha), especially when it was compared with the yield of

the old assortment (5-6 t/ha). Furthermore, besides their special productivity, Diablo F1 (15.714 t/ha), Groninger (15.340 t/ha) and Spring F1 (14.132 t/ha), realized much uniformed. The smallest yield and the less uniform production were found to the Roodnerf cultivar.

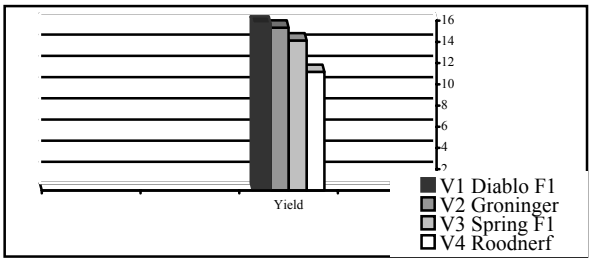


Figure 2 - The sprouts yield (t/ha)

CONCLUSION AND RECOMMENDATION

1. The importance of the Brussels sprouts, especially into the European assortment, imposes the introduction of this species also in our country.
2. Brussels sprouts constitute a profitable culture through its great ecological plasticity, its relative easy culture and especially through its big price on the market.
3. Considering the sprouts production realized in the present study (11 t/ha), we highly recommend to introduce the studied cultivars in the actual assortment.
4. Remarkable results were obtained with the Groninger cultivar, which realized the smallest height of the plants (84.5 cm) and, in the same time, the production was estimated as a high quality production (the sprouts mass 13.3 g and their diameter was 4.3 cm) and a high quantity production, through its great proportion of 26.66 % from the total vegetal production.

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STUDIES REGARDING THE CONTAINER SIZE INFLUENCE TO TRANSPLANT QUALITY, VEGETATIVE PERIOD AND LETTUCE YIELD GROWN IN HIGH TUNNEL

ELENA DRĂGHICI

Key Words: lettuce, container size, transplant

SUMMARY

In this study we followed the influence of container size on the quality and the product at the lettuce. We obtained the average mass of lettuce plant bigger in a shorter period from the transplant realised in bigger container size.

INTRODUCTION

The lettuce is a variety frequently grown in high tunnel because of the short vegetative period and of the possibility to get high incomes on meter square surface. Talking off the soil grown in a short period of time gives the possibility to plant a new cycle of lettuce or of other species.

This present work has as a purpose the study of the container size influence on transplant lettuce quality and of the way this determines the period of lettuce production.

MATERIAL AND METHODS

In this study we use as biologic material Dena lettuce, especially also for high tunnel which has a vegetative period for 55 days. The transplant was obtained in warm greenhouse. This was transplanted in nutritive cubes and container size having different volumes. The nutritive mixture contains 40% manure, 20% peat, 30% follow soil and 10% sand.

The experimental variants were:

V1 (Mt) – nutritive cubes with 5 cm length;
V2 –Jiffy pot container with 6.5-cm maxims diameter;
V3 – Jiffy pot container with 6.0 cm maxims diameter;
V4 –Jiffy seven with 4 cm diameter;
V5 – plastic glasses with 7.0 cm maxims diameter;
V6 – alveolar pallets with 3.5 cm diameter;
V7 – alveolar pallets with 4.5 cm diameter.

The transplants lettuce was planted when it was 30 days age. The chemical analysis was made for nutritive mixture used not only for nutritive cubes but for filling the containers; the container size volume was determined but also the nutritive mixture to fill the container.

We made some notes regarding the dynamic grown of lettuce transplant in greenhouse and of plant evolution in high tunnel and the recorded production.

RESULTS AND DISCUSSION

The nutritive characteristics used for filling the container are recorded in table no.1.

Table 1

Some characteristics regarding the nutritive mixture used for filling the container

Nutritive mixture	pH	Soluble salt %	N-NH4 ppm	P ppm	K ppm
Peat 20% + manure 40% + follow soil 30% + sand 10%	6.61	0.301	287.5	51.3	347

Table 2

The characteristics of nutritive cubes and container size

Variant	Containers type cm	Container size volume cm^3	Mixture nutritive volume for 100 containers cm^3	The nutritive mixture quantity used for 100 containers kg	The difference in % to V1 %
V1 (control)	Nutritive cubes with 5 cm length	125	16,666	4.320	100
V2	Jiffy pot container with 6.5 cm max. diameter	108	10,800	2.800	65
V3	Jiffy pot container with 6.0 cm max. diameter	192	19,200	4.977	115
V4	Jiffy seven with 4 cm diameter	98	-	-	
V5	Plastic glasses with 7.0 cm maxims diameter	206	20,600	5.341	124
V6	Alveolar pallets with 3.5 cm diameter	42	4,200	1.088	25
V7	Alveolar pallets with 4.5 cm diameter	63	6,300	1.633	38

The container size volume varied between 42 cm^3 (V6) and 206 cm^3 (V_5). The smallest nutritive mixture quantities were used for 5 and 6 variants, these being of 25% and respectively 38% to V_1 variants. The biggest mixture quantity was used for the variant, which presented a biggest percent of 24% than V_1 variants.

The characteristics of transplants lettuce planted at the age of 30 days are presented in table no.3.

Table 3

Transplants lettuce characteristics at the age of 30 days

Variants	Height cm	Leaves No.	Rooting volume cm^3	Foliar surface cm^2
V1(Mt)	10.90	5.67	3.35	39.19
V2	10.93	5.67	3.50	41.99
V3	11.53	5.67	3,87	42.80
V4	11.13	5.33	3.20	39.62
V5	12.47	6.00	4.33	43.38
V6	11.33	5.00	1.65	28.98
V7	12.23	4.67	2.05	32.42
DL 5 % (Tukey)	2.629	1.07	1.80	15.979
DL 1% (Tukey)	3.309	2.00	2.40	12.694
Significations	Ns	Ns	**	Ns

The transplant height does not present important differences between variants, neither at the number of leaves. The rooting system volume in 5 variant was the biggest (4.33 cm^3). The foliar surface was biggest (43.38 cm^2), too.

At 6 variant the rooting volume and also the foliar surface were the smallest in comparison to control variant and to the other variants.

In table 4 we can notice the edible lettuce mass at 45 days was over minims STAS of 100 g in the majority experimental variants. The V_6 presented the lowest edible mass responding to the small dimension of nutritive container size.

At V_5 when the nutritive volume was the highest and the edible mass was over 158 g; this could include the plant of the variant in STAS II dimensions and would correspond to a higher price.

The lowest edible mass at 50 days corresponded to the lowest container dimension that overpasses with only 6-g minimum value of the third standard category.

We can remark the V_5 lettuce plants recording the highest edible mass (186 g) with 42% over control.

Table 4

Characteristics of lettuce edible mass grown in high tunnel, at 45 days and 50 days

Variants	At 45 days		At 50 days		
	Edible mass g	% to control	Plants diameter cm	Edible mass g	% to control
V1 (control)	118	100	21.73	131	100
V2	123	104	21.73	135	103
V3	131	111	22.20	144	110
V4	124	105	21.73	141	108
V5	158	134	22.90	186	142
V6	87	74	19.10	106	81
V7	125	106	20.10	146	114
DL 5 % (Tukey)	-	-	2.302	0.23	-
DL 1% (Tukey)	-	-	2.898	0.28	-
Signification	-	-	Ns	**	-

STAS III (100-150 g); STAS II (150-180 g); STAS I (over180 g)

CONCLUSIONS

In this work we can estimate that we are able to get on average bigger lettuce mass during a shorter five days period of time using container size in bigger dimensions.

The container size influenced the height, the leaves number, the rooting system volume and foliar surface.

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STUDIES REGARDING UNIFORMITY OF PRODUCTION FOR SOME NEW TOMATO HYBRIDS GROWN IN GREENHOUSE

ELENA DRAGHICI, GH. BUDOI, O. PETRA, CREOLA BREZEANU

Key words: hybrid, fruit, average weight, uniformity

SUMMARY

In this study we followed the reaction of seven tomato hybrids grown in greenhouse conditions. We characterised them from fruit uniformity point of view. An index of uniformity for fruit number, average mass of fruit and total yield production was calculated. On this basis we evaluated these hybrids.

INTRODUCTION

The tomatoes grown in greenhouse in the first cycle occupies the most proportion regarding other varieties. Generally during the cold season the fruit of smaller size between 80-150 g are better capitalized. That's why the choice of a productive type with average, uniform size fruit from the biggest number of hybrids on the crop list, is a great problem when they aren't well tested in crop for the conditions of our country.

The demands for tomatoes of over average size are bigger in the second cycle of crop or for crop in high tunnel. Of course, the choice of some hybrids in order to present fruit with the bigger balance of a special type implies the choice work lightening and finally a better using.

The purpose of this work was to characterise new hybrids grown in greenhouse condition in the first cycle from the fruit and production uniformity point of view and of course they can be recommended in greenhouse crop for the first and the second cycle.

MATERIALS AND METHODS

The studies were realised inside the warm greenhouse from U.Ş.A.M.V Bucharest, between 2002 and 2003 on seven Holland tomato hybrids. The variants cultivated were: V_1 – Marissa; V_2 – Cyndel; V_3 – Velasco; V_4 – Gironda; V_5 – Aurelius; V_6 – Yakut; V_7 – Chaman. The nurseling for realising tomato crop in greenhouse in the first cycle was produced in increase greenhouse and it was seventy days when the crop was set up. From each hybrid twenty-five plants at 80 cm distance between rows and 40 cm between plants on row were planted. Each fruit harvested from the cultivated hybrids was separately weighed and recorded in a file. In the final of harvest recorded in file fruit on hybrids were groped on categories of quality from 20 to 20 grams. After the results we calculated distribution index for each parameter, which could characterise the cultivated

hybrids from the point of view of variability for fruit size. An index was calculated for the total number of fruit (DIfn), for the average fruit mass (DIaw) and for whole realised production having as a basis the fruit cultivated from 130-150 grams category. We present the reported dates at the surface of 1 m^2 in this work.

RESULTS AND DISCUSSION

In the basis of the production dates realised in greenhouse for those seven tomato hybrids we found out that the biggest total production was recorded at Yakut hybrid (12.556 kg/m^2) and the smallest one at Marissa hybrid (8.485 kg/m^2). The biggest early production was recorded at Velasco hybrid (5.647 kg/m^2) with a percent of 58% comparatively to the total production; that means we can appreciate it as a very good hybrid for the crop in the first cycle. The smallest early production was recorded at Yakut hybrid (1.00 kg/m^2) with a percent of only 8% comparatively to total production.

Table 1

Total and early productions at the tomato hybrids grown in greenhouse

Specifications	V_1	V_2	V_3	V_4	V_5	V_6	V_7
Total prod. kg/m^2)	8.485	8.864	9.63	9.683	12.131	12.556	11.826
% to control	100	105	110	114	143	148	139
Early production (kg/m^2)	2.926	3.553	5.647	2.835	5.292	1.000	3.920
% to control	100	121	193	96	181	43	134
Percent early prod. from total prod. (%)	34	40	58	29	44	8	33

If we analyse the hybrids in the basis of distribution index we can appreciate that: at Marissa hybrid the better distribution of fruit number comparatively to the reference category of the best quality (130-150 g) can be recorded at 100 and 160 gr. Cyndel hybrid can be characterised as having small fruits of 80-120 gr. category and the smaller size fruit has almost the same number as the extra category (140 gr.) The big variability of fruit number but also the big number of small fruits places this hybrid on the first place in classification of these hybrids after the DIfn index. Velasco hybrid presented a smaller variability on categories of fruit number; the hybrid had values like those of reference (figure 1).

In figure 2 we can see the variation of distribution index regarding the average mass of fruits. Generally we didn't record at cultivated hybrids a group of average mass around a category of close mass.

Although, we can remark Marissa and Velasco hybrids with index which suggests a tendency of grouping an average mass of fruit to groups of size corresponding to the average value of the group with 100-180 gr.

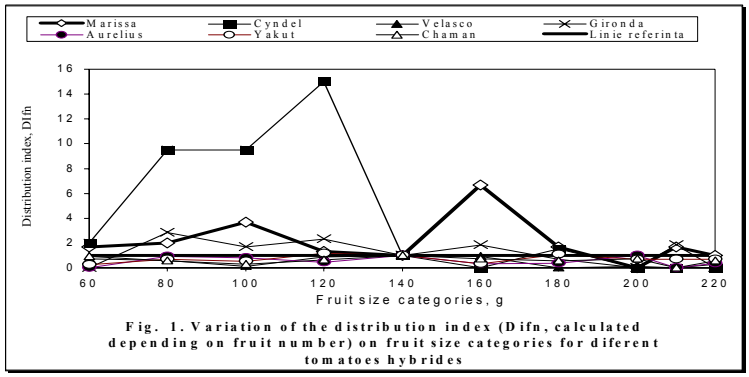

Fig. 1. Variation of the distribution index (Difn, calculated depending on fruit number) on fruit size categories for diferent tomatoes hybrides

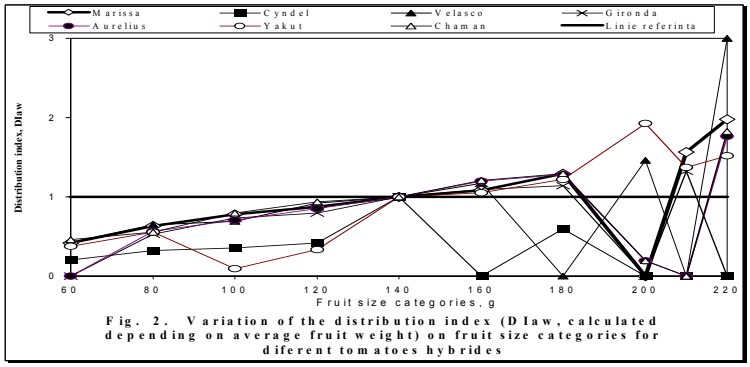

Fig. 2. Variation of the distribution index (Dlaw, calculated depending on average fruit weight) on fruit size categories for diferent tomatoes hybrides

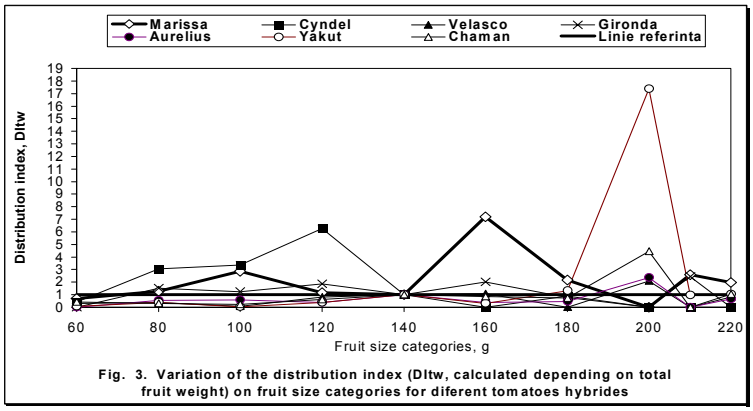

Fig. 3. Variation of the distribution index (Dltw, calculated depending on total fruit weight) on fruit size categories for diferent tomatoes hybrides

As far as the distribution of total realised production is concerned (DItw), we can remark Yakut hybrid with a very big index (17.4) in the categories between 180 and 200 g and at Cyndel hybrid with smaller productions but which can appear in the categories under 140 g (group 130-150 g). Marissa hybrid presented a very big index (7.2), around the category (figure 3).

CONCLUSION

For 2002 climate conditions of growing we could analyse the dates and we concluded: Yakut hybrid couldn't be recommended for the greenhouse production in the first cycle although it presented the biggest production per m^2 because of a very small early production (8%).

Although we realised a small production at Cyndel hybrid the uniformity of the average mass of fruits was better in comparison with the other variants. Uniform big production were realised at Chaman hybrid because of some fruits with average mass of over 160 g.

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INFLUENCE OF THERMOPHYSICALY PARAMETERS ON DRYING PROCESS OF TOMATOES

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Key words: drying, dried vegetables, air temperature, air velocity, relative humidity

SUMMARY

The laboratory dryer was created at the Institute for Agricultural Engineering in the Tropics and Subtropics, Hohenheim University. Main advantage of that consists in possibility to be regulated with high accuracy to maintain the different drying condition. Local processing of dried vegetables could have a significant contribution to provide farmers with regular income. High-energy consumption and the lack of knowledge of optimum drying parameters increase drying cost significantly. To optimise the drying process were investigated the impact of drying parameters on the kinetics of drying. By research work, the authors gave a contribution to develop a proper technology for drying of vegetables. That is an important tool to produce a high quality dried vegetables at minimum cost and energy consumption. Those products may find a place in a market as distinctive quality or as raw material for industrial application. Out of all vegetables grown in Romania, a tomato was used into that experiment.

INTRODUCTION

Drying is a complex thermo-physical and biochemical process comprising heat and mass exchange between product and surrounding media, and a transfer of heat and moisture within the substance. The transfer of moisture from the interior of the product to its surface depends of the structure and the properties of the material, which are conditioned by the type of binding forces between the moisture and dry substance.

In the frame of this research, thin layer drying experiments of tomatoes were conducted under controlled laboratory conditions using a dryer developed at the Institute for Agricultural Engineering in the Tropics and Subtropics.

MATERIAL AND METHOD

The laboratory dryer developed at the Institute for Agricultural Engineering in the Tropics and Subtropics, University of Hohenheim to be used in systematic research of drying of vegetables, fruits and other agricultural products consisted of four basic section: air flow control, humidifier section with inter-cooler, heating control section with primary and secondary heating elements, and two drying compartments (***fig.1***).

The process is automatically controlled by a computer and can be regulated with high accuracy to maintain the required drying conditions in terms of the drying temperature, humidity and air velocity. The entering air is heated by a primary heating system and channelled to the drying chamber. In the drying chamber, the incoming air was exposed further to secondary heating system in order to obtain uniform temperature distribution within the product bed with accuracy of ± 0.5 ^{0}K. Ni-Cr-Ni thermocouples were used to measure the air temperature and the temperature of tomatoes during the drying process.

The drying temperature can be varied in the range of 30 to 100 ^{0}C. The air velocity could be kept constant during drying experiments at any desired level ranging from 0.1 up to 1.47 m/s. This was achieved by the airflow control assembly which regulated the amount of fresh air entering in the drying compartment with an accuracy of ± 0.05 m/s. In addition to these, the humidity of the drying air could be precisely controlled and desired initial dew point temperature of the drying air was perfectly adjusted with an accuracy of ± 0.5 K

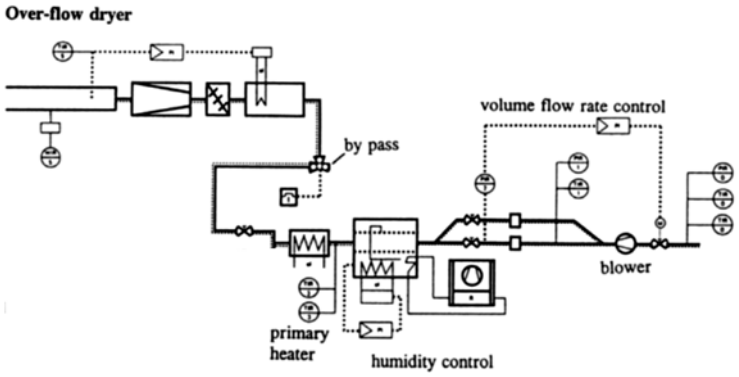

Fig. 1 Schematic diagram of the thin layer dryer and instrumentation

In that experience it was used only the over-flow mode, in which the air passed over the tomatoes. The weight loss during the drying process can be measured either continuously or discontinuously. The continuous measurement was done by recording the measured values while the drying air passed over the drying product. The airflow forces have an effect on the tray and the tomatoes. In order to prevent that effect during weight measurement, the discontinuous method is used during the drying experiments. In that case, prior to the weight measurement a bypass is opened automatically for few seconds to divert the drying air from passing over the tomatoes. The time interval for taking the measurements (weight, temperature, air velocity) could be programmed in the computer.

RESULTS ANS DISCUSSIONS

It was used fresh tomatoes, which was supplied by a German supermarket chain. It was use variety Flandra F1 of bush tomatoes (*Lycopersicon esculentum* Mill). Tomatoes were manually sorted, washed and cut in the quarters. The ripening level was tested by refractometer and has value of 4.6 Brix.

For determination of moisture content of tomatoes was used Karl – Fischer method. After drying of product, that was stored 24 hours in refrigeration in hermetic containers for homogenization. Regardless of the method used, there are possibilities of measurement errors in determining the moisture content. To reduce the possibilities of errors, two replicates were used.

Drying experiments were carried out using a laboratory dryer which offers the possibility of drying in over-flow mode, which the aim to study the influence on the drying behaviour. Some series were dried at different temperatures ranging from 40 to 90 ^{o} C, with intervals of 10 K. The drying time of tomatoes to reach the desired final moisture content of 9 % was significantly affected by the temperature of air of drying. Preliminary quality evaluations, on effect of drying temperature on the quality deterioration, revealed that higher drying temperature affect significantly the colour of the dried tomatoes. The temperature of 70^{o} C was founded to be the optimum drying temperature, from thermodynamic point of view **(*fig. 2*).**

The moisture removal rate was founded to be fast at the beginning, due to the higher level of moisture content in tomatoes, and drying is accelerated by increasing the air velocity rate. Increasing the air velocity to a certain limit is resulted in significantly decreasing of the drying time. The increase of the velocity from 0.25 to 0.50 m/s is resulted in 32 % decrease in the drying time, while the increase from 0.5 to 1.0 m/s is resulted in decreasing the drying time with 32 %, and increase from 1.0 to 1.45 m/s is resulted in decreasing the drying time by only 19.2 %.

Higher drying rates were achieved by higher air velocity of drying air. The experiments were conducted at constant drying temperature of 60 ^{0}C and relative humidity of drying air of 7 % (***fig. 3***).

The driving force for drying is provided by gradient of water vapour pressure between the drying air and the evaporating surface. As the moisture is progressively removed from the tomatoes, the coupled heat and mass transfer between tomatoes and the drying air undergoes several changes. The effect of air relative humidity on the drying behaviour of quarters of tomatoes when all drying parameters were kept constant (temperature of air 60 ^{0}C and air velocity of 1m/s) is show in ***figure 4***. During the drying process, the relative humidity of the drying air increases whereas the temperature at the exhaust reduces. The drying time to reach the desired final moisture content of dried tomatoes is increased gradually with the humidity of the air.

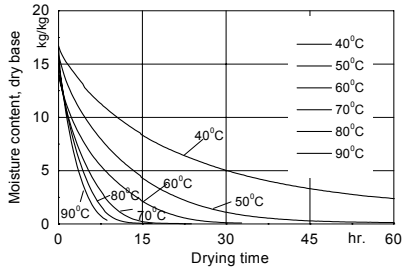

Fig. 2 Influence of the air velocity on the drying time of tomatoes

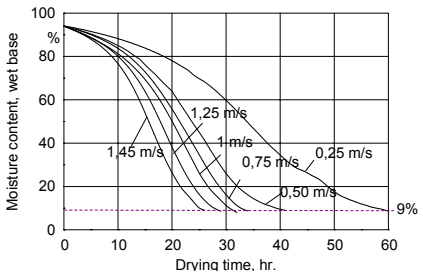

Fig. 3 Influence of drying temperature on the drying time

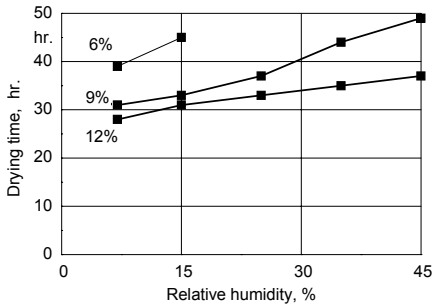

Fig. 4 Drying time at different humidity to reach the final moisture content at 6, 9 and 12 % in a dried product

CONCLUSIONS

According to the results of basic information derived from the laboratory experiments the optimum drying parameters obtained are: the temperature of drying air of 70 ^{0}C, air velocity of drying air of 1 m/s and relative humidity of drying air of 7 %. The optimum drying parameters are considered from thermodynamic point of view. The temperature of the drying air is the most important parameter affecting the drying rate of product.

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A NEW CREATION S.C. UNISEM S.A. OF EGGPLANTS - NICULINA

GH. GLĂMAN, NICULINA POPA, GH. POPA

ABSTRACT

'NICULINA' is a new eggplant variety, with several uses in culinary art, as well as for industrialisation.

It has been obtained through individual repeated selection, during 1996-2000, the initial material being a local population of eggplants, tested in ISTIS stations during 2000-2002 and homologated in February 2003. At present it is in process of conservative selection for remultiplication in Scânteia farm - S.C. UNISEM S.A. Ialomiţa branch, on a surface of 3 ha.

It is a mid early variety, requiring 118 –125 days from spring till the maturity of first fruits. It has a good production capacity, 35-40 t/ha, with fruits of high quality and attractive commercial aspect. This variety has a high tolerance at *Verticilium dahliae* and *Pseudomonas solanocearum*.

***

The eggplants, through their several therapeutic aspects (antianemic, calming, laxative, diuretic, of hepatic and pancreatic stimulation), through the various ways of use in culinary art and canning industry as well as the international yield estimated at 5.6 million tonnes, (FA0-2001), rank on the 9-th place among the vegetable species cultivated. This production is obtained in proportion of 60% in the countries of South Asia, 25% in the Middle East (in which Turkey through the total yield obtained is ranking on the 4-th place worldwide) and 8% in the south eastern Mediterranean countries; the rest, 7% is obtained in the countries from south–eastern Europe (Bulgaria, Greece, Yugoslavia, Romania).

An important fact to be remarked: in a work (Voyage de l'aubergine – N. Kahayan) are given 115 recipes of preparing eggplants: 48 belonging to Mediterranean occidental countries, 37 from Middle East, 19 from Asia (India, China, Japan), 8-Russia and 3 from tropical zones; none of the recipes is from northern countries or North America.

Consumption – Kg/year/inhabitant is much influenced by the population density, i.e. 1.5 Kg/year/inhabitant in south eastern Asian countries (reaching to 5Kg in Japan), 9-10 Kg in the Middle East and 3 Kg for the western Mediterranean countries.

In **EEC** countries the total yield reaches 550.000 t on a surface of 20.000 ha, from which 285.000 t are obtained in Italy, 145.000 t in Spain, 76.000 t in Greece, 25.000 t – Holland and Belgium and 23.000 t in France.

The medium yield world wide is of 27.5 t/ha, oscillating according to the zones and producing countries between 15 and 28 t/ha. In Holland and Belgium, the eggplants are entirely cultivated in greenhouses, in Italy (Sicilia) over 13% are protected cultures with polythene foil, the same situation being in Spain, (Catalonia) and Greece (Levant and Murcia).

In **Romania** the eggplants are known from the XVIII – th century, being cultivated year after year on a surface of 4-4.5 thousand ha, mainly in south, south east and south west. The average yield doesn't exceed 14-15 t/ha. The main cause for this trouble (14 t/ha) is, besides a culture technology more pretentious and expensive (it is produced only through seedlings produced in warm spaces) the range of eggplants cultivated in Romania. The Official Catalogue of Varieties (Hybrids) of Culture Plants in Romania - 2002 indicates for eggplants a range of 12 cultivars, from which 9 (**'Amurg', 'Andra', 'Contesa', 'Daniela', 'Drăgaica', 'Lucia', 'Pana corbului', 'Rona' and 'Viorica')** are autochthonous and mainly registered during 1992-2000, and only 3 (**'Fabina', 'Long violet' and 'Rima**') are imported (**France 1, Israel 1 and Holland 1).**

At first sight, it is an assortment more or less satisfactory as number, but it doesn't include any hybrid, 9 varieties are mid-early and mid-late and only one - **'Pana corbului'**- the oldest (registered for the third time in 1965) can be cultivated in solariums, although the cultivation of eggplants in solariums is one of the most efficient cultures from the economic point of view, on the condition that the variety (hybrid) in culture, besides a superior quality of the yield and high productions, is early, sufficient productive, with fruits of superior quality (commercial and organoleptic aspects) and, last but not least to own associated resistances at specific pathogen agents.

All these convinced S.C. UNISEM S.A. beginning 1996, to conduct amelioration works for the creation of a new autochthonous variety of eggplants, which, in great measure, eliminates the above mentioned deficiencies. Through works of repeated individual selection, on a local population of aubergines **'Madona F1'** type, conducted during 1996- 1999, it succeeded to obtain a new variety of eggplants, homologated in 2003, under the name of **'NICULINA'** , which will be subsequent presented.

MATERIAL AND METHOD

The works of amelioration in order to obtain this new variety (**'NICULINA'**) have been done at Ciolpani farm (located in the superior terrace of Ialomița river, on a soil brown red of forest on D.N. 1 Bucureşti-Ploieşti km 32) belonging to UNISEM S.A. Bucharest - Ilfov branch. The initial material was a local population of aubergines type **'Madona F1'**.

The selection works conducted during 1996 –2000 had the following objectives:

-adaptability at pedoclimatic conditions of culture zones for eggplants in the country, mainly those from south west, south and south east.

- high production potential , over 30-35 t/ha, in the field cultures and 40-45-50 t/ha in solariums,

-superior quality of fruits, at European standards, from physical, biochemical and organoleptic points of view,

-precocity – early – mid early, needing from sawing till the harvest of the first fruits, especially in solar cultivation less than 125 days,

-the flesh resistance at blacking (oxidation) during the preparation of different dishes, and mainly the canning under the forms of salads, stews,

-resistance/tolerance to the attack of specific pathogen agents, both in the field cultures as well as in solariums and greenhouses,

-the high efficiency in several canning processes, and mainly at the producing of aubergine salad,

-early productions (appreciated till 10.08 in southern zone and 20.08. in the other zones of the country) of at least 20-25% from the total,

- big fruits (>200 g/pcs.) middle-long, coloured in shinning violet, with white flesh, fine texture, good taste, resistant at blacking (oxidation) during processing, uniformity (size and shape) during the whole period of harvesting.

The variety obtained, **'NICULINA'** has been tested during 2000, 2001 and 2002 in the stations network belonging to I.S.T.I.S (Calafat, Călăraşi, Ovidiu-Constanța, Târgovişte, Tecuci and Turda) and as a consequence of the results obtained it has been homologated in 2003, under the name of **'NICULINA'**.

REZULTS AND DISCUSSIONS

The personality of this new variety -**' NICULINA'**- is evidenced through morphologic characters of the plant, physiologic features, yield and quality.

Morphologic characters

These are presented according to UPOV norms, in ***table 1***, insisting mainly on the strong characters –9, absolutely necessary for the variety identification.

Table 1 - Morphologic characters

Crt. no	Character	Graduation	Ranking
17*	Fruit: length	average	5
19*	Fruit: proportion length /diameter	average (3,37)	5
20*	Fruit: general shape	piriform, much lengthened	1
21*	Fruit: the catch of the pistil	medium	5
22*	Fruit: form of top	easy	1
25*	Fruit: flesh colour, at the stage of commercial maturity	purple	5
27*	Fruit: strips	absent	1
35*	Fruit: anthocyanic pigmentation of calyx	absent	1
38*	Fruit: colour of flesh	white	1

Strong characters (key for identification that cannot be missing from the characterisation)

'NICULINA' eggplant variety is identified, mainly, through piriform fruits, much lengthened, with the top easy deepened, colour of flesh purple-shining,

strips-missing, the fruit and calyx without anthocyanic pigmentation.

The morphologic characters mentioned in ***table 1*** evidence that:

- the plants of '**NICULINA**' variety differ from the initial material, due to the stronger development (height over 70 cm), strong ramification, bush mid-spread, having aspect of vigorous bush.
- the leaves are big, oval, with uniform margins, the main nervure having a white-violet colour, the leafage rather rich.
- the flowers are axial, solitary, violet coloured, medium calyx, with strong thorns, with positioning on the fruit medium-adherent, without depreciation of fruit colour.
- the fruit is pear shaped, much lengthened, purple coloured; the colour of fruit flesh at consumption maturity is white, with fine texture, good taste, resistant at oxidation (blacking), big 230-250 g/pcs., without strips and very uniform during the whole harvesting period.
- the variety **'NICULINA'** has a good stability, maintaining the basic features specific to its personality during the whole period of conservative selection(4 years), without segregation in descendents.
- the new created variety **'NICULINA'** belongs to the group of aubergines **'Madona F1'** ameliorated - *Solanum melongena* L.

Physiologic features:

It refers to precocity, resistance at storage and quality (taste) of the main dishes prepared out of fruit that reach consumption maturity, as well as the behaviour to the specific pathogen agents of aubergines, in the field and in protected spaces, which are presented in ***table 2.***

Table 2 - Physiologic characters

		Years				
		2000	2001	2002	Average	
1	Vegetation period (mid-early variety) from en masse plants springing (75%), till the beginning en masse (10%) of fruits technical maturity - *days*	118	123	125	122	-2
2	Flowering epoch – start of flowering: 10% of the plants have at least 1 flower	mid-early				mid-early
3	Technical maturity of fruits	spread out (5-6 harvests)				spread out (7-8 harvests)
5	Early production * - *%*	24.6	18.6		21.6	17.0
6	Behaviour regarding to diseases**) -*Verticillium dahliae* -*Pseudomonas solanaceorum*		 T(+) T(+)			 T T

*) Productions obtained till 10 August in the southern zones

**) In conditions of natural infection

T= tolerant T(+) = highly tolerant

- '**NICULINA'** is a mid-early variety, requiring 122-127 days from plant springing till first fruits maturation in open field cultures and 117-119 days in protected spaces – greenhouses and tunnels. It obtains early yields (till 10-th August) on average 21.6 t/ha, with 25.8% more than the control (**Amurg variety**) which, at the same date, obtained production of only 17.2 t/ha.

- the storage resistance (in closed spaces with an environmental temperature of 16 - 18 ºC) is very good, about 7-8 days after harvesting.

- the taste of dishes prepared from this fruits variety (organoleptic determined) – is very good, balanced.

- regarding the resistance to pathogen agents specific to aubergine cultures, this variety shows strong tolerance T(+) at *Verticillium dahliae* and *Pseudomona solonascearum.*

The data from this table indicates:

Fruit yield:

It is presented an average on 3 years in ***table 3***, obtained in the 5 I.S.T.I.S. stations.

'NICULINA' A NEW CREATION S.C. UNISEM S.A. OF EGGPLANT

Table 3 - Total yield

				Production t/ha							
				Locality *)						Average	
				Tc.	Ov.	Cl.	Cf.	Tu.	Tg.	t/ha	%
1.	AMURG	Romania		36.9	-	16.5	37.2	16.5	36.5	28.7	100
2.	NICULINA	Romania	2	30.8	-	17.3	38.1	21.3	35.8	28.7	100

*) Tc= Tecuci	Cf=Calafat	DL	5%	4.9%	17.0%
Ov= Ovidiu-Constanţa	Tu=Tulcea	DL	1%	8.1%	28.3%
Cl=Călăraşi	Tg=Târgovişte	DL	0.1%	15.2%	52.9%

From the data shown in this table it results that:

- the total yield of the aubergine variety **'NICULINA'** is 28.7 t/ha, equal to the control variety **'AMURG'**, but, out of it 21.6 t/ha is early production, representing 75.20% from the total yield, while at the control variety **'AMURG',** from the same yield, only 60% (that is 17.2 t/ha) is early.
- although the medium yield on 3 years for the 5 I.S.T.I.S. stations is equal, it was noticed that in only one station -Tecuci- the control ('**AMURG**' variety) has a total yield (36.9 t) superior to **'NICULINA'** variety (30.8 t/ha). In the other 4 stations the new aubergine variety **'NICULINA'** obtains productions superior to the control, which shows a better adaptability of the new variety **'NICULINA '**, to the edaphic and climatic conditions of the respective stations.

- the highest yield 38.1 t/ha (at Calafat) was obtained in the conditions of the south of the country by **'NICULINA'** variety that shows a high production potential.

The yield quality

It is shown in table 4 data, regarding the quality categories according to R.S. (Romanian Standards) for aubergines (***table 4 (I)***) and organoleptic features for the canned products – in oil (***table 4(II)***).

Table 4 - I. The distribution of total yield in percentages, according to quality

			from which				from which	
			Extra (over 250 g)	RST I (190 - 250g)	RSII (150 - 190 g)		under 150 g	sick and attacked by pests
1.	**'AMURG' – control**	**90.8**	36.4	40.2	14.2	**9.2**	5.1	4.1
2.	**'NICULINA'**	**93.4**	51.7	35.8	5.9	**6.6**	3.0	3.6

II. Quality of the products preserved in oil (mark 0-6)

		from which	
		'NICULINA'	**'AMURG'**
1.	Aspect	5.40	5.40
2.	Colour	5.90	5.70
3.	Taste	3.60	2.80
4.	Texture	3.40	3.30
	Medium average score	18.30	17.20
	Qualification	Very good	Good

- 93.4 % of the fruits rank in the categories of R.S. (Romanian Standards) with 51.7% fruits – extra quality (over 250 g/ pcs.) 35.8% R.S. (190-250 g/pcs.) and only 5.9% are under R.S. In the meantime for the control 'AMURG' the values are: 90.8% according to R.S. from which 36.4% extra quality, 40.2% R.S. I and 14.2% R.S. II and 9.2% unsuitable (under R.S. 5.1% and damaged 4.1%)
- the fruits, during harvesting, are easily picked up from the plant, and show resistance during manipulation (storage –packing).
- the quality features of the variety according to aspect, colour, taste and texture, on the product canned in oil, strongly evidence for **'NICULINA'** variety a score of 18.30 (from 24 possible) compared to 17.20 points for the control **'AMURG'.** This indicates that the variety **'NICULINA'** ranks as raw material, among the best varieties for processing in oil.

- sold on the market, **'NICULINA'** variety is superior to all other eggplants cultivars, being preferred by the buyers.

CONCLUSIONS

1. **'**NICULINA**'** is a new, valuable variety, aimed for the current consumption – as dishes but also as raw material for industrialisation as cans in oil.
2. it is a new variety with distinct personality, evident stability and adaptability at different pedoclimatic conditions, specific to the culture zones for eggplants in our country, especially the southern ones.
3. it imposes itself through:
   - high production potential, over 35 – 40 t/ha,
   - quality fruits, over 90% of the total yield is according to R.S.,
   - very good quality of the yield with remarkable fruit biochemical features,
   - very good uniformity of fruits, having a percentage of 8.5% in weight over 190 g/pcs,
   - it completes the range of varieties, being of very good quality both as raw material and canned product (flesh resistant at oxidation),
   - high tolerance at *Verticillium dahliae* and *Pseudomonas solanocearum*

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THE INFLUENCE OF SOME TECHNOLOGICAL MEASURES ON ECONOMIC PROFITABILITY (ECONOMIC RESULTS) IN TOMATOES GROWN IN GEO-THERMAL WATER HEATED GLASS-HOUSES

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Key words: technological measures, economic efficiency, expenses, incomes, and profitability rate.

SUMMARY

Qualitative and quantitative levels in yield together with the higher marketing price than cost price determines most of the economic efficiency of a crop. In this study we showed the share of profitability rate of some technological measures such as: diminishing expenses on seeds due to optimising growth axial system (diminution with 50% of seeds by plant growth guidance on two stems in the 1st production cycle); total diminution of expenses on seeds in the 2nd cycle by using seedlings obtained from rooting of shoots eliminated from plants by pruning; achieving a yield increase as an effect of improving fertilising with modern fertilisers (of the Kemira-Cropcare and Ferticare type) by dripping irrigation (fertirrigation), which implicitly results in greater incomes.

INTRODUCTION

In vegetable growing, economic effect of some technical and organisational technical measures is appreciated as a rule through yield per surface unit. The average yields level represents an important starting point in the economical efficiency calculus, but not every yield increase insures an increase in economic efficiency. Economic efficiency is ensured only when yield increase is the result of expense cut per unit of product or when yield increase rate is superior to that of expenses (Lagadin, N., 1970).

Profitability itself is more than cost price, as cost price cut is an essential factor in its growth. Profitability also implies improving vegetables quality, which contribute to the substantial growth of profitability by average delivery price.

MATHERIAL AND METHOD

The experiment was settled in the Curtici Greenhouses as part of a vaster research concerning the modernisation of tomato cultivation technology in industrial greenhouses.

The experiment lasted two years (2001-2002) and it is going on, crops being settled between 23-25 February, with 70-day old seedlings and with the first inflorescence in a bud state. Clearing the land was done in the third decade of July.

Technological measures were as follows:

1. Vegetation leading system (factor A): a1 – leading the plant on a single stem (not modified axial system); a2 – leading the plant on two stems (the main stem and a pre-floral shoot – modified axial system).

2. Improved fertilising system (factor B – basic or phasial fertilising): b1 – classical fertilising; b2 – fertilising by dripping irrigation with fertilisers of the Kemira type.

3. Performing hybrids (factor C): c1 – Falcato 1; c2 – Thomas F1.

4. Seedling from seed (by replanting) – d1 RS and from rooted shoots – d2 – R s, 1 (factor D).

RESULTS AND DISCUSSIONS

Table 1

Yield results in tomatoes in the 1st cycle in geo-thermal water heated industrial greenhouses

Factor A (vegetation leading system)	Factor B (fertilising system)	Factor C (hybrid)		Average yield (2001-2002)		Extra and 1st quality products		% of comparison in a1 and a2	% of comparison B and C compared to the average of the factor A
				Kg/plant	Kg/ha	Kg/ha	%		
a1 – one-stem leading system (28.000 plants/ha)	b1 – classical fertilising	c_1-Falcato F_1		4,856	135968	108318	79,7	91,2	94,3
		c_2-Thomas F_1		4,450	124586	102191	82,0	86,0	86,4
	b2 – fertilising with Kemira	c_1-Falcato F_1		5,537	155036	131205	84,6	110,5	107,5
		c_2-Thomas F_1		5,290	148134	133159	89,9	112,2	102,7
	Average of the factor B for the factor a1			5,034	140931	118719	84,2	100,0	97,7
a2 – two-stem leading system (main stem + a prefloral shoot) (20.000plants /ha)	b1 – classical fertilising	c_1-Falcato F_1	Stem	5,101	102010	76727	75,2	91,2	99,4
			Shoot	2,070	41400	34588	83,5		
			Total	7,171	143410	111314	77,6		
		c_2-Thomas F_1	Stem	4,803	96050	73598	76,6	86,8	92,9
			Shoot	1,897	37940	32385	85,4		
			Total	6,700	133990	105983	79,1		
	b2 – fertilising with Kemira	c_1-Falcato F_1	Shoot	1,984	39670	33487	84,4		
			Total	6,936	138700	108650	78,3		
			Stem	5,173	103460	82879	80,1	109,9	111,0
			Shoot	2,830	56590	51243	90,6		
			Total	8,003	160050	134122	83,8		
		c_2-Thomas F_1	Stem	5,395	107890	94737	87,8	112,1	105,9
			Shoot	2,245	44890	42109	93,8		
			Total	7,640	152790	136846	89,6		
			Shoot	2,538	50745	46676	91,9		
			Total	7,822	156420	135485	86,6		
	Average of the factor B for the factor a2		Stem	5,118	102353	81986	80,1	100,0	102,3
			Shoot	2,261	45208	40082	88,7		
			Total	7,379	147561	122068	82,7		
Average of the factor A for the factors B and C				6,207	144246	120394	83,5	*	100,0

Table 1 shows yield as a result of interaction between the three factors A X B X C. We can see a stepping in yields within factor A, decreasing from a1 to a2 in both hybrids, within factor B from b1 to b2 in both hybrids, and in factor C from c1

to c2 in both hybrids, which confirms the particular germinate capacity of these hybrids.

Table 2

Economical efficiency in tomatoes in the 1st and 2nd cycles 2002 using rooted shoot seedlings (one-stem vegetation leading)

Specification				Average yield (kg/ha)	Incomes (thousand ROL)	Expenses (thousand ROL)	Profit (thousand ROL)	Profitability rate (%)
Factor B	**Factor C**	**Factor D**	**Cycle**					
b1: Classical fertilising	c1: Falcato F1	Seed seedling (d1)	C I	127.904	1.536.767	1.011.280	525.487	34,2
			CII	48.123	633.878	724.232	-90.354	-14,3
			Total year	*176.027*	*2.170.645*	*1.735.512*	*435.133*	*20,0*
		Rooted seedling (d2)	C I	127.904	1.536.767	1.011.280	525.487	34,2
			CII	47.989	631.918	584.232	47.686	7,5
			Total year	*175.893*	*2.168.685*	*1.595.512*	*573.173*	*26,4*
	c2: Thomas F1	Seed seedling (d1)	C I	128.912	1.564.346	983.280	581.066	37,1
			CII	46.541	616.574	696.808	-80.234	-13,0
			Total year	*175.453*	*2.180.920*	*1.680.088*	*500.832*	*23,0*
		Rooted seedling (d2)	C I	128.912	1.564.346	983.280	581.066	37,1
			CII	47.804	631.204	584.808	46.396	7,3
			Total year	*176.716*	*2.195.550*	*1.568.088*	*627.462*	*28,6*
Average (b1)	Seed seedling – d1		C I	128.408	1.550.557	997.280	553.277	35,7
			CII	47.332	625.226	710.520	-85.294	-13,6
			Total year	***175.740***	***2.175.783***	***1.707.800***	***467.983***	***21,5***
	Rooted seedling (d2)		C I	128.408	1.550.557	997.280	553.277	35,7
			CII	47.897	631.561	584.520	47.041	7,4
			Total year	***176.305***	***2.182.118***	***1.581.800***	***600.318***	***27,5***
	% RS / RS, l			100,3	100,3	92,6	128,3	127,9
b2: fertilising with Kemira	c1: Falcato F1	Seed seedling (d1)	C I	147.588	1.808.689	1.111.280	697.409	38,6
			CII	63.895	853.382	814.682	38.700	4,5
			Total year	*211.483*	*2.662.071*	*1.925.962*	*736.109*	*27,7*
		Rooted seedling (d2)	C I	147.588	1.808.689	1.111.280	697.409	38,6
			CII	64.802	866.272	674.682	191.590	22,1
			Total year	*212.390*	*2.674.961*	*1.785.962*	*888.999*	*33,2*
	c2: Thomas F1	Seed seedling (d1)	C I	144.620	1.809.920	1.083.280	726.640	40,1
			CII	61.909	838.990	786.705	52.285	6,2
			Total year	*206.529*	*2.648.910*	*1.869.985*	*778.925*	*29,4*
		Rooted seedling (d2)	C I	144.620	1.809.920	1.083.280	726.640	40,1
			CII	60.771	824.298	674.705	149.593	18,1
			Total year	*205.391*	*2.634.218*	*1.757.985*	*876.233*	*33,3*
Average (b2)	Seed seedling – d1		C I	146.104	1.809.305	1.097.280	712.025	39,4
			CII	62.902	846.186	800.694	45.492	5,4
			Total year	***209.006***	***2.655.491***	***1.897.974***	***757.517***	***28,5***
	Rooted seedling – d2		C I	146.104	1.809.305	1.097.280	712.025	39,4
			CII	62.787	845.285	674.693	170.592	20,2
			Total year	***208.891***	***2.654.590***	***1.771.973***	***882.617***	***33,2***
% RS / RS, l				**99,9**	**99,9**	**93,4**	**116,5**	*
% b2 (RS - d1) / b1 (RS - d1)				**118,9**	**122,0**	**111,1**	**161,9**	*
% b2 (RS,l - d2) / b1 (RS - d2)				**118,5**	**121,6**	**112,0**	**147,0**	*
% b2 / b1				**118,7**	**121,8**	**111,6**	**153,5**	*

Table 2 shows the economic efficiency of the crop in 2002, when in the 2nd cycle we used rooted shoots to make seedlings from plants lead on one stem. The interference of the factor D [d1 – seed seedling; d2 – seed seedling (CI) and rooted seedlings (CII)] in the interaction of the factors B (b1) x C (c1 and c2) result in negative profitability rate values in the case of the combination b1 x c1 (d1) and b1 x c2 (d1), i.e. –14.3% and –13% respectively.

CONCLUSIONS

1. The results both in average and in extra and 1st quality yields show that the Kemira fertilising system is advantageous on both leading systems though it implies supplementary production costs.
2. From the point of view of making the crop profitable applying the two stem leading system proved beneficial; the profit in both fertilising systems (Kemira and classical) is superior or almost equal to that in the one-stem leading system.
3. Using 2nd cycle rooted shoots to get seedlings substantially contributes to making the crop profitable through an increased economical efficiency; from negative profitability rate values in the 2nd cycle in the case of seed seedlings we got to positive profitability rate values in the case of rooted shoots.
4. Technical measures of leading the plants on two stems and of producing seedling for the 2nd cycle resulted in substantial diminution of production costs; using the Kemira fertilising system and performing hybrids resulted in increased average per unit of surface and in high quality products (extra and 1st quality); both measures resulted in substantial profits and increased profitability.

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RESEARCHES REGARDING THE PLANTING DISTANCE ON WITLOOF ROOTS PRODUCE

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Key words: witloof, planting distance

SUMMARY

In the present research had been studied three variants of plants thinning in row, maintaining the same distance between the rows. The culture density, according to the three variants was of 625000 pl/ha at V1, 277777 pl/ha at V2 and 227272 pl/ha at V3. On the results obtained had been costated that the best variant was V3 with a density of 227272 pl/ha. In this case, the witloof roots had superior morphological characteristics, comparatively with the other variants: the colet diameter of 4.3 cm, the roots length of 22.9 cm and the roots weight of 88.6 g. The total roots production was of 20.3 t/ha and the over 3 cm diameter roots production was of 19 t/ha.

INTRODUCTION

The witloof is a Compositae vegetable species, appreciated for its nutritive value. The witloofs are produced in two stages: in the first one, are produced the roots which have to be of a very good quality, and in the second one, through the roots forcing is produced the part which can be eaten. The roots quality influences the quality of the part which can be eaten. In the present paper are presented the results regarding the influence of the planting distance on the diameters of the roots.

MATERIAL AND METHOD

The present experiences were effectuated in 2002-2003 period, in a familiar garden from Sâmbureşti Olt area. This area was included in the second category of favourability. On this surface the witloofs had good conditions from the light, temperature and soil moisture point of view. As biologic material was used a Spanish variety. Were experimented many thinning variants to obtain optimal nutritional space for a normal roots growing. The sawing was effectuated in the second decade of May, in rows with equal distance between them (40 cm) and 1-2 cm between the seeds. When the plants had 3-4 leaves the thinning was done at 4 cm (V1), 9 cm (V2) and 11 cm (V3). After thinning were obtained three densities: 625000 pl/ha at V1, 277777 pl/ha at V2 and 227272 pl/ha at V3. In the vegetation period were done current maintenance works specific for the roots species. Were effectuated the works of the soil, 5 irrigations, 2 foliar fertilizations by Nitrophoska 0.3-0.4%, the first one in the active rosette growing faze, and the second at the beginning of the roots forming.

Were determinate: the rosette diameter, the roots` length, the diameter at the colet roots, medium weight, soluble dry substance and was calculated the total production.

THE RESULTS AND DISCUSIONS

From this experience we can tell that the witloof can find good conditions in the studied zone. Analyzing the dynamic growing of the rosette it can be observed that it has a straight position and the leaves have a vertical position. The diameter of the rosette, after the fourth determination, has 10.4 cm at V1 and 13.6 cm at V3 (table 1).

Table 1

The dynamic of the witloof rosette

Variant	The first determination	The second determination	The third determination	The fourth determination
V1	2.3	5.6	8.2	10.4
V2	3.1	6.4	9.1	12.2
V3	3.7	7.7	10.4	13.6

The influence of planting distance influenced the roots` diameter (table 2). Thus, the roots` weight was different between the variants, at high densities were obtained many and small roots and at low densities were obtained less and bigger roots. At all variants the roots obtained had normal length, because they were cut at 16-18 cm.

The diameter of the colet was influenced by the distance from the roots, the best results were obtained at the biggest distance used (11 cm).

Table 2

The characteristic morphological of the witloof roots

Variant	The diameter of rosette (cm)	The weight of roots (g)	The length of roots (cm)	The diameter of colet (cm)
V1	12.5	44.5	16.3	2.4
V2	15.6	77.2	21.7	3.5
V3	17.3	88.6	22.9	4.3

The roots production obtained was between 20.3 t/ha at V3 and 29.65 t/ha at V1. From this production only a part had the diameter over 3 cm, the values were between 93.7 at V3 and 74 at V1 (table 3).

For forcing are used only the roots with the diameter over 3 cm, from this results the rare densities assure the best roots. From the statistical point of view the variants V2 and V3 had smaller productions, comparatively with V1.

From the chemical composition point of view we ascertained a level of 23-24% for total dry substance, from the biggest roots vegetable species (table 4).

Table 3

The production of witloof roots

Variant	The weight of roots (g)	The total of roots production (t/ha)	The of roots production over 3 cm diameter (t/ha)	Signifi cation	% of roots over 3 cm diameter	Signifi cation
V1	44.5	27.8	20.6	Mt	74	Mt
V2	77.2	21.4	19.2	oo	89.9	***
V3	88.6	20.1	18.8	oo	93.7	***
	DL 5%		0.78 t/ha		1.93 %	
	DL 1%		1.30 t/ha		3.20 %	
	DL 0.1%		2.43 t/ha		6.00%	

Table 4

The chemical composition of witloof roots

Variant	Total dry meter (%)	Mineral substance (%)	Vitamin C (mg/100 g)	Acidity (% malic acid)
V1	23.2	1.42	13.0	0.22
V2	24.3	1.56	13.1	0.23
V3	24.1	1.53	12.9	0.23

The mineral level was contented between 1.42% at V1 and 1.56% at V2. The witloof has a small content of C vitamin; the values are of 12.9 and 13.1 mg/100g. Also, the acidity was low, between 0.22-0.23 mg/100 g malic acid (table 4).

CONCLUSIONS

On the results obtained in the first stage we can reach the following conclusions:

1. The respectability for the optimal sowing period
2. The use of a quality seed
3. The thinning in time of the plant to assure an optima nutritional space
4. The use of the planting distance of 40/11 cm assures very good conditions for the roots growing.

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MANAGEMENT OF INTEGRATED CONTROL OF THE WEED WITH HERBICIDES FROM CIG CÂMPIA TURZII IN ONION AND TOMATOES

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Key words: tomato, onion, herbicide

SUMMARY

The usage of the high potential yielding ability of the new cultivars, in a more complex way, by efficient technologies, represents the fundamental problem of any agriculture system, which aims to a high productivity. The modern technologies of crop production give a great importance to identification and control of the diseases, pests and weeds in order to reduce the losses caused by these factors.

The concept of integrated control appeared at the beginning of ’70 and implies drawing up some technologies, which join together all the methods of prevention and control in order to obtain the best results from the economical point of view. This concept does not exclude the utilization of chemical products, but their use in a rational way, in minimum but efficient doses and their replacement in some technological links with other methods which can assure at least effectiveness in the weed control.

MATERIALS AND METHODS

This trial was carried out on a private farm using the variety of green pepper Export and herbicides having a good selectivity for the growing plant. On the farm there was applied a technology of crop production recommended by the R.I.V.F.G. Vidra but it was correlated with the specific of this trial (table 1). Species of weed identified in the control plot reached 54, 48, 51 pieces/sqm of monocotyledonous and 94, 98, 74 pieces/sqm of dicotyledonous respectively in direct-seed tomatoes and onion.

RESULTS AND DISCUTION

The range of herbicides used ensured an efficient control of the species of dicotyledonous and monocotyledonous weeds and an optimum selectivity for the growing plant (figure 1).

Species of dicotyledonous weeds were efficiently controlled by the herbicide AS 70 PU, Sencor 70 WP and GOAL 2 E in rotation in percentage of 85 and 92 respectively. Monocotyledonous weeds were efficiently controlled by the herbicides assuring an efficient control of the dicotyledonous and monocotyledonous weeds existed in the phytocenosis and they are recommended for the yields which proved to be obtained, from statistics point of view, as 90-92% in tomato crops and 85-92% in onion crops (table 2).

Table 1

Four year vegetable crop rotation

Year/plot	1	2	3	4
I	Cereals	Gourd crops, root crops, bulb crops	Solanaceae vegetable crops	Vegetable and cabbage-family crops
II	Gourd crops, root crops, bulb crops	Solanaceae vegetable crops	Vegetable and cabbage-family crops	Cereals
III	Solanaceae vegetable crops	Vegetable and cabbage-family crops	Cereals	Gourd crops, root crops, bulb crops
IV	Vegetable and cabbage-family crops	Cereals	Gourd crops, root crops, bulb crops	Solanaceae vegetable crops

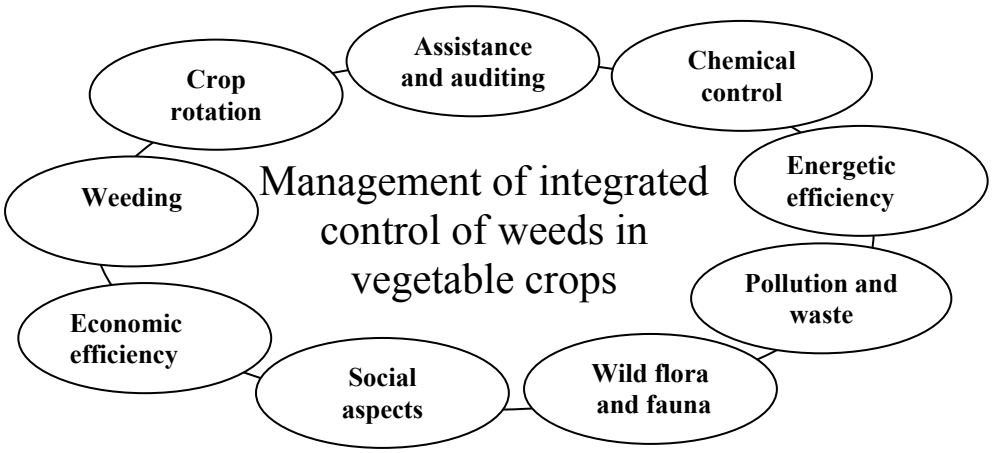

Figure 1- Interrelation in integrated control of weeds

Table 2

Effectiveness of herbicides in weed control

a) TRANSPLANTED TOMATOES – cultivar Unirea

Herbicidation recipe	Rate (l, kg /ha)	Appli-cation	Weeds controlled			Total yield (t/ha)	Relative yield (%)	Diffe-rence (t/ha)	Meaning
			Total of weeds	Mono	Dico				
Check untreated	-	-	(146)	(52)	(94)	23,2	100	-	-
SENCOR 70 WP	0.3	Preem	88	88	89	29.2	126	6.0	xxx
AS 70 PU	0.3	Preem	91	90	92	30.3	131	7.1	xxx

b) DIRECT SEED TOMATOES – cultivar UNIREA

Herbicidation recipe	Rate (l, kg /ha)	Appli-cation	Weeds controlled			Total yield (t/ha)	Relative yield (%)	Diffe-rence (t/ha)	Meaning
			Total of weeds	Mono	Dico				
Check untreated	-	-	(135)	(48)	(92)	22.6	100	-	-
SENCOR 70 WP	0.3	Preem	84	83	85	27.2	121	4.6	xxx
AS 70 PU	0.3	Preem	90	91	90	28.6	127	6.0	xxx

c) DIRECT SEED ONION – cultivar DIAMANT

Herbicidation recipe	Rate (l, kg /ha)	Appli-cation	Weeds controlled			Total yield (t/ha)	Relative yield (%)	Diffe-rence (t/ha)	Meaning
			Total of weeds	Mono	Dico				
Check untreated	-	-	(125)	(51)	(74)	21.6	100	-	-
Goal 2 X	1.0	Post-emerg	52	18	85	25.6	119	4.0	xxx
GOAL 2 E	1.0	Post-Emerg	57	21	92	26.8	125	5.2	xxx

CONCLUSIONS

1. In the vegetable crops, competition of weeds creates greater troubles than in other agricultural crops;
2. There are sufficient reasons in order to try the control of the weeds by the aid of herbicides;
3. Application of herbicides became an indispensable auxiliary for the increasing of both labour productivity and harvest quality;

4. Weeds are regarded as “green enemy” of the agricultural crops and they can compromise the onion crops completely;
5. In the system of integrated control of the weeds in the frame of the integrated management of plant protection (IMPP), one has to manifest a flexibility characterized by elements of miniaturization for the large farms;
6. For the chemical control of the weeds in onion crops, we *recommend* the following receipt of herbicide GOAL 2E and for tomatoes AS 70 PU
7. For the onion crops grown in the field, having in phytocenosis both dicotyledonous and monocotyledonous weeds, we recommend application of the herbicides in combination by pre-emergent application and during the vegetative period respectively.

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RESEARCHES REGARDING THE INFLUENCE OF TOMATO HYBRID ON PRODUCTION AND ACCUMULATION OF NUTRITIVE ELEMENTS IN FRUITS

GABRIELA NEAŢĂ, ELENA DRĂGHICI, PETRA O.

Key words: Tomato hybrid, quality, quantity

SUMMARY

In last time a lot of tomato hybrids are introduced in our country without being tested. The authors of this research want to test six Holland hybrids to characterize in greenhouse conditions for cycle I from the point of view of uniformity of fruits, high crop and quality. Researches were carried out in one of the greenhouses of University of Agronomic Sciences and Veterinary Medicine Bucharest in 2002/2003 years. The variants were: V1-Marissa, V2- Cyndel, V3- Velasco, V4-Gironda, V5- Aurelius, V6-Yakut

The accumulation of nutritive elements in tomato fruits was low in nitrogen and had normal levels of potassium and phosphorus. Nitrates accumulation, a dangerous compound for the quality of tomato fruits was low; the values were under the maximum admissible limits of 150ppm. Yakut hybrid presented the highest earlier crop (kg/m^2) and it could be recommended for glasshouse culture in the 1st cycle.

INTRODUCTION

Tomatoes cultivated in greenhouses could be easily commercialized if their quality and quantity characteristics are corresponding with the standard conditions.

A great problem occurs when we have to choose the best hybrids from the tomato assortment, which present a normal content of nutrients, a low nitrates content and a high productivity [1, 2, 3]

The aim of this research was to characterize some hybrids in greenhouse conditions for cycle I from the point of view of uniformity of fruits, high crop and quality.

MATERIALS AND METHODS

Researches were carried out in one of the greenhouses of University of Agronomic Sciences and Veterinary Medicine Bucharest in 2002/2003 years, where six Holland tomato hybrids were tested.

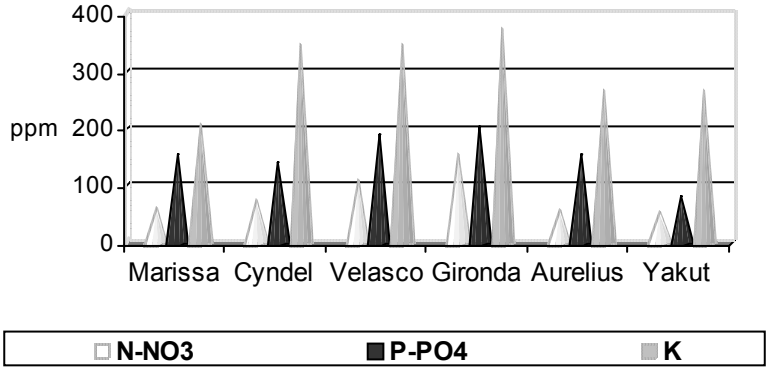
The variants were: V1-Marissa, V2- Cyndel, V3- Velasco, V4-Gironda, V5- Aurelius, V6 -Yakut. Seedlings were made into a greenhouse nursery. Transplant of plants was made at 70 days. Transplanting was made using 25 plants per variant, at 40cm apart and 80cm between rows. Before transplanting, the soil was fertilized with 13:13:13 complex, approximately 50Kg/ha, because the agrochemical analyze showed that the soil had a low content of nutritive elements for tomato culture [3, 4, 5].

During the vegetation period agrochemical analyses were made to fruits at three periods: the beginning of fruits harvest, the period of maximum harvest and the last period of harvest. The analyses of fruits regarded the soluble forms of nitrogen ($N\text{-}NO_3$), phosphorus ($P\text{-}PO_4^{3-}$) and potassium. Also, the production was determined.

RESULTS AND DISCUSSIONS

Data concerning the tomatoes quality shows a low content of nitrates, phosphorus and potassium where the values were medium from three period of analyses (Fig.1.)

Fig.1.The accumulation of nutritive elements in tomato hybrides

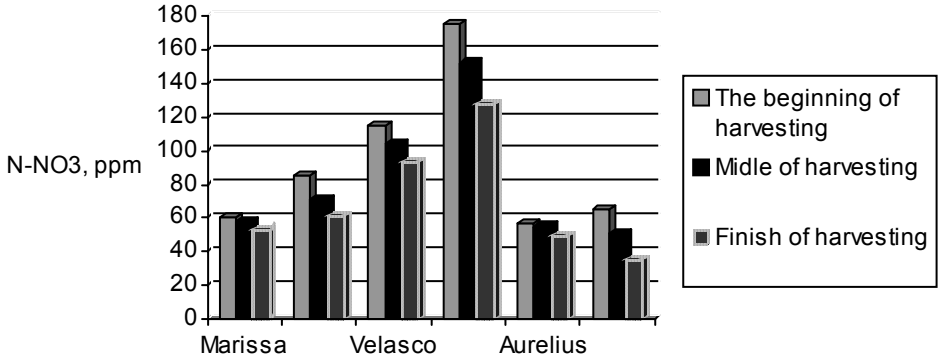


Analyses of nitrates, during the vegetation period, show variable content of nitrates, because the accumulation of nitrogen was gradually during the vegetation period.

The results obtained didn't exceed the maximum admissible limits of 150ppm, which determine restrictions to consume.

Only Gironda hybrid presents high values of nitrates, near the maximum admissible limits, that determined a restriction on fertilization scheme (Fig.2.).

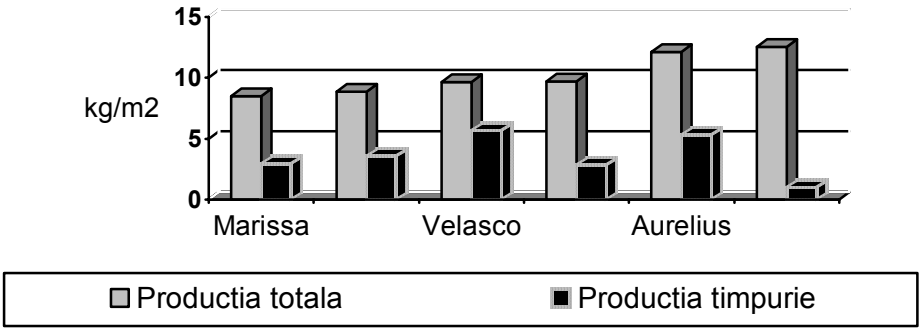
Fig.2.The evolution of nitrates on the harvesting periods



The crop obtained at the 6 hybrids showed that the highest total crop was registered at Yakut (12.556kg/m^2) and the lowest at Marissa (8.485 kg/m^2). The earlier crop is registered at Velasco (5.647 kg/m^2) with a 58% from total crop, results which recommend this hybrid to be cultivated in the 1st cycle greenhouse.

The lowest earlier crop was registered at Yakut (1.00 kg/m^2) with 8% from total crop (Fig.3).

Fig.3.Productia totala si timpurie la hibrizii de tomate



CONCLUSIONS

The studies concerning the adaptation in our country of the Holland tomato hybrids and their capacity to accumulate nutrients showed:

1. The accumulation of nutritive elements in tomato fruits was low in nitrogen and normal levels of potassium and phosphorus.
2. Nitrates accumulation, a dangerous compound for the quality of tomato fruits was low; the values were under the maximum admissible limits of 150ppm (STAS 84/2002) with the exception of Gironda hybrid.
3. Although the Yakut hybrid presented the highest total crop (kg/m^2), because of earlier crop of 8%, it couldn't be recommended for glasshouse culture in the 1st cycle.

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VITICULTURE AND OENOLOGY

THE INFLUENCE OF THE ROOTSTOCK ON THE ANTHOCYAN CONTENT OF THE GRAPES AND WINES OBTAINED FROM PINOT NOIR CLONES

ARINA OANA ANTOCE, MARINELA VICUŢA STROE,
IOAN NĂMOLOŞANU, ELENA HEROIU

Key words: Pinot noir, rootstock, wine colour, CIELAB method

SUMMARY

This work presents the results concerning the influence of the rootstocks SO_4-5 and 3309-111 on the anthocyan content of the grapes of 3 different Pinot noir clones in the conditions of the Stefaneşti - Argeş vineyard, as well as their influence on the colour characteristics of the wines obtained. The CIELAB colour parameters *L, a, b, c* and *h* were determined and the differences among the wines were discussed.

INTRODUCTION

Pinot noir is a grape variety very appreciated by the wine consumers of the world, but, in the same time, it is a variety that requires more attention as far as the winemaking technology is concerned, due to the low extractability of the colour pigments from the skins. For this reason, in order to select a clone that gives a better colour for the produced wines, we studied some clones of Pinot noir grafted on different rootstocks and we assessed the influence of the scion and rootstock on the final colour of the wine. As it has been demonstrated before, the rootstock has indirect influence on the quantity and quality of the grape harvest. It was expected, therefore, that some variation in the colour of the wines resulted from different Pinot noir clones could also be observed.

DATA AND METHODS

The Pinot noir clones studied were some clones of French origin cultivated in Stefanesti-Arges region; the wines assessed were those produced in the conditions of the year 2002. The clones are as following: 777A, 115B and 375C grafted on the SO4-5 and 3309-111 rootstocks; their names were abbreviated hereafter as noted in Table 1.

The grapes were analyzed for the evolution of the free anthocyan pigments in three different moments during their maturation, namely at the start of color formation, at full maturity and at technological maturity. Also, the content of the free anthocyans in wines was assessed. The method used for this determination is

that of pH difference developed by Singleton [1]. The colour parameters of the wines were determined by using a spectrophotometer Unicam with Chroma software ver. 1.0 which provides the colour parameters in accordance with the CIELAB standard.

Table 1. Studied Pinot noir clones and the rootstock on which they were grafted

Sample abbreviation	**Pinot Noir clone/rootstock**
C	**CONTROL - Pinot noir/Kober 5 BB**
PN1a	375C/3309-111
PN1b	375C/SO_4-5
PN2a	115B/3309-111
PN2b	115B/SO_4-5
PN3a	777A/3309-111
PN3b	777A/SO_4-5

RESULTS AND DISCUSSIONS

The results obtained for the free anthocyan content in grapes, at various moments of maturity, and in wines are plotted in Fig. 1. As expected, the concentration of the pigments in grapes increases with the advance towards maturity. However, for the PN2a clone, the content of anthocyans already dropped at the moment considered for all the clones as technological maturity, compared to that of full maturity. For the rest of the clones, the content increased or remained at least constant (PN2b). Anyway, we can say that the 115B clones have the tendency of losing the colour after reaching full maturity. Still, the control variety C leads to the highest content of the colour pigments at technological maturity.

This high level of anthocyans in the control variety is not actually an advantage for the colour of the wines obtained out of it, because the concentration of the pigments in skins does not always correlate to the level of the extraction of these pigments in wines, the later depending on the rigidity of the cellular membranes. In this respect, we observed that the levels of free anthocyans in the produced wines vary from 128 mg/l for PN3b to 189.5 mg/l for the control. Although the colour depends on many factors, the level of free anthocyans is a good indicator for the overall colour of a young wine.

In order to evaluate the components of the colour, we analyzed the CIELAB parameters, to actually determine the degree of red (parameter *a*) and yellow (parameter *b*) contained in the wine colour and the lightness *L*, the hue *h* and the chromaticity *c* of the colour. All the parameters are presented in Table 2.

All the wines resulted from the vinification of these clones are, as expected, grouped in the red-yellow region of the chromatic space. The parameter *a* varies between green and red, and the parameter *b* from blue to yellow. A positive value of parameter *a* means that the tested sample appears red to the viewer; the larger the *a* value, the more reddish the sample is.

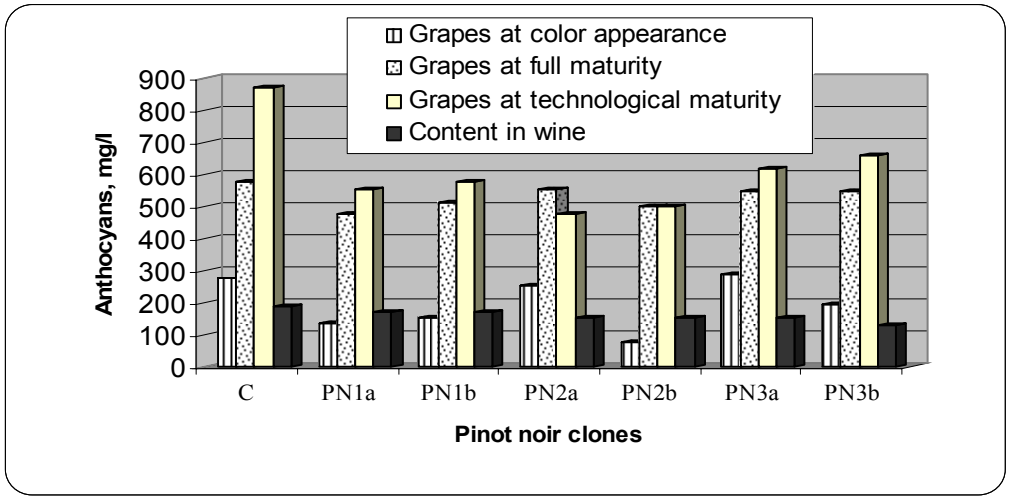

Fig. 1. The level of anthocyans in grapes and wines of the various Pinot noir clones

Table 2. Chromatic parameters of the Pinot noir clones (CIELAB standard)

	L	*a*	*b*	*c*	*H*
C	**46.34**	**46.42**	**26.95**	**53.68**	**0.53**
PN1a	45.59	48.99	26.79	55.84	0.50
PN1b	46.37	51.41	26.59	57.88	0.48
PN2a	48.92	49.29	23.73	54.70	0.45
PN2b	45.80	46.48	30.32	55.50	0.58
PN3a	52.20	45.21	24.48	51.41	0.50
PN3b	45.55	48.30	30.26	57.00	0.56

From Table 2 we can see that all the wines obtained from the clones are more red then the control sample, which has the lowest value of $a = 46.42$. The rootstock, again, seems to have no constant influence on the colour of wines; no correlation between the values of parameter *a* and type of the rootstock was apparent. Also, there was no direct correlation between the scions and the values of the parameter *a*. The highest value for the red colour was obtained for the PN1b clone, 375C grafted on SO_4-5. The SO_4-5 rootstock, however, tends to bring a little bit more yellow into the colour, all the values for the *b* parameter being higher then those for 3309-111 rootstock (except for clone PN1a and PN1b, where the values were similar).

In a chromatic bidimensional space, which does not take into consideration the lightness and the chromaticity of the colour, all the samples are grouped in the same region, the apparent colour being a combination of red and yellow (Fig. 2B).

Also, as it can be seen in Fig. 2A, the lightness of the sample PN3a is the highest, and this positively correlates also with a lower chromaticity ($c = 51.41$). This happens although the content of the anthocyans from grapes or extracted in

wines is not especially lower for this clone. The colour of this wine, however, is not as deep as that of the others, which have a chromaticity of at least 54.7 or larger. Since the PN3b does not display the same pattern we can conclude that it is the rootstock that influenced the lightness of the 777A clone.

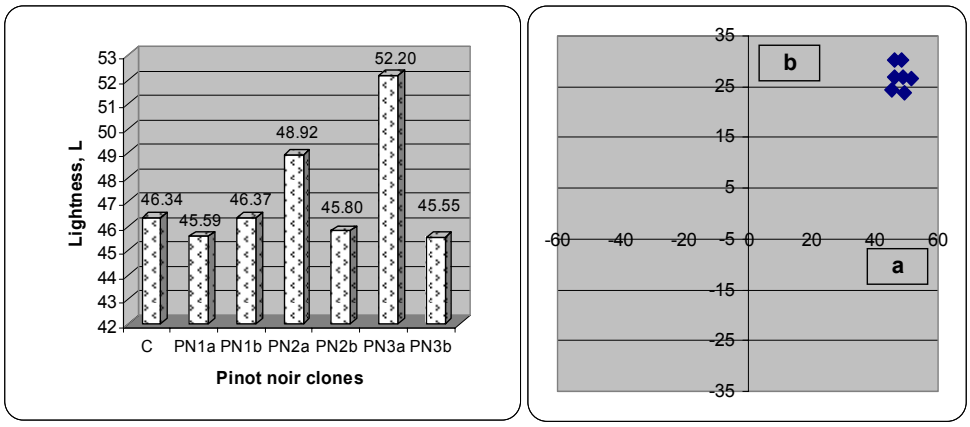

Fig. 2. A. Lightness of the wines obtained form the Pinot noir clones. B. The placement of the wine samples in the diagram *ab*

CONCLUSIONS

1. In spite of a lower content of anthocyans at technological maturity of grapes for some clones compared to the control variety, the extraction from the skins was probably better for the clones and especially for the PN1 (irrespective of the rootstock), since the content in wine is approximately equal to that of the control sample (167.5 mg/l for PN1a and PN1b, compared to 189.5 mg/l for the control).
2. Although the control sample had the highest concentration of anthocyans, the apparent red colour perceived by the viewer did not directly correlate with those values, the least red sample being exactly the control.
3. The rootstock seems to have no constant influence on the colour of wines; no correlation between the values of parameter *a* and type of the rootstock could be established. Also, there was no direct correlation between the scions and the values of the parameter *a*.

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THE INFLUENCE OF THE ROOTSTOCK ON THE COLOUR PARAMETERS OF THE WINES OBTAINED FROM PINOT NOIR CLONES CULTIVATED IN THE STEFANESTI REGION

ARINA OANA ANTOCE, MARINELA VICUȚA STROE,
IOAN NĂMOLOŞANU, ELENA HEROIU

Key words: Pinot noir, rootstock, wine colour, CIELAB 76 method

SUMMARY

This work presents the results on the variation of the tri-stimulus values of the colour of wines produced from 3 different Pinot noir clones grafted on the rootstocks SO_4-5 and 3309-111. The CIELAB 76 colour parameters *L, a, b, c* and *h* were determined and the differences among the wines were calculated and discussed in comparison with a standard Pinot noir wine. The differences for colour parameters and for the total colour, ΔE, were also evaluated for every clone grafted on both rootstocks, considering as control the clone grafted on 3309-111.

INTRODUCTION

Pinot noir is a famous French grape variety which, in comparison with other black grape cultivars, has a lower concentration of pigments in the skins; this fact leads to lower intensity of colour in the wine. In order to improve this deficiency, aside of the application of special wine technologies intended for attaining a higher extraction, the selection of some clones that lead to a better colour was also researched. In this paper we compared the colour of the wines obtained from clones of Pinot noir grafted on different rootstocks and we assessed the influence of the rootstock on the final colour of the wine.

DATA AND METHODS

The Pinot noir clones studied were some clones 777A, 115B and 375C grafted on both SO4-5 and 3309-111 rootstocks. The clones are cultivated in the Stefanesti-Arges region in a 3-year old plantation, and the wines were produced in the conditions of the year 2002. The samples analyzed were abbreviated as following: PN1a for the clone 375C on 3309-111 rootstock, PN1b for the same clone on SO_4-5, PN2a and PN2b for clone 115B on 3309-111 and SO_4-5 rootstock, respectively, and PN3a and PN3b for clone 777A on 3309-111 and SO_4-5 rootstock, respectively. A Pinot noir grafted on Kober 5 BB was considered as standard.

The colour parameters of the wines were determined by using a spectrophotometer Unicam with Chroma software ver. 1.0 which provides the tri-stimulus values X, Y, Z and the colour parameters *L, a, b, c* and *h* in accordance with the CIELAB 76 standard.

The colour differences are calculated by using the following equations:

$\Delta L = L_C - L_S$

$\Delta a = a_C - a_S$

$\Delta b = b_C - b_S$

$\Delta c = c_C - c_S$

$\Delta H^2 = (2\Delta L^2 + \Delta a^2 + \Delta b^2 + \Delta c^2)^{1/2}$

$\Delta E^2 = (\Delta L^2 + \Delta a^2 + \Delta b^2)^{1/2}$

where:

L_S is the lightness coordinate of colour standard

L_C is the lightness coordinate of colour sample

a_S is the red-green coordinate of colour standard

a_C is the red-green coordinate of colour sample

b_S is the blue-yellow coordinate of colour standard

b_C is the blue-yellow coordinate of colour sample

c_S is the "chroma" of colour standard

c_C is the "chroma" of colour sample

ΔE is the color difference.

RESULTS AND DISCUSSIONS

The values of the tri-stimulus parameters and chromatic parameters for all the Pinot noir wines are presented in Table 1.

Table 1. Tri-stimulus parameters and chromatic parameters of the Pinot noir clones evaluated by CIELAB 76 method

	X	**Y**	**Z**	**x**	**y**	**z**	***L***	***a***	***b***	***c***	***H***
C	**24.36**	**15.52**	**7.58**	**0.51**	**0.33**	**0.16**	**46.34**	**46.42**	**26.95**	**53.68**	**0.53**
PN1a	24.20	14.96	7.27	0.52	0.32	0.16	45.59	48.99	26.79	55.84	0.50
PN1b	25.56	15.54	7.70	0.52	0.32	0.16	46.37	51.41	26.59	57.88	0.48
PN2a	27.74	17.53	9.96	0.50	0.32	0.18	48.92	49.29	23.73	54.70	0.45
PN2b	23.84	15.12	6.43	0.52	0.33	0.14	45.80	46.48	30.32	55.50	0.58
PN3a	30.37	20.32	11.72	0.49	0.33	0.19	52.20	45.21	24.48	51.41	0.50
PN3b	24.01	14.94	6.34	0.53	0.33	0.14	45.55	48.30	30.26	57.00	0.56

As far as the distribution of the colour components x, y, z (calculated from the X, Y, Z parameters divided by the sum X+Y+Z), we can say that the 375C clone behaves in the same way as the control, irrespective of the rootstock on which it is grafted (C = PN1a = PN1b).

On the other hand, the clones 115B and 777A displayed an increase of the blue component of the colour, described by the parameter z, coupled with a decrease of the red component, x, for the case of the varieties grafted on 3309-111 rootstock (Fig. 1). The values for the same clones grafted on SO_4-5, a rootstock closely related to the one used for the control variety, gave similar results with the control wine (Fig 1.).

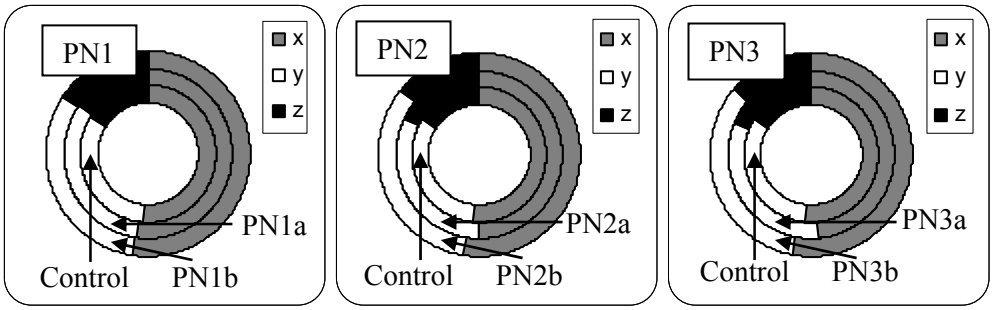

Fig. 1. The proportion of colour components x (red), y (green), z (blue) for the wines of the Pinot noir clones. The clones 375C (PN1), 115B (PN2) and 777A (PN3) grafted on both types of rootstock (SO_4-5 and 3309-111) are plotted separately against the control.

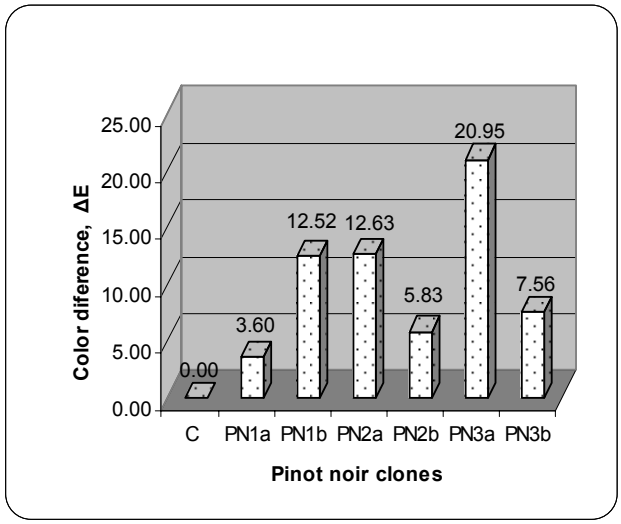

Fig. 2. The total colour difference of the Pinot noir wines obtained form clones compared to the control wine

In Fig. 2 there is plotted the difference of the total colour, ΔE, of wine from clones compared to the control wine. The most representative differences were manifested by the 777A clone (PN3a) and 115B (PN2a) clone grafted on 3309-111. For the same clones we observed significant differences even for the combination with the SO_4-5 rootstock, although the values were lower in this case. On the other hand, the colour difference for the 375C clone was higher when grafted on SO_4-5 rootstock.

For a better evaluation of the influence of the rootstock, the colour differences were calculated for groups of clones, comparing the same clone grafted

on both rootstocks by taking the 3309-111 as the control in each group (Table 2).

Table 2. The differences for the colour parameters of the clones grafted on SO_4-5 calculated against 3309-111 rootstock

	Δ*L*	Δ*c*	Δ*a*	Δ*b*	Δ*E*	Δ*H*
PN1a	0.00	0.00	0.00	0.00	0.00	0.00
PN1b	0.78	116.10	2.42	-0.20	3.25	116.18
PN2a	0.00	0.00	0.00	0.00	0.00	0.00
PN2b	-3.12	43.54	-2.81	6.59	30.53	44.34
PN3a	0.00	0.00	0.00	0.00	0.00	0.00
PN3b	-6.65	302.70	3.09	5.78	43.59	302.89

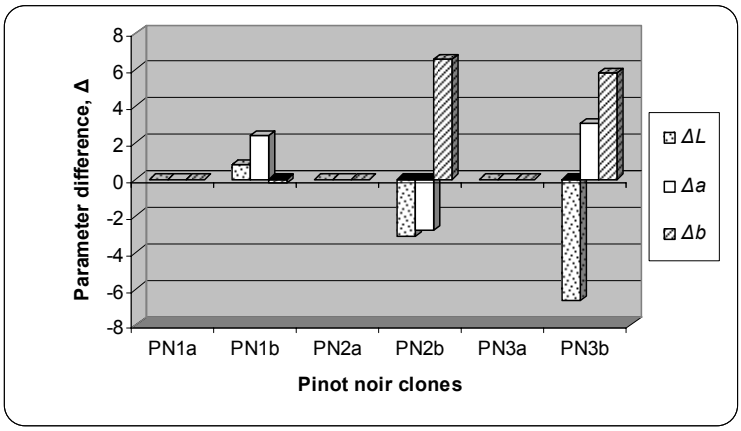

Fig 3. Parameter differences Δ*L*, Δ*a* and Δ*b* of clones grafted on SO_4-5 rootstock compared to 3309-111 rootstock (control)

Comparing the differences of colour parameters for wines produced from clones grafted on SO_4-5 with those grafted on 3309-111 we observe the following:

- the lightness of the colour (*L*) is not significantly different for the clone 375C on SO_4-5 compared to the same clone on 3309-111, but it is 6.4% lower for clone 115B and even lower (12.7%) for the clone 777A.
- the red colour component (*a*) increases for 375C and 777A on SO_4-5 and for the 115 B on 3309-111;
- the yellow colour (*b*), however, increases for 115B and 777A on SO_4-5 and remains constant for 375C;
- the chromaticity (*c*) is higher for all the wines from clones grafted on SO_4-5 comparing to the wines of clones grafted on 3309-111;
- the total difference of colour (Δ*E*) is positively correlated with the usage of the rootstock SO_4-5 for all the clones, although for the clone 375C the difference is rather small.

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A SURVEY OF ROMANIAN CONSUMERS OF ALCOHOLIC DRINKS: SOME DIFFERENCES BETWEEN GENDERS

ANTOCE OANA ARINA

Key words: survey, opinion poll, alcoholic drinks, men, women, gender

SUMMARY

A survey was conducted to gather various information regarding the general preferences, perceptions, tendencies, opinions and knowledge of Romanian consumers of alcoholic drinks. The survey showed that the proportion of men who consume alcoholic beverages is higher than that of women. Analysis of the responses indicated that, although in many aspects the opinions of men and women are quite similar, there are also some aspects on which the opinions of the two genders differ. Despite the relatively small scale of the sample, the differences between women' and men's preferences was found to be statistically significant in a number of situations.

INTRODUCTION

Students and staff of USAMVB, as well as persons from outside of USAMVB, of various ages and professions, participated in the survey. The data thus obtained was analyzed in various ways – depending on the particular aspects of interest. In this article, some considerations regarding observed differences between genders are presented. Although it is clear that the sample size is not sufficient to allow for a safe generalization of conclusions at a national scale, the results are still interesting and suggestive, at least until a larger study is available.

DATA AND METHODS

The survey was done on the basis of a questionnaire comprising 31 questions (plus 2 optional questions regarding name and address). Questions were of all kinds usually included in consumer surveys – that is, open-ended questions, close-ended questions with one or more answers possible, etc. The total number of respondents was 233. Usually, those persons considered "specialists", who work or study in the field of grapevine and winemaking, were removed from analysis. The various results were analyzed statistically in order to assess the statistic significance of results. For this purpose, a statistic analysis software package (SigmaStat from SPSS ver. 2.03) was employed.

RESULTS AND DISCUSSIONS

Figure no. 1 shows the results obtained from the answers to the basic question: "Do you drink alcoholic beverages?" There is a difference of almost 9% in favour of men – a difference that was found to be statistically significant (z test, $P<5\%$). This is an important finding, which should probably be taken into account by all those concerned with the production and marketing of alcoholic beverages.

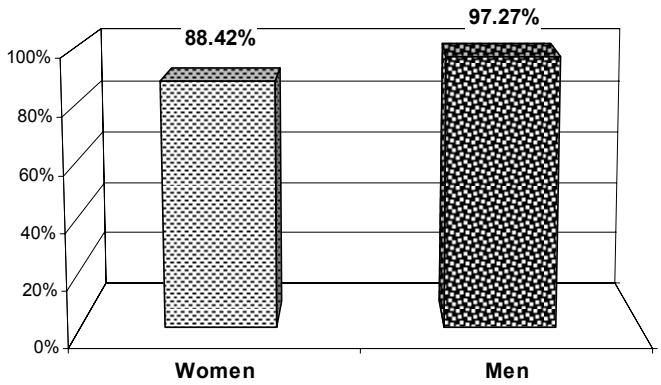

Fig. 1. Percentages – by gender – of the adult population who declare that they drink alcoholic beverages.

Table 1

Grades granted by women and men when asked how important some wine characteristics are for them, on a scale from 1 (not at all important) to 7 (very important).

The data marked * indicates a difference between men' and women's opinions which was found to be statistically significant (P<5%) with the Mann-Whitney Rank Sum Test.

Wine characteristic	Women/ mean ± SD	Men/ mean ± SD	Women/ median	Men/ median
Region/vineyard	5.87 ± 1.68	5.84 ± 1.67	7	6,5
Wine/grapevine variety	6.34 ± 1.08	6.21 ± 1.39	7	7
Vintage year	5.75 ± 1.51	5.20 ± 1.94	6	6
Brand name/producer	5.80 ± 1.71	5.96 ± 1.51	7	7
Color	5.82 ± 1.64	6.13 ± 1.22	7	7
Aroma	6.49 ± 0.86	6.33 ± 1.18	7	7
Barrel maturation	5.30 ± 1.78	5.51 ± 1.70	6	6
Recommendation of an expert	5.26 ± 2.09	4.59 ± 2.21	6*	5*
Availability on the market	3.77 ± 2.12	4.38 ± 2.10	4*	5*
Price	4.71 ± 2.08	5.03 ± 2.10	5	6
Bottle	4.82 ± 2.00	4.66 ± 2.66	5	5
Label	4.83 ± 1.99	4.42 ± 2.11	5	5
Prizes awarded/commercials	4.21 ± 2.05	4.93 ± 2.05	5	5

Table 1 shows the average marks and medians resulted from the female and male respondents, when they were asked how important some wine characteristics are to them. The presented data indicate that, for example, women are more

interested than men in the wine variety, vintage year, aroma, bottle and label. In turn, men consider more important than women the brand name / the producer, barrel maturation, price and prizes awarded or commercials. Because of the high scattering of the data (high variance), only two results could be proved to be statistically significant, as follows: women seem to put more trust in a recommendation from an expert – while men appear to value more highly the wine's availability on the market. It must be mentioned that, due to the fact that the data represents ranks rather than numbers, it was analyzed with the Mann-Whitney Rank Sum Test, which practically tests if the medians of two data sets differ significantly.

Table 2 lists the results of a similar question: subjects were requested to grade from 1 to 7 their degree of agreement to certain statements. These results also suggest certain differences between men and women in their relationship with wine. Men seem more confident: they have less difficulty choosing a wine, even in the restaurant; they agree that wine is more sophisticated than beer; are more willing to experiment, even if they do show some apprehension of forged wines. The fact that both women and men are more likely to agree than to disagree with the statement no. 14 is, again, underlining the need for a better education of the public – which, as it often happens, has very different opinions than those of the experts. Moreover, the public does appear to be willing to learn – as indicated by the high rank of opinions related to statement no. 5.

It is also worth noting that there were four instances in which the opinions of men and women differed in a statistically significant degree. Interestingly, women choose wines more easily than men; in balance, somewhat surprisingly, men like wine because it goes well with food, they state that wine relaxes them, and they believe it is healthy.

CONCLUSIONS

The answers given by respondents to a survey were collected and analyzed in order to assess some of the preferences of the Romanian consumers. One direction of analysis was to see if men's and women's opinions differ significantly – a hypothesis which was found to be true in relation to a large number of questions. Although some of the results are interesting and suggestive, imprecision's inherent to small-scale surveys underline the need for more investigations with larger numbers of respondents.

Table 2

Grades granted by women and men when asked how much they agree with the following statements, on a scale from 1 (total disagreement) to 7 (total agreement).

The data marked with * and ** indicate a difference between males and females opinions which was found to be statistically significant with the Mann-Whitney Rank Sum Test (P<5% for * and P< 1% for **).

Statement	Women/ mean ± SD	Men/ mean ± SD	Women/ median	Men/ median
1. *I choose a wine very easily.*	4.06 ± 1.87	4.79 ± 1.92	4**	5**
2. *I do not buy a lot, because I am afraid it will deteriorate before I finish it.*	2.55 ± 1.94	2.78 ± 2.17	2	2
3. *I find it difficult to choose a wine in the restaurant – I am afraid not to look inexperienced.*	3.40 ± 2.21	3.14 ± 2.20	3	3
4. *Wine is more sophisticated than beer.*	6.23 ± 1.57	6.40 ± 1.31	7	7
5. *I would like to try various brands and varieties of wine.*	6.09 ± 1.57	6.39 ± 1.30	7	7
6. *I drink wine because I like its taste.*	5.91 ± 1.46	6.29 ± 1.40	6	7
7. *I drink wine because it goes well with food.*	5.24 ± 1.93	6.07 ± 1.47	6**	7**
8. *I drink wine because it relaxes me.*	3.97 ± 2.16	4.95 ± 2.20	4**	5**
9. *I drink wine because it is healthy.*	5.55 ± 1.73	5.86 ± 1.76	6*	7*
10. *It is difficult to choose, because there are too many brands.*	4.23 ± 2.08	4.35 ± 2.05	4	5
11. *I try a new wine if recommended by a specialist.*	4.65 ± 2.15	4.51 ± 2.21	5	5
12. *I save money for the wine I like.*	3.81 ± 2.19	4.28 ± 2.29	4	5
13. *I do not buy wine because I am afraid it is falsified.*	2.77 ± 1.81	2.85 ± 2.25	2	2
14. *Homemade wine is better than the one in commerce.*	3.94 ± 2.21	4.16 ± 2.22	4	4

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PERSONAL PREFERENCES ABOUT WINES AS INDICATED BY A SURVEY OF ROMANIAN CONSUMERS

ANTOCE OANA ARINA

Key words: survey, opinion poll, consumers, preferences, wine

SUMMARY

Part of the data gathered from a survey regarding the general preferences, perceptions, tendencies, opinions and knowledge of Romanian consumers of alcoholic drinks was analyzed aiming to discern the most wanted as well as the most unwanted features that these consumers recognize in a wine. The results thus obtained suggest that many of the likes and dislikes of the majority of wine consumers in Romania are dictated by the actual situation on the wine market – where there are still many wines insufficiently stabilized or with flaws of taste, aroma or colour.

INTRODUCTION

Students and staff of USAMVB, as well as persons from outside of USAMVB, of various ages and professions, participated in the survey. The data thus obtained was analyzed in various ways – depending on the particular aspect of interest. In this article, some considerations regarding the relationship between the age of the respondents and their preferences, as well the importance granted by consumers to the wine age, are presented.

Although it is clear that the sample size is not sufficient to allow for a generalization of conclusions at a national scale, the results are still interesting and suggestive, at least until a larger study is available.

DATA AND METHODS

The survey was done on the basis of a questionnaire comprising 31 questions (plus 2 optional questions regarding name and address). Questions were of all kinds usually included in consumer surveys – that is, open-ended questions, close-ended questions with one or more answers possible, etc. The total number of respondents was 233. Usually, those persons considered “specialists”, who work or study in the field of grapevine and winemaking, were removed from analysis. The various results were analyzed in order to reveal various aspects of interest regarding the particularities of the Romanian consumers. From case to case, statistic analysis procedures were applied to assess the statistic significance of results. For this purpose, statistic analysis software (SigmaStat, from SPSS) was employed.

RESULTS AND DISCUSSIONS

Table 1 lists in an ordered manner the results obtained when respondents were asked to list 3 features most wanted in a wine.

Table 1

Wine features most wanted by Romanian consumers

Feature	Number of mentions	Percentage of total mentions
Aroma and flavour	103	22.6%
Limpidity (stability)	68	14.9%
Colour	67	14.7%
Sweetness (various degrees)	32	7.0%
Fruitiness	32	7.0%
Acidity, freshness, dryness	32	7.0%
Bouquet (maturity, aging)	32	7.0%
Balance (acid-sugar-alcohol), drinkable, light	21	4.6%
Strength (alcohol)	21	4.6%
Quality features: no defects, typicality, natural	17	3.7%
Extractivity	14	3.1%
Fineness	10	2.2%
Other (packaging, astringency, poorly defined)	7	1.6%

Examination of Table 1 shows, first of all, that aroma and flavour are the most important features that the Romanian consumer looks for in a wine.

The second, in the order of importance, is limpidity (stability) – surprising, in comparison with the market in other countries. The fact that the Romanian consumer is so much concerned by the limpidity of his/her wine suggests the harsh reality of the market, where there are still a lot of wines insufficiently stabilized. Colour is the third most sought feature; together with limpidity, it comes to suggest that Romanians place a lot of trust in their sight, the "aspect" of the wine being very important (34.6% of the total number of mentions – Fig. 1).

Then, each at 7% of the total number of mentions, there are four categories: sweetness (of course, here there were various degrees of sweetness mentioned, depending on respondent), fruitiness, acidity (freshness, dryness) and bouquet (maturity, aging). Together with aroma and flavour, all these features (summing up to about 50.6% of the total number of mentions – Fig. 1) suggest the importance that Romanians attach to the taste and smell of the wine.

The rest of the answers fell in two kinds of categories – either refined, requiring more-then-average knowledge about wines (such as fineness or balance), or insufficiently defined (an example of such an answer is "*good*").

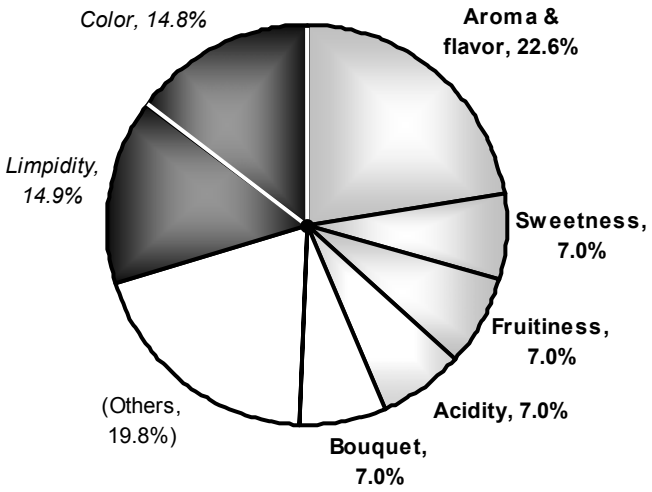

Fig. 1. Plot of the wine features preferred by consumers. They can be grouped in taste- and smell-related features (bold, total 50.6%), aspect-related features (italic, in total 34.6%) and others.

Table 2

Wine features most unwanted by Romanian consumers

Feature	Number of mentions	Percentage of total mentions
Turbidity	75	18.2%
Off-odors	58	14.1%
Volatile acidity (vinegar smell)	56	13.6%
Acidity (too high)	47	11.4%
Taste defects	46	11.2%
Color defects (browning, oxidation)	24	5.8%
Sweetness	21	5.1%
Astringency	19	4.6%
Adulteration	14	3.4%
Deposits	12	2.9%
Sulphur odor	9	2.2%
Unbalance (acidity too low)	8	1.9%
Too low alcohol content	7	1.8%
Too high alcohol content	4	1.0%
Low extract	4	1.0%
Aspect (packaging)	4	1.0%
Bitterness	3	0.8%

As it can be seen from Table 2, when it comes to unpleasant features, the Romanian consumers prove to be quite diverse and with many antipathies. Compared to the favourable features (Table 1), where there was a group of three which stood out from the others, in the case of unwanted features the drop from the most spread dislike (turbidity) to the least mentioned (bitterness) is much more

continuous.

However, confirming the previous findings regarding limpidity (Table 1), we find turbidity on top of the "unwanted" list. Right under that come off-odors and vinegar smell, high acidity and colour defects. Once again, this seems to be an indication of the state of affairs on the wine market – as it is probable that respondents mention exactly those faults which they encountered personally in the past. On interesting aspect is that very many subjects mentioned explicitly the "vinegar smell" (volatile acidity), in other words, differentiating it clearly from among the other off-odors. The same is true about the sulphur odor. If one was to include the volatile acidity and the sulphur odor in the other off-odors, then these would be first in the list of unwanted features, with 29.9% of the total number of answers.

CONCLUSIONS

The particular interests of Romanian consumers, their preferences regarding favourable feature that they seek in a wine, as well as their opinions on what constitutes an unwanted feature in a wine were surveyed and analyzed. As far as the favourable features are concerned, the majority of consumers are interested in the aroma, flavour and taste of the wine. (In particular, very few subjects declared that they are especially interested in the wine packaging or the label.) As for the unwanted features, again, most people mentioned off-odors and defects of taste and colour. All these are indications of the personal experiences of the respondents – and a warning regarding the need for a better quality in the wines marketed in our country.

Although the number of subjects interviewed was limited, the results obtained are considered valuable and suggestive, at least until a study on a larger scale is carried out.

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THE AGE OF THE CONSUMERS AND ITS INFLUENCE ON THE CONSUMPTION OF BEVERAGES IN ROMANIA

ANTOCE OANA ARINA

Key words: survey, opinion poll, wine, beer, spirits, non-alcoholic drinks, age

SUMMARY

A survey was conducted regarding the general preferences, perceptions, tendencies, opinions and knowledge of Romanian consumers of alcoholic drinks. Analysis of the database thus created suggests certain differences regarding personal preferences and habits between consumers belonging to different age groups. It was found that, in general, the majority of consumers, of all ages, usually select an alcoholic drink, rather than a non-alcoholic one. Among those consumers who choose alcoholic drinks, wine is the most popular in almost any situation – although there are exceptions, such beer preferred by young people at a party, or by most people when it comes to have a drink while watching a sport event.

INTRODUCTION

Students and staff of USAMVB, as well as persons from outside of USAMVB, of various ages and professions, participated in the survey. The data thus obtained was analyzed in various ways – depending on the particular aspects of interest. In this article, some considerations regarding the relationship between the age of the respondents and their preferences, as well the importance granted by consumers to the wine age, are presented.

Although it is clear that the sample size is not sufficient to allow for a generalization of conclusions at a national scale, the results are still interesting and suggestive, at least until a larger study is available.

DATA AND METHODS

The survey was done on the basis of a questionnaire comprising 31 questions (plus 2 optional questions regarding name and address). Questions were of all kinds usually included in consumer surveys – that is, open-ended questions, close-ended questions with one or more answers possible, etc. The total number of respondents was 233. Usually, those persons considered “specialists”, who work or study in the field of grapevine and winemaking, were removed from analysis. The results were analyzed in various ways, depending on the studied aspects.

RESULTS AND DISCUSSIONS

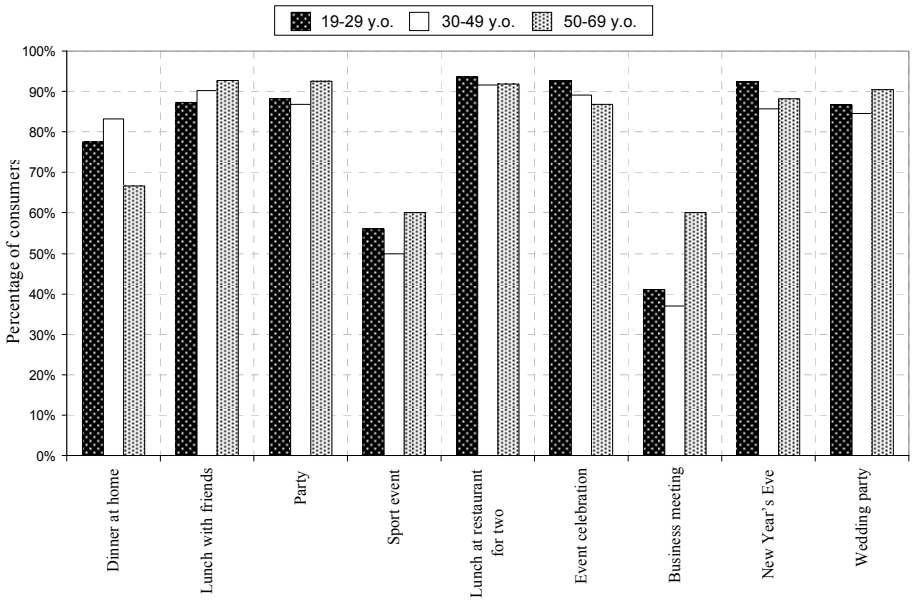

Fig. 1. Percentage of respondents in the three age groups who declare that they prefer alcoholic beverages at various moments of life

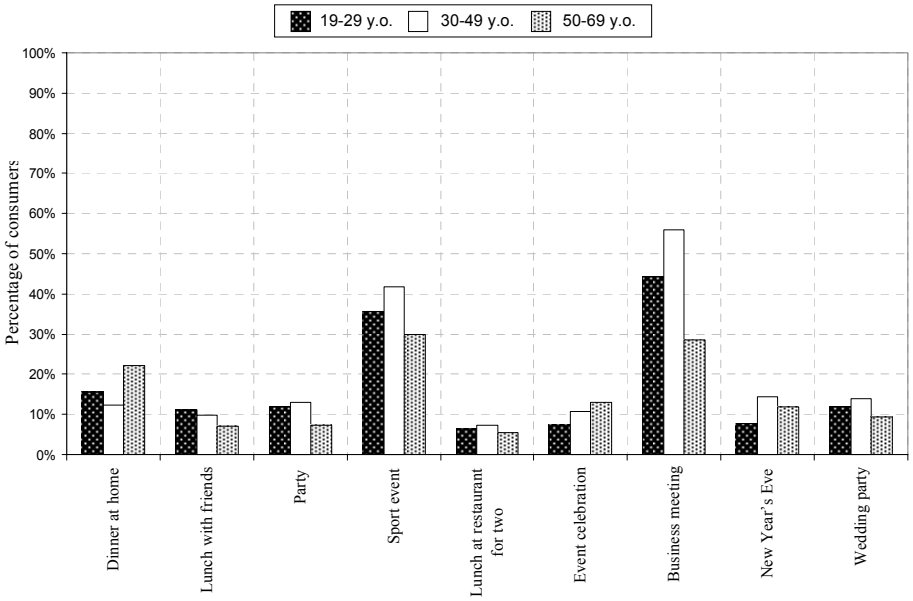

Fig. 2. Percentage of respondents in the three age groups who declare that they prefer non-alcoholic beverages at various moments of life

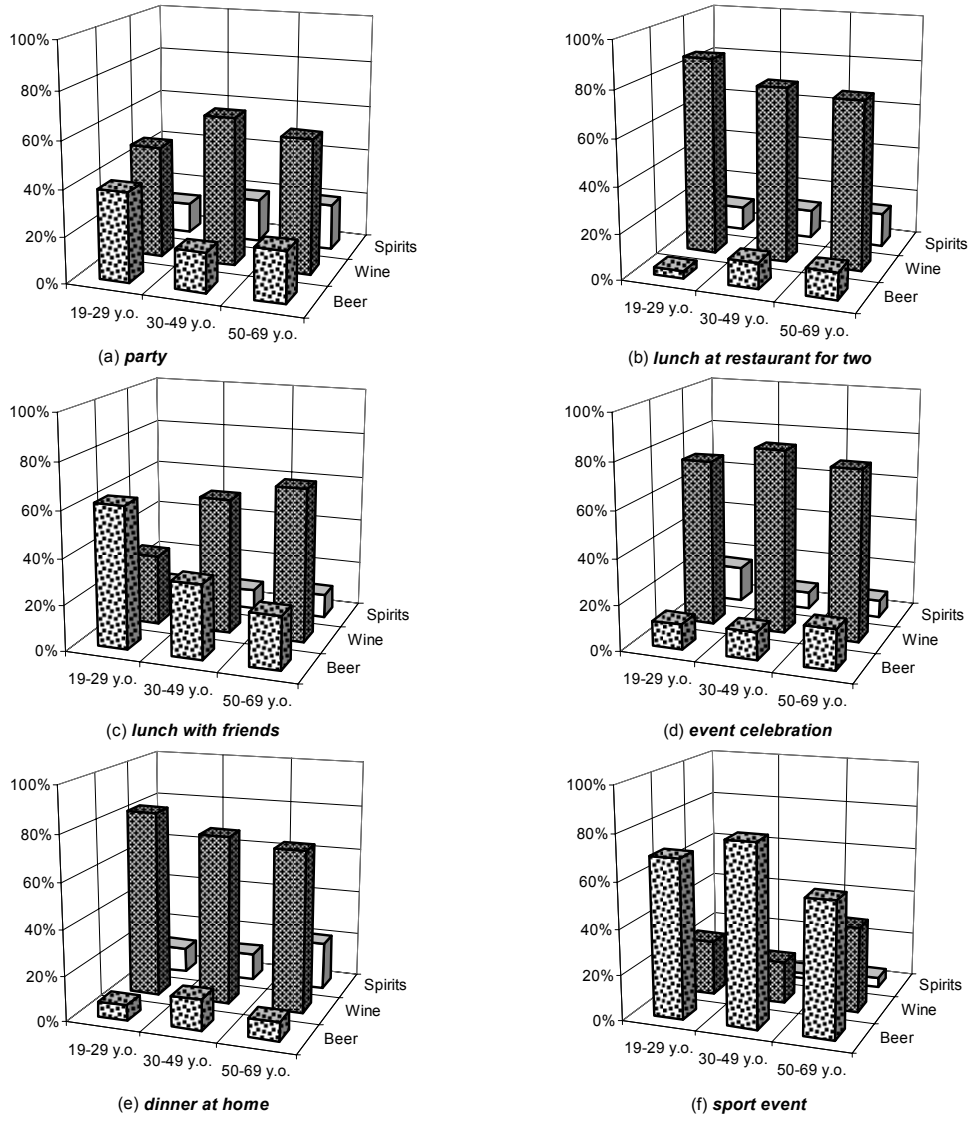

Fig. 3. Distribution of preferences for beer, wine and spirits among consumers from three age groups in various moments of life.

The data are percentages from the total number of respondents in each age group who stated that they prefer a certain beverage for that particular moment.

Analysis of the data presented in the two figures allows for a multitude of observations – which may prove useful for a better understanding of the behaviour

of consumers of various ages.

For example, it appears that alcoholic beverages are preferred by the majority of consumers in most situations – except for two: business meetings and sport events, where consumers split roughly in two, between alcoholic and non-alcoholic beverages. In the case of sport events, there are two interpretations possible: "participating in a sport event" and "watching a sport event"; therefore, the high percentage of those who do not want alcohol in this situation may be explained, in part, by this confusion. In the case of "business meetings", 60% of the respondents in the age group 50~69 y.o. would rather have alcohol even at business meetings – in slight contrast with the other age groups.

Alcoholic beverages are definitely preferred in the situations related to a special event, such as a wedding, New Years' Eve, parties or lunch in a restaurant with friends of with the girlfriend/boyfriend.

Figure 3 shows the how the preferences of respondents shown in Fig. 1 are distributed between beer, wine and spirits, for six different circumstances. It is rather interesting to observe that, in spite of the general offensive of beer, perceived in recent years, wine still has its place in the hearts of Romanian consumers. In fact, examination of Figure 3 reveals that beer is the drink of election ahead of wine only in two situation: the first is that of people aged 19~29, who are having lunch with friends; and the second is that of people of all ages who are enjoying (watching) a sport event. In turn, wine has more of a cultural connotation and enjoys a special relationship with the consumers. Probably the relatively high price of wine compared to beer also contributes to this image.

It must be said that this apparent preference for wine does not necessarily mean that everybody drinks noble wine. Data from the same survey indicates important ratios of consumers who go for homemade wine, which is mostly obtained from HPD (hybrids).

CONCLUSIONS

Results such as those presented in this paper indicate, as expected, that the consumer's age plays an important role in the selection of a beverage, and may prove useful when planning the general promotion strategy for a certain beverage, or in order to get an idea about the competition (for example, beer vs. wine). The results are suggestive, but the limitations of the survey underline the need for ongoing research, at a larger scale, in order to be able to generalize the analysis at a national level.

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RESEARCH CONCERNING THE VARIATION CONTENT IN LEAVES' PIGMENTS AT DIFERENT TYPES OF PRUNING AND BUD LOADS WITH GRAPEVINE

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LILIANA BĂDULESCU, I. BURZO

Key words: grapevine, pruning, chlorophyll, carotenoids

SUMMARY

This paper investigates the variation of chlorophyll and carotenoid contents of Fetească regală cultivar leaves, clone 21 B1, on Kober 5 BB rootstock at 4 pruning types (multiple Guyot, Guyot on demi-high stem, Cazenave cordon, spur-pruned cordon) and 3 bud loads (10; 15; 20 buds/m^2). The total chlorophyll and chlorophyll ***a*** contents increase during plant growth and development from flowering to veraison – without significant differences between variants, then decrease to grape ripening, most evident for multiple Guyot pruning and 10 buds/m^2 load. There is a significant correlation between the total chlorophyll accumulation and photosynthesis rate, too. The carotenoid content varied little between different types of pruning and bud loads.

The photosynthesis rate depends on a great number of genetic, biologic, climatic and pedologic factors, as well as by the technologic parameters [1,2,3]. The type of pruning, bud load and the moment of determination influence the intensity of photosynthesis [4].

The aim of this paper is to study the influence of pruning type and bud load on chlorophyll accumulation in leaves during grapevine growth and development, as well as the photosynthesis rate/chlorophyll content correlation.

MATERIALS AND METHODS

The experiment was carried out between 2000-2001, in the field of the Department of Viticulture and Enology, University of Agronomical Sciences and Veterinary Medicine, Bucharest. There has been studied the Fetească regală cultivar, clone 21 Bl, on the Kober 5 BB rootstock in a plantation founded in 1995, with the distances of 2.2/1.2 m.

The determinations were made at four pruning types: multiple Guyot (low training); Guyot on demi-high stem; Cazenave cordon and spur-pruned cordon and three bud loads (10; 15 and 20 buds/m^2).

It was measured spectrophotometrically the chlorophyll (***a***, ***b*** and total) and carotenoids contents on the fifth leaf of fertile shoots, as well as the photosynthesis rate with an automatic analyser LCA4.

The chlorophyll and carotenoid content was determined by extraction in acetone 80% and measured spectrophotometrically at 663, 645 and 470 nm. Data were calculated with Makiney formula and expressed in mg/100 g.

RESULTS AND DISCUSSION

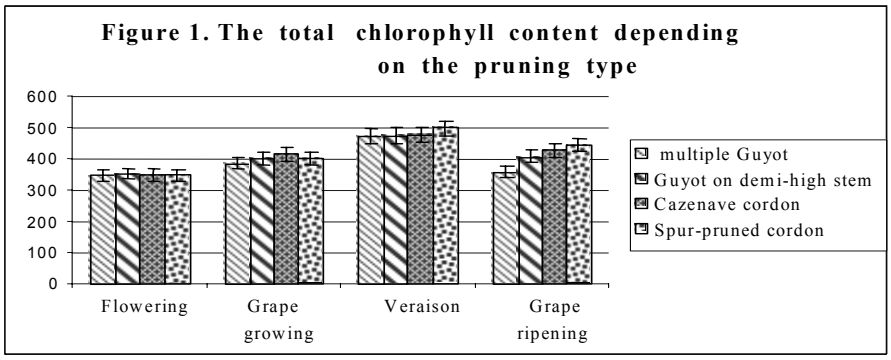
The tests were made during plant growth and development, at 4 moments: flowering, grape growing, veraison, and grape ripening. The total chlorophyll (figure 1) and chlorophyll ***a*** (table 1) contents increase during plant growth and development from flowering to veraison – without significant differences between pruning type, then decrease to grape ripening, most evident for multiple Guyot pruning and 10 buds/m^2 load.

Table 1

The influence of the pruning type on the chlorophyll and carotenoids content.

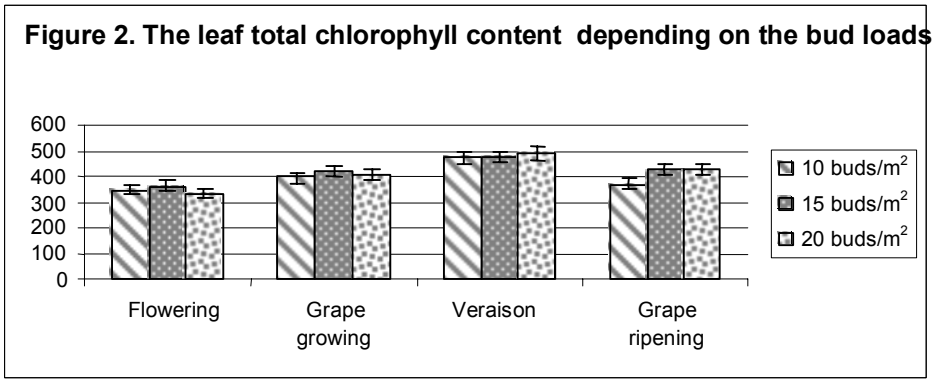
The determination moment	Pigments	Pruning type			
		Multiple Guyot	Guyot on demi-high stem	Cazenave Cordon	Spur-pruned Cordon
Flowering	Chlorophyll a	249.35	245.76	245.70	235.93
	Chlorophyll b	97.14	105.55	102.73	115.80
	Carotens and xantophyls	14.91	14.43	15.17	16.72
Grape growing	Chlorophyll a	280.76	285.40	291.33	263.97
	Chlorophyll b	105.70	175.23	121.50	98.49
	Carotens and xantophyls	13.33	17.74	14.64	12.98
Veraison	Chlorophyll a	292.91	314.08	313.55	310.00
	Chlorophyll b	179.5	158.86	162.12	186.63
	Carotens and xantophyls	18.13	17.72	17.7	16.7
Grape ripening	Chlorophyll a	198.21	250.9	265.6	250.9
	Chlorophyll b	158.22	156.43	160.5	193.42
	Carotens and xantophyls	13.87	15.64	15.3	16.07

It could be observed that the chlorophyll ***a*** content varied between 198.21 mg/100 g for the pruning type - multiple Guyot (low training) and 314.08 mg/100 g for Guyot on demi-high stem (table 1).



Also, the highest leaf carotenoid content (table1) was registered for Guyot on demi-high stem (18.13 mg/100 g), while the lowest values are registered for Spur-pruned cordon (12.98 mg/100 g).

The bud load assigned by cutting had a little influence on the leaf chlorophyll ***a*** and ***b*** contents (table 2), and the total chlorophyll (figure 2), too. For the medium bud loads (15 bud/m^2), the total chlorophyll increased from 364.06 mg/100 g (at flowering) to 475.81 mg/100 g (at veraison), than decreased to 428.94 mg/100 g. However, the highest total chlorophyll value was registered for 15 buds / m^2 at veraison.



The relative low variations were registered with relation to leaf carotenoid content for the different studied bud loads (table 2).

Table 2

The influence of bud load on the chlorophyll and carotenoids content

The determination moment	Pigments	Bud load / m^2		
		10	15	20
Flowering	Chlorophyll a	252.05	265.67	214.84
	Chlorophyll b	96.86	98.39	92.66
	Carotens and xantophyls	15.1	13.93	16.88
Grape growing	Chlorophyll a	264.07	292.16	284.86
	Chlorophyll b	130.04	127.7	117.95
	Carotens and xantophyls	14.62	14.93	14.46
Veraison	Chlorophyll a	297.88	313.58	311.46
	Chlorophyll b	176.19	162.23	168.84
	Carotens and xantophyls	18.02	17.58	17.63
Grape ripening	Chlorophyll a	220.44	250.33	253.44
	Chlorophyll b	149.38	178.61	173.44
	Carotens and xantophyls	15.29	15.31	15.07

Following the correlation between the total chlorophyll content and photosynthesis rate for different pruning type and bud loads it could be noticed that a distinct signification (y = 19.74x + 152.69, r=0,62, n=11,) occurred between these leaf physiological parameters (figure 3).

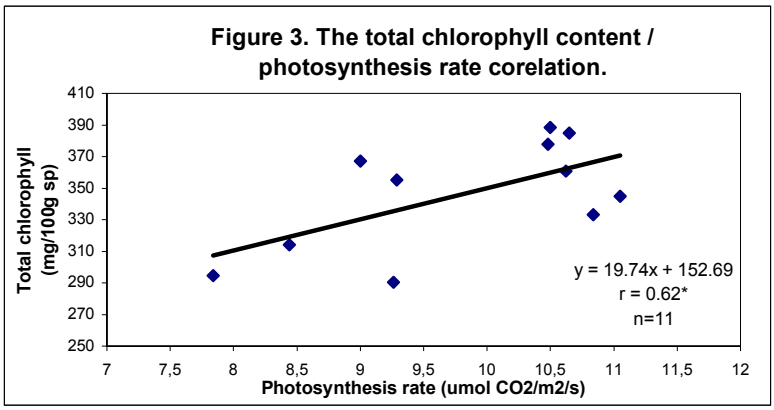


Figure 3. The total chlorophyll content / photosynthesis rate corelation.

CONCLUSIONS

1. The total chlorophyll and chlorophyll ***a*** contents increase during plant growth and development from flowering to veraison – without significant differences between variants – then decrease to grape ripening, most evident for multiple Guyot pruning.
2. The bud loads assigned by pruning had a lower influence on the leaf total, the ***a*** and ***b*** chlorophyll contents as the pruning type. The highest total chlorophyll value was registered for 15 buds / m^2 at veraison.

3. The carotenoid content varied little between different types of pruning and bud loads.
4. It could observed a distinct signification (y = 19.74x + 152.69, r=0.62*, n=11) between the total chlorophyll content and photosynthesis rate for the studied pruning types and bud loads, too.

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THE GLYCEROL FORMING AND ITS INFLUENCE UPON THE WINES

GEORGETA BELENIUC, MARIN GH.

Keywords: Inoculation, prefermentation period, alcohol, total acidity, volatile acidity, glycerol.

SUMMARY

One of the secondary product of alcoholic fermentation, glycerol has the greatest importance due to its favourable influence on organoleptic properties of wines. Its synthesis depends upon many factors. This study was conducted under laboratory conditions, using selected yeast strains from the Murfatlar Research Station yeast collection, belonging to the *Saccharomyces ellipsoideus*, *S. bayanus* and *S. italicus* species. The fermentation medium was Pinot gris must which was inoculated with 1.5 to 1.7 x 10^7 cells/ ml. The objective was to enumerate the importance of several factors that determine wine glycerol concentration (e.g. must sugar and glycerol, inoculum's concentration, fermentation temperature and yeast species). The glycerol produced was determined by volumetric method with potassium periodat. The result were: Depending of the grapevine variety and sugar content of the must, glycerol concentration of the grapes varies between 1.70 to 3.02 g/l; The inoculation rate had not an influence on the glycerol concentration of wines; The most glycerol was formed in the first 2 to 3 days of fermentation; in this period 80 to 90 g/l of the initial sugar decreased and about 2/3 of the glycerol was formed; The most glycerol was obtained at fermentation temperatures of 20^0C and 25^0C; A fermentation temperature >30^0C leads to a decrease of glycerol formation; Yeast species and the sugar content had the greatest contribution to glycerol formation. Among the strains tested, SE-2, belonging to *Saccharomyces ellipsoideus* species was notable. This strain produced the highest glycerol concentration in wines (7.80 to 9.20 g/l) and did not produce foam during fermentation.

INTRODUCTION

As a result of research, it has been asserted that glycerol is formed under yeasts action in the first stage of alcoholic fermentation, in which dihydroxyacetone -1 phosphate under reductaza action in presence of $NADH.H^+$, is transformed into glycerophosphate; from this are formed glycerol and NAD^+ which take part in glycoliza process. The preferential formation of glycerol in this alcoholic fermentation stage is explained by the fact that there are no large quantities of acetaldehyde which accept H^+ from $NADH^+$ more easily; this reacts with dihydroxyacetone -1 phosphate producing glycerol.

The research done in the alcoholic fermentation range, does not explain theoretical antagonism referring to acetaldehide appearance without its presence in the fermentation medium.

MATERIAL AND METHODS

The study was made in laboratory and production conditions, using selected yeasts belonging to the *Sacch. ellipsoideus*, *Sacch. bayanus* and *Sacch.*

italicus yeasts, from Murfatlar Research Station laboratory yeasts collection and the fermentation medium was represented by Pinot gris musts. It had in view the specification of some factors that determine the glycerol content in the wines (the presence of glycerol in the fresh must, the influence of inoculated density, the influence of fermentation temperature, yeast specie and the sugars content of the must).

The glycerol produced was determined by volumetric method with potassium periodat.

RESULTS

To determine the glycerol quantity from the grapes, it was determined its presence in fresh musts with different sugars contents.

The results obtained shown that the fresh must contains different quantities of glycerol depending on grapes variety and the harvest moment. This analyse confirm us the presence of glycerol before the alcoholic fermentation.

For checking the influence of inoculation density on the forming of glycerol, there were tested the strains *Sacch. ellipsoideus* SE-2, *Sacch. bayanus* SB-9 and *Sacch. italicus* SI-2. It had in view the prefermentation period, time of alcoholic fermentation and there were made the main characteristics of wines: alcohol, residual sugars, total acidity and glycerol. The results show that indifferent of inoculate density, the quantity of glycerol of the wines obtained was aproximatively equal within the same specie of yeast.

To establish the period when more glycerol is formed, it was checked the evolution of sugars, alcohol, acetaldehide and glycerol during alcoholic fermentation for SE-2 strain. The results obtained showed that the forming of glycerol starts simultaneous with the multiplication and fermentative activity of the yeasts.

Generally, in the first days of fermentation, the sugars content decreased with 80-90 g/l and the glycerol content that is produced is about 5.6 - 6.0 g/l. Acetic aldehide was not found at the fermentation start; it was found after 15 - 30 hours, period in which the greatest quantity of glycerol was produced in the wines. To the end of fermentation the quantity of acetic aldehide decreased, till 42 mg/l value. As the acetaldehide content decreased, a small increase of glycerol was registered in the first days of alcoholic fermentation.

It is known that the yeast specie and sugars must content have a big influence in the forming of glycerol process and therefore the strains mentioned before were tested in the must with different sugars contents 185 - 205 - 226 g/l, and fermented at 20^{o} C temperature. The yeast strains SE-2, SB-9, SI-2 formed great quantities of glycerol, proportional with sugars musts content. SB-9 and SI-2 strains have a high foaming degree, unlike the SE-2 strain which does not produce foam.

For knowing the influence of the yeast strain and fermentation temperature

on the forming of glycerol, the fermentation was tested at different temperatures 15° C – 20° C – 25° C and the results showed that the period and the way of alcoholic fermentation as well as the glycerol content are influenced directly by the fermentation temperature.

Table 1 -The influence of the yeast strains and the fermentation temperature on the glycerol content (Pinot gris must, 205 g/L sugars, 6,20 g/l total acidity, inoculation density 2.1x10^5 cells/ml)

Yeast specie		Time of alcoholic ferment. (days)	The main characteristics of wines obtained				
			Alcohol vol. %	Sugars (g/L)	Total acidity (g/L H2SO4)	Glycerol (g/L)	Foaming degree
Fermentation temperature = 15° C							
Sacch ellipsoideus	SE-2	9	11,95	12	4.20	7.80	-
Sacch. bayanus	SB-9	10	11.8	3.9	4.06	7.00	+++
Sacch. italicus	SI-2	12	11.8	4.0	3.90	6.85	+++
Fermentation temperature = 20° C							
Sacch. ellipsoideus	SE-2	8	11.9	2,5	4.50	8.90	-
Sacch. bayanus	SB-9	9	11.8	4.0	3.98	7.10	+++
Sacch. italicus	SI-2	11	11.7	6.1	4.02	7.08	+++
Fermentation temperature = 25° C							
Sacch. ellipsoideus	SE-2	8	11.8	4.2	4.50	8.20	-
Sacch. bayanus	SB-9	9	11.8	4.3	4.03	6.80	+++
Sacch. italicus	SI-2	8	11.7	6.0	4.12	6.86	+++

The biggest quantities in glycerol were obtained at 20° C temperature. The increasing of fermentation temperature to 25° C leads to a slight decreasing of glycerol content.

CONCLUSIONS

1. Depending on of the grapevine variety and sugars content on the must, glycerol concentration of the grapes varies between 1.70 – 3.02 g/l;
2. The inoculation rate used has not an influence on the glycerol content of wines;
3. The most glycerol was formed in the first 2 – 3 days of fermentation; in this period 80 – 90 g/l from the total quantity of the sugars decreased and about 2/3 of glycerol was formed from the total content of the wines;
4. The most glycerol was obtained at fermentation temperatures of 20° C and 25°C;
5. A fermentation temperature > 30°C leads to a decrease of glycerol formation;
6. Yeasts specie and the sugar content have the most important contribution in the glycerol formation. Among the strains tested, SE–2, belonging to *Saccharomyces ellipsoideus* specie was remarked. This strain produced the

highest glycerol concentration in wines (7.80 to 9.20 g/L) and does not produce foam during fermentation.

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SOME ASPECTS OF KNOWLEDGE REGARDING THE VINE'S ENERGETIC PRODUCTIVITY IN BIHOR VITICULTURAL AREA

CHEREGI VIOREL

Key words: productivity, conversion coefficient, photosynthesis

SUMMARY

Productivity is estimated according to the economical importance of the main product accomplished per surface unit. To understand the complexity of the factors that the viticultural yield depends on, by referring especially to the productivity, there is the necessity of expressing into measurable units both the outputs regarding the production of grapes as well as the value of the main product's content.

The viticultural specialists measure the yield capacity according to the efficiency with which the plant succeeds in converting the solar energy into potential chemical energy.

The possibility of expressing into measurable units the energy consumption necessary for accomplishing the grape production and of the final result let us interfere in the process of viticultural production through agro-phyto-technical measures, in the context of increasing the conversion coefficient of the solar energy into chemical energy and of decreasing the consumption of energy on the product unit.

INTRODUCTION

Productivity is estimated according to the economical importance of the main product accomplished per surface unit. To understand the complexity of the factors that the viticultural yield depends on, by referring especially to the productivity, there is the necessity of expressing into measurable units both the outputs regarding the production of grapes and the value of the main product's content.

The viticultural specialists measure the yield capacity according to the efficiency with which the plant succeeds in converting the solar energy into potential chemical energy.

MATERIAL AND METHODS

The studies have been made on Riesling Italian and Mustoasă de Măderat, both of them being grafted on the Berlandieri Riparia Kober 5BB father. Plantation has been founded in 1979 using a plantation distance of 2.20/1.20 m and the bilateral cord of leading.

The plantation has a south-west exposition and its soil is Brown Forest soil.

The sum of the total active temperatures during the vegetation period was of 3146 °C, the sum of the real temperatures was of 192 °C, the sum of precipitation was of 430 mm, and the annual insolation was of 2008 hours.

The coefficient of converting the solar energy into potential chemical energy was determined using the relation:

$c = \frac{ax100}{b}$, where:

c – conversion coefficient

a – quantity of energy chemically linked

b – quantity of the absorbed energy

To determine the quantity of energy absorbed, the following indices have been had in view (according to Zamfirescu, 1979)

- the total solar radiation recorded at the level of soil for the horizontal surface during May – October is of 815.10^{10} cal./ha.;
- radiation that interferes in the photosynthesis represents 50% of the total radiation;
- radiation that is not retained by the vegetal stratum and which is influenced by the phenological phase, by the planting distance, by the vigour of the vine variety, and by the eye load left, when dry cutting, represents 40 – 60%;
- 80% of the radiation retained by the vine is absorbed;
- about 10% of the radiation retained by leaves don't take part in the photosynthesis;

When determining the quantity of energy chemically linked, it have been had in view the energetic value of the grafted grapes per ha, 1 g of SU being the equivalent of 4000 calories.

During the period of vegetation, for both varieties of vine under study – Riesling Italian and Mustoasă de Măderat some observations and determinations have been made regarding the dynamics of accumulating the biomass of the aerial part on the vine expressed in fresh and dry substance.

RESULTS AND DISCUSSIONS

The vegetal substance is elaborated as a result of accomplishing the phenomenon of photosynthesis:

$$(6CO_2 + 6H_2O + \text{solar light} = C_6H_{12}O_6 + 6O_2)$$

Glucose is produced by the help of the chlorophyll through photosynthesis; the kinetic energy of the sun is converted and accumulated in plants under the form of potential energy materialized in carbon hydrates and other constitutive substances of the vegetal tissue. The conversion of the solar energy into chemical energy was determined by using the work methodology elaborated by Zamfirescu (1979).

Table 1

Determination of the conversion coefficient of the solar energy in chemical energy at two varieties of vines in Bihor viticultural area

Specification	Riesling italian	Mustoasă de Măderat
Recorded solar radiation (period 1.V-30X),cal/ha	815.10^{10}	815.10^{10}
Radiation that interferes in photosynthesis - 50% of the total radiation	407.10^{10}	407.10^{10}
Radiation unrecorded by the vegetal cover (40-60%)	224.10^{10}	163.10^{10}
Retained incident radiation (80%)	179.10^{10}	130.10^{10}
Inactive radiation (10%)	161.10^{10}	117.10^{10}
Total absorbed active radiation, cal./ha	161.10^{10}	117.10^{10}
Energetic value of the main economical product (grapes), cal./ha	$1,36.10^{10}$	$1,32.10^{10}$
Conversion coefficient, %	0.84	1.13

The biomass of the vine's aerial part, determined during the vegetation period, highlights the reports between the biomass components, the beginning of the formation and the growth rhythm of the grape production as a result of the vine productivity.

The biomass of the aerial part is accumulated on the vine step by step, altogether with the formation and growth of the vegetative organs.

The structure of the aerial part's biomass is presented in Table 2.

Table 2

Structure of the aerial part's biomass at vine under the influence of the genetic and edaphic factor (Forest Brown Soil) Oradea

Variety name	Biomass of aerial part, kg./ha			
	offshoot	leaves	grapes	total
Riesling italian	3 846	4 166	14 743	22 755
Mustoasă de Măderat	4 269	3 307	15 700	23 276

Mustoasă de Măderat variety has a production that represents 67% of the aerial part's biomass.

The energetic productivity accomplished by the vine was calculated having in view the elements with an energetic role that form the grape crop and the energy necessary to their elaboration. In table 3, the energetic productivity is presented for the two varieties of vine found in Bihor viticultural area. By assessing the energetic efficiency as a report between the energy seen as "output" and the consumed energy seen as "input" it results that it has more than one values both for Riesling italian and Mustoasă de Măderat.

Table 3

The energetic productivity for the main varieties of vine under study in Bihor viticultural area

Variety	Grape Production kg./ha	Content in sugars g/l	Energetic productivity, calories	
			per tone of grapes	per ha.
Riesling italian	14 743	192,6	920 000	$1,36.10^{10}$
Mustoasă de Măderat	15 700	168,3	840 000	$1,32.10^{10}$

The possibility of expressing in measurable units the consumption of energy necessary for the realization of the grape crop and for the realization of the final energetic result allow us to highlight the measures that have to be applied in each ecosystem, in order to increase the degree of converting the solar energy into chemical energy and to decrease the consumption of energy.

CONCLUSIONS

1. For Bihor viticultural ecosystem, the coefficient of converting the solar energy into chemical energy stored in grapes has values ranging from 0.49% to 1.13%.
2. The biomass of the aerial part is accumulated on the vine step by step, altogether with the formation and growth of the vegetative organs.
3. The crop of Mustoasă de Măderat variety represents 67% of the aerial part's biomass.
4. The energetic efficiency seen as a report between the accomplished energy (output) and consumed energy (input) presents more than one values for both varieties under study.
5. The possibility of expressing in measurable units the consumption of energy necessary for the realization of the grape crop and for the realization of the final energetic result allow us to highlight the measures that have to be applied in each ecosystem, in order to increase the degree of converting the solar energy into chemical energy and to decrease the consumption of energy.

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SOME ASPECTS OF INTEGRATED CONTROL OF PESTS AND DISEASES AT VINE

CHEREGI V.

Key words: treatment, biotechnology, biopreparations, integrated control

SUMMARY

For the efficient control of pests and diseases in the vineyards, during the vegetation period 6 – 7 treatments are applied, mostly with chemical insecto-fungicides toxic for the useful fauna within the viticultural ecosystem, presenting some pollution risks of the grapes and wine.

The solution for the removal of these shortcomings from the viticultural practice is represented by the integrated protection which harmoniously combines the results of the physical, chemical, agro-phyto-technical, biological means of control and which have as an objective the reduction to minimum of the number of treatments.

The present paper has in view the biological control of the grey rot of the grapes with Trichodex 25 WP, and of the grapes' moth by using the biopreparations and sexual synthetically pheromones**.**

In comparison with the chemical control of pests and diseases, the biological control presents the following advantages: removes the toxicity risks, reduces the risk of environmental pollution, reduces the risk of residues in the viticultural products, removes and reduces the negative influence of the chemical substances upon the useful organisms, etc. As disadvantages we can mention: a low biological efficiency, oscillator efficiency, the necessity of some ecology and biology knowledge, etc.

INTRODUCTION

For the efficient control of pests and diseases in the vineyards, during the vegetation period 6 – 7 treatments are applied, mostly with chemical insecto-fungicides toxic for the useful fauna within the viticultural ecosystem, presenting some pollution risks of the grapes and wine.

The solution for the removal of these shortcomings from the viticultural practice is represented by the integrated protection which harmoniously combines the results of the physical, chemical, agro-phyto-technical, biological means of control and which have as an objective the reduction to minimum of the number of treatments.

To accomplish this objective we need to have in view the following principles:

- to establish the optimal moment for the treatments application, according to the local climatic conditions in correlation with the biology of the pathogen agents, of the pests and of the plant phenology;
- to apply the treatments according to the economical damage threshold.

- To use some chemical products as toxic as possible, with the possibility of being associated, able to control in the same time more pathogen agents and pests;
- To promote methods of biological control methods for pests and diseases;

The present paper focuses on the biological control of the grey rot of grapes with Trichodex 25WP, of the grapes' moth by using the biopreparations and sexual synthetic pheromones.

MATERIALS AND METHOD

a. The biological control of the grey rot of grapes with the microbiological product Trichodex 25 WP.

The usage of Trichodex 25WP in the biological control of the grey rot of grapes was decided due to its effect of diminishing the attack of *Botrytis cinerea.*

As a control scheme was the execution of treatments with this product at moments B, D in alternation with the chemical antibotrytic products by the help of which there were executed the treatments at moments A and C.

b. The biological control of the grapes' moth by using the biopreparations based on *Bacillus thuringiensis*.

Dipe 2X and Biobit-Forey 48S are included in this group of biopreparations.

The treatments were applied by sprayings at warnings for all the three generations of grapes' moth and the biological efficiency was established through a scale from 0 to 6.

c. The biological control of the grapes' moth by using the biopreparation based on *Sitotroga cerealela*.

The experiment was made by fixing on the vine's leaves petiole of some pieces of cardboard of small dimensions (4 – 6 cm) on which there were stuck 1000 eggs of *Sitotroga cerealela*. These eggs are paralyzed in a proportion of 95-100% by the wasp *Trichogramma embryophagum*.

To establish the optimal period of placing the launchers, there were used some synthetically and sexual traps of Atrybot type containing pheromones. This period is after 2 or 3 days after the maximum of the flying curve of the male butterflies for each of the three moths generations; the second period of launching is at a distance of 7 days from the first one.

The dosages used were of about 50 to 100 and 200 wasps/ha.

d. The biological control of the grapes' moth by the help of some traps containing sexual synthetically pheromones.

There were made some observations upon the attack frequency of moths after 3 weeks after the maximum of the flying curve and it was noticed the attack on the inflorescences and grapes by using and untreated witness.

MATERIALS AND DISCUSSIONS

a. The biological control of the grey rot of the grapes with the microbiological product Trichodex 25 WP.

Trichodex WP is an moisten powder that contains conidia of *Trichoderma* and actions after the foliar powdering by consuming the natural nutrients secreted by the plant tissues necessary for the germination of *Botrytis* pathogen.

With this product the grapes grey rot (*Botrytis cinerea*) can be controlled, a non-toxic product for man and animals and the chemical residues from grapes are reduced. It is applied in dosages of 2 kg/ha with a water volume of 500-1000l/ha.

Good results of this product can be obtained when it is used alternatively with the chemical botrytic products, such as: Ronlan, Rovral FL, according to the following scheme:

- Trichodex 25WP applied in B and D stages;
- Chemical botrytic products applied in A and C stages.

b. The biological control of the grape's moth with biopreparations based on *Bacillus thuringiensis*. Dipel 2X and Biobit (Foray) are included in this group of biopreparations. These biological insecticides are under the form of moisten powder and their active ingredient is *Bacillus thuringiensis*.

Bacillus thuringiensis is an entomopathogen microorganism, an aerobic bacillus that forms spores.

Products based on B.t. act exclusively through ingestion, fact that is specific to the *Lepidoptera* larvae which stop feeding a few hours after the ingestion, and they can't produce anymore damages to plants. The death of the moths takes place the next day after the ingestion.

These products don't act upon the eggs, chrysalis and adults.

The best results are obtained when the products are applied to the young larvae in the following doses: Dipel 2X – 0.5 kg/ha and Biobit – 1.5 l/ha. These products are compatible and they can be associated with almost all the products used in plant protection.

c. The biological control of grape moth by using the biopreparations based on *Sitotroga cerealela*.

One of the used preparations that gave good results was Trichomed when it was applied in doses of 100,000 wasps/ha at a single generation of moths. When the frequency of attack exceeds 20% it is applied the dose of 200,000 wasps/ha.

d. The biological control of the grape moth by the help of traps with sexual synthetic pheromones.

The Atrabot traps with sexual synthetic pheromones represent a biotechnical means by the help of which the warning upon the moment of control treatment application as well as the direct control can be accomplished.

The warning upon the treatments application can be made by monitoring the flying curve of the butterflies by establishing that they can be applied in 3 days

after the maximum of the curve. The treatments will be applied only in the plots where the economical damage threshold is of 100 butterflies / trap / week.

CONCLUSIONS

1. In comparison with the chemical control of pests and diseases, the biological control presents the following advantages:
   - it reduces the risks of air, water and soil pollution;
   - it removes or reduces the residues from the viticultural products;
   - it doesn't alter the useful entomofauna;
   - it isn't phytotoxic;
2. The biological control of the vine pests and diseases also presents disadvantages, such as:
   - problems regarding their storage;
   - low or oscillator biological efficiency;
   - a poor mechanization of applying animal eaters
   - It needs ecological and biological knowledge;

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THE PROGNOSIS, WARNING AND CONTROL OF THE MAIN PESTS AND DISEASES AT VINE IN DIOSIG VINEYARD

CHEREGI V., BURESCU P.

Key words: vineyard, pathogen agents, diseases, pests.

SUMMARY

The viticultural plantations within Diosig vineyard are annually exposed to attacks of different pathogen agents and pests. The number, frequency and intensity of their attack are different according to the climatic conditions, the cultivated variety of vine and the circulation of the viticultural sowing material.

There have been studied the causes of the appearance, evolution and spreading of the main pathogen agents, such as: *Plasmmopara viticola*, *Uncinula necator*, *Botriotina fukeliana*, *Botrytis cinerea*, as well as of the following pests: *Lobesia botrana, Boarmia rhomboidaria*, *Panonychus ulmi*, etc.

For Diosig vineyard, there are recommended 3-8 treatments for blight, 4-8 treatments for mildew and 3 treatments for the grey rot of the grapes, according to the climatic conditions.

INTRODUCTION

Diosig vineyard includes the viticultural centres: Diosig, Oradea, and Sâniob – Marghita. The viticultural plantations within Diosig vineyard are annually exposed to attacks of different pathogen agents and pests. The number, frequency and intensity of their attack are different according to the climatic conditions, the cultivated variety of vine and the circulation of the viticultural sowing material.

The main factor that conditions the appearance and evolution of the pathogen agents and pests is the climatic one. This is why an important link in the process of integrated control is represented by the establishment of the relationships between the climatic conditions and the appearance of the pathogen agents. The protection measures for vine are applied according to the specific conditions existent in each viticultural centre.

MATERIALS AND METHODS

The observation upon the frequency, evolution and the spreading of the main pests and diseases of the vine, according to the environmental conditions were made in the period 1996-2000. The meteorological data were recorded at Oradea Meteorological Station.

According to these data, there was monitored the evolution of the following fungi: *Plasmopara viticola, Unccinula necator, Botriotina fuckeliana, Botrytis cinerea* as well as of the pests: *Lobesia botrana, Boarmia rhomboidaria* and *Panonychus ulmi*.

In order to make prognosis and give warnings, there have been made some phenological and pathological observations during the vegetation period.

The control treatments were made just when warning, with M.S.P.P. 3x 300. There have been made observations upon the attack of the leaves and bunches of grapes making random sampling for the main varieties within the production plots. These observations have been made both before and after the application of treatments.

The appearance and evolution of *Plasmopara viticola* was monitored in the plots with high humidity, on the low areas, that is in places where there is a tendency of getting infected.

To identify the primary infections there have been chosen warning vine logs from different varieties, having in view the dynamics of the offshoots growth, the appearance of new leaves from one treatment to the other.

The evolution of *Uncinula necator* was monitored in a plot cultivated with Mustoasă de Măderat.

The sequence of generations was monitored according to the daily average temperature, calculating the cumulated coefficient necessary for the development of a new generation in April- August.

Botritina fuckeliana was monitored for almost all the varieties, the treatments being made at warning, according to the climatic conditions in correlation with the phenology of vine.

The appearance and evolution of *Lobesia botrana, Boarmia rhomboridaria* and *Panonycus ulmi* were monitored through random samplings, recording the frequency and intensity of the attack; the attack degree was calculated on its basis. (G.A. %).

The climatic data of the studied years are found in Table 1.

It is noticed that 1996 and 1999 are characterized by heavy rains, providing conditions for the appearance and evolution of blight and grey rot infections.

1998 and 2000, having less precipitation, and high average temperatures during the vegetation period determined favourable conditions for the mildew infections and for the evolution of pests.

In 2000, the absolute minimum of –18.4°C reduced the biological reserve of the main diseases and pests. The absolute maximum, during the vegetation period, of 36.1°C (1996) and of 37.1°C (2000) influenced the evolution of pathogen agents.

RESULTS AND DISCUSSION

The favourable conditions for the appearance of the primary infections in Diosig vineyard for *Plasmopara viticola*, are created starting with the first decade of May, and at the end of April when the first spots appear. The number and intensity of blight differ, thus, in the years when the precipitation were lower (year

2000), the number of infections was less in comparison with 1996, when having more precipitation, there were recorded 24 of infections.

It is recommended the application of 3-8 treatments during the vegetation period.

Table 1

Climatic data recorded at Oradea Meteorological Station (1996-2000)

Crt. No.	Climatic elements	Years					Mean 1996-2000
		1996	1997	1998	1999	2000	
1.	Total of active temperatures, ^{0}C	3290	3100	3375	2998	2971	3146,8
2.	Total of real temperatures, ^{0}C	1535	1587	1591	1339	1408	1492
3.	Average temperature of the air during the vegetation period, ^{0}C	16.1	19.6	18.9	17.1	18.2	17.9
4.	Absolute maximum value of the air, ^{0}C	36.1	34	35.8	34.2	37.1	35.5
5.	Absolute minimum value of the air, ^{0}C	-14.1	-12.3	-13.0	-13.3	-18.4	-14.2
6.	Total of precipitation during the vegetation period mm / m^2	480	350	335	374	295	366.8

Uncinula necator, in the climatic conditions of Diosig vineyard, has 12 generations during March-August, the developmental period for one generation being of 12 days.

The first treatment is recommended to be made at the end of April when the offshoots have 3-5 cm, the next treatments are made when warning and the others are associated with those for blight and grey rot.

Botriotina fukeliana and *Botrytis cinerea* find favourable conditions for evolution in the rainy autumns. (1996).

The application of safety treatments is recommended to be compulsory after blooming, the next one when compaction of bunches takes place and the third one before the grapes to get ripen.

Lobesia botrana within Diosig vineyard presents 3 generations a year, while *Boarmia rhomboidaria* has 2 generations a year: a dormant one and a summer one.

Panonychus ulmi, *Tetranychus urtice*, *Eotetranychus caprini*, *Eriophyes vitis* and *Phyllocoptes vitis* cause the biggest damages during the bud's unfolding till the blooming period.

It is recommended to apply 2-3 treatments for acaricides: the first one to be applied before the swelling of the buds and the others to be applied during the growth of offshoots.

CONCLUSIONS

1. According to the climatic conditions within Diosig vineyard there is recommended a number of 3-8 treatments for blight, 4-8 treatments for mildew and 3 treatments against the grey rot of grapes.
2. A good efficiency is achieved in the control of *Boarmia rhomboidaria* when applying a treatment with Oleocarbetox 3% during the vegetative dormancy while the larvae migrate to cords.
3. The control of acari is made according to the density of population. EPD limit is of 15 mobile forms on a bud when it is unfolding; 2-3 acari on a leaf while the offshoots grow till the leafing of the vine, and after blooming, the critical limit appears at a density of 4-6 acari on a leaf.
4. To increase the efficiency of the treatments as well as the economical efficiency, it is recommended the associated application of treatments only when warning.

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THE CUTTING AND GUIDING SYSTEM AT TWO VARIETIES OF VINE CULTIVATED IN SANIOB VITICULTURAL CENTER

CHEREGI V., BURESCU P.

Key words: fruitful, fruitful short cord, fruitful plug, cutting system

SUMMARY

The application of crop technologies with a maximum efficiency in viticulture is necessary due to the increase of the economical profit of this sector. It has in view the promotion of those technologies that lead to the diminution of the labour force consumes, without affecting the quality and quantity of the production. In this technologies there are included the cutting and guiding system applied to the vine.

In 2000-2002, an experiment took place within Saniob viticultural centre regarding the cutting in short plugs as a measure of rationalizing the cutting.

It was noticed that the cutting in short plugs of two eyes doesn't affect the quantity and quality of the production, in comparison with the cutting in plugs and short cords this type of cutting reduces a lot the phenomenon of removing the fruitful elements.

By applying this type of cutting, the work is simplified a lot and it can be made by unskilled staff leading to a productivity of work and to a higher economical efficiency.

INTRODUCTION

The application of crop technologies with a maximum efficiency in viticulture is necessary due to the economical profit increase of this sector. It has in view the promotion of those technologies that lead to the diminution of the labour force consumes, without affecting the quality and quantity of the production.

In this technologies there are included the cutting and guiding system applied to the vine. In 2000-2002, an experiment took place within Saniob viticultural centre regarding the cutting in short plugs as a measure of rationalizing the cutting. The reason to study these aspects was determined by the continuous diminution of the labour force from viticulture.

MATERIALS AND METHODS

The experiment was placed in the plantation of Saniob viticultural centre. The varieties under study were: Fetească regală and Mustoasă de Măderat grafted on Kober 5BB. The guiding form under study was that of simple bilateral cordon and the planting distances were of 1.8 / 1.2m.

The experiment was located on a plateau with a land slope of 2%, on an eumesobasic brown soil in a 17 years old plantation.

The variants have been arranged in a Latin rectangle of 6 x 4 type.

The cutting in fruitful plugs was studied in comparison with the cutting in fruitful plug-short cords. There were used 5 increases of the fruit load, this is: 2

extra increases and 2 less increases in comparison with the recommended load. The increases differ one from another with two eyes per m, this is 20,000 eyes/ha, the difference between the terminal increases being of 8 eyes/m, respectively 80,000 eyes/ha.

The experimental variants have been the following:

V1 – (Mt.) simple bilateral cordon cut in fruitful formation (plugs of 2 eyes + short cord of 4 eyes;

V2 – simple bilateral cordon cut in fruit plugs of 2 eyes with a recommended load reduced with 2 increases;

V3 – simple bilateral cordon cut in fruit plugs of 2 eyes with a recommended load reduced with one increase;

V4 – simple bilateral cordon cut in fruit plugs of 2 eyes with the recommended load;

V5 – simple bilateral cordon cut in fruit plugs of 2 eyes with the recommended load increased with one increase;

V6 – simple bilateral cordon cut in fruit plugs of 2 eyes with the recommended load increased with 2 increases;

RESULTS AND DISCUSSIONS

The parameters studied at Fetească regală are written in table 1 and those for Mustoasă de Măderat in table 2, respectively.

As regards the percent of offshoots started at Fetească regală, it is noticed almost the same number of eyes at V1 cut into short cords and V4 cut into plugs, with a better start for plug cutting, due to the fact that at a short cord only the eyes in a terminal position are started.

A better absolute fertility is noticed for V2 with the load diminished with two increases. As regards the relative fertility, the differences between the variants are small, because different fruit loads don't affect proportionally the fertility.

The absolute productivity presents a maximum value at the variant with a normal load cut in plugs, while the minimum values are present at V2 and V6.

The production, from a quantitative point of view, has the best results at V5, followed by V3 and V4. The worst results registered at V2, followed by V1 and V6.

As regards the accumulated quantity of sugar, the results are definitely in the favour of cutting in plugs. The maximum value is recorded at V6, followed by V3 and V4 and the minimum value at V1 (control).

The acidity has balanced values for all the variants.

Table 1

Parameters studied at Feteasca regala

Variant	Load of eyes and production of offshoots			Fertility and productivity				Quantity and Quality			Productivity
	eyes / vine log	offshoots/ vine log	%started offshoots	a.c.f.	r.c.f..	a.i.p.	r.i.p.	kg/ha	sugar, g/l	acidity g/l	z.o ./ ha
V1	35	29	82.3	1.47	0.93	138	91	14700	158	4.28	11.5
V2	26	23	88.5	1.50	1.00	131	88	14000	166	5.10	8.6
V3	30	27	89.9	1.48	0.99	135	93	15050	167	5.09	8.7
V4	35	31	87.9	1.49	0.96	145	97	15050	166	4.80	9.6
V5	39	35	89.2	1.48	1.01	140	99	15750	161	4.43	10.5
V6	43	38	89.0	1.49	0.99	133	89	14700	171	4.83	9.9

c.f.a. – absolute coefficient of fertility; c.f.r. – relative coefficient of fertility;
i.p.a. –absolute index of productivity; i.p.r. – relative index of productivity

Table 2

Parameters studied at Mustoasă de Măderat

Variant	Load of eyes and production of offshoots			Fertility and productivity				Quantity and quality			Productivity
	eyes / vine log	offshoots / vine log	%started offshoots	a.c.f.	r.c.f.	a.i.p.	r.i.p.	kg/ha	sugar, g/l	acidity g/l	z.o ./ ha
V1	35	29	82.3	1.12	0.58	203	105	13800	163	7.49	11.5
V2	26	34	91.0	1.19	0.63	199	115	14200	167	7.54	10.1
V3	30	28	92.4	1.21	0.61	201	109	13100	160	7.73	9.7
V4	35	32	90.8	1.21	0.61	199	107	15000	150	7.59	9.7
V5	39	35	89.9.	1.18	0.55	181	100	13700	151	8.08	10.9
V6	43	37	86.3	1.22	0.58	178	93	13700	158	7.73	10.8

c.f.a. – absolute coefficient of fertility; c.f.r. – relative coefficient of fertility;
i.p.a. – absolute index of productivity; i.p.r. – relative index of productivity

The work productivity expressed in days / man per ha is: the minimum productivity at V1, followed by V5 and the maximum productivity is at V2 followed by V3.

As regards Mustoasă de Măderat, the percent of offshoots started from the total number of eyes left on the vine log presents maximum values at V3 and V2. V1 which is cut in plugs and short cords presents the poorest start due to the polarity of cords which favour the start of the terminal eyes in comparison with the basic eyes.

The coefficients of absolute fertility present values ranging from 1.12 and 1.22. The relative fertility represents about 50% of the absolute one and it is not influenced by the length and number of fruit elements.

The maximum absolute productivity is recorded at V1 (control) and the minimum productivity is recorded at V6, followed by V5. The best grape production was achieved at V4 with 15 t/ha, followed by V2 with 14.2 t/ha, V1 with 13.8 t/ha and V5 and V6 with 13.7 t/ha and the worst production was achieved at V3 with 13.1 t/ha.

The quality of production supports the plug cutting with a reduced load (V2 and V3) and the plug and short cord cutting (V1).

The acidity with maximum values is present at V5 and V6.

The work productivity expressed in z.o. /ha is less at V1, which is cut in plugs and short cord, in comparison with the variants cut in plugs. A good productivity is recorded at V3 and V4.

CONCLUSIONS

1. The cutting in short plugs of 2 eyes doesn't affect the quantity and quality of the production in comparison with the cutting in plugs and short cord.
2. The cutting in plugs reduces a lot the phenomenon of removing the fruit elements.
3. By applying short cuttings, the work is simplified a lot and it can be realized by unskilled staff.
4. The work productivity is definitely superior for cutting in plugs.

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ANTIEROSION METHODS IMPROVEMENT OF THE SLOPPY LANDS RECLAMATION FOR VINE CROP

CHEREGI V., BURESCU P.

Key words: antierosion reclamation, terrace, slope

SUMMARY

At present, over 70% of the vine cultivated surfaces in Romania can be found in the elevated area, fact that ascertains that the vine exploits the sloppy lands at their best.

The reclamation of the sloppy plots is made in order set up new viticultural plantations and to control the soil erosion. There are 4 types of reclamations, such as: reclamation with the plantations of rows on the direction of contour line; with the plantations of rows on the contour line and the formation of microterraces in the next years; by terracing, having as a result some terraces of different widths according to the slope of the land; by orientating the rows on the line with the biggest slope, at the end of the rows being found some roads. In the last case, the mechanized works are realized by a swipe.

While the slope of the land increases, the work volume necessary for reclamation and preparation of land for plantation and exploitation increases, too.

The erosion on the high sloppy lands decreases while the terracing is accomplished.

The control of the soil erosion is made by planting the vine on the direction of contour line where the slope of the land ranges from 4 to 14%; when it ranges from 14 to 24% the terracing is realized.

INTRODUCTION

At present, over 70% of the surfaces cultivated with vine in Romania can be found in the elevated area, fact that ascertains that the vine exploits the sloppy lands at their best.

The reclamation of the sloppy plots is made in order to set up new viticultural plantations and to control the soil erosion.

MATERIALS AND METHODS

The dominant soil type present in the studied area was the brown forest soil.

The reclamation of plots and the modelling of lands were made as follows:

a. The vine rows were planted along the general direction of the contour line according to the exposition conditions, realizing a work length as long as possible in order to make profitable the mechanization and application of antierosion agrotechnical measures. This type of reclamation was practiced where the slope of the land was ranging from 4 to 14%.
b. Where the slope of the land was higher than 14% till 16%, it was realized the levelling and trenching of the hill side; then the roads were placed along the contour line and between the rows some vines were planted following the same

direction. In the first 3 years, by repeated works of the soil, a microterrace is formed on each interval.

c. On the lands with slopes ranging from 14 to 24%, they were terraced, accomplishing widths of the platforms in inverse proportion to the slope of the land. It has to be mentioned that the soil with a depth of 0 - 30 cm on the second terrace was pulled with a bulldozer on the first terrace and after that it was levelled. The second terrace was arranged, then the surface soil was pulled to the depth of 30 cm from the third terrace on the second one; after that it was levelled, and so on. The stripped terrace where no soil is pulled coincides with a road.
d. This type of reclamation is practiced on the lands with a slope higher than 24%. The roads are placed along the contour lines direction and the vine rows are orientated on the line with the highest slope and are worked mechanically with a swipe.

On the lands with a slope lower than 4%, because the danger of soil erosion doesn't exist, there are no soil control measures. The rows orientation is made north to south or according to the requirements imposed by the established irrigation method.

We mention that on the lands with a slope of 4-14%, the prevention and control of the soil erosion is provided especially by the orientation of the vine rows along the general direction of the contour lines being completed by some antierosional agrotechnical measures: weeding, buffer strips, inclined channels.

On the lands with a slope of 14 – 24% some terraces are realized and they can be of two types: terraces with horizontal platform, recommended in the vineyards with no sufficient precipitation (under 400 – 500 mm) and soils with high permeability; terraces with the platform inclined on the direction of slope, of maximum 5 – 6%, which provides the exhaust of the water in excess (it is recommended in the vineyards with precipitation over 500 mm).

The height of the gradient is limited to 1.5 – 2.5 with an inclination of 1/1 or 1/1.5 which will be grassed with perennial herbs.

The width of the platform is established according to the inclination of the slope, height of the gradient, distance between rows and degree of mechanization, having in view the realization of some terraces as long as possible and which have at least 3 rows of vine. The width of the platform has to be the multiple of the distance between rows.

$$L = D\,(n - 1) + (d_1 + d_2)$$

Where: L – width of the platform
D – distance between rows
n – number of rows on the terrace
d_1+d_2 – distance between the side rows and gradients.

The planting distances, density of vines per ha and the leading form used are presented in Table 1.

Planting distance, density of vines and ways of guiding them.

Reclamation system	Planting distance m	Nutritional surface/ Vine log	Vine density,/ Vine logs/ha	Distance report	Guiding form
Unterraced along the contour line	2.20 x 1.0	2.20	4545	2.20	bilateral cord on the stem
On contour lines through micro-terracing	2.80 x 0.80	2.24	4464	2.80	unilateral cord the stem
Terraces	2.00 x 1.20	2.40	4167	1.66	bilateral cord on the stem
Orientation of rows along the slope line	1.50 x 1.00	1.50	6666	1.50	unilateral cord on the stem

RESULTS AND DISCUSSIONS

By the reclamation of the land in terraces some losses take place (Table 2) ranging from 30 – 40%.

Ways of using the land according to the reclamation system

Land slope, %	Reclamation system	Useful width of the platform in m	No. of rows	Unproductive land of the reclaimed area, %
0 – 14	unterraced on the contour line	60 – 100	25 – 45	5 – 15
14 – 16	on contour lines by microterracing	80 – 100	29 – 35	15 – 23
15 – 24	terraces	9.5 – 17.5	4 – 8	34 - 42
over 24	by orientating the rows on the sloppy line	40 – 80	-	10 - 15

The soil erosion (Table 3) is influenced by the reclamation system and by the slope.

Annual average erosion of the soil according to the reclamation system.

Reclamation system	Width of the platform in m	Inclination of the platform %	Eroded soil m^3/ha/an
Unterraced on contour line	60 – 100	0 – 14	3.11
On contour lines through	80 – 100	12 – 20	22.87
Microterraces	9.5 – 17.5	0 – 6	2.47
Terraces	4 – 80	over 24	28.83
By orientating the rows along the slope line			

The volume of the eroded soil as a consequence of the heavy rains ranges from 2.47 and 28.83 m/ha/year, being considerably reduced in the plantations on the contour lines with a slope of up to 14% and in the plantations arranged in terraces. Erosion can also be stopped by ameliorative works, such as: soil mulching, practicing weed killing, intercrossed crops.

CONCLUSIONS

1. On the lands found on slopes higher than 4% some specific technologies of cultivation will be applied, in order to prevent and control the soil erosion as well as to preserve and increase its fertility potential.
2. According to the increase of the slope, the volume of necessary works for the reclamation and preparation of the land for plantation and exploitation also increases with 35 – 130%.
3. The process of erosion on the lands with a higher slope is diminished through terracing.
4. For the prevention of the soil erosion, the plantations of vine are recommended on the slopes of up to 14% with the rows orientated along the contour line in terraces with slopes of up to 24%.

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PERFORMANCES OF FETEASCĂ REGALĂ CULTIVAR ON FIVE TYPES OF PRUNING

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Key words: grapevine; types of pruning; yield; quality

SUMMARY

The effects of five types of pruning (multiple Guyot; Guyot with periodically renewed arms; Guyot on demi-high stem; Cazenave cordon; spur-pruned cordon) was followed for three years (2000-2002) in a plantation with 2,2/1,2 m distance.

The differences between types of pruning in terms of pruning weight, yield and sugar accumulation were lower as compared to the influence of the climatic conditions in the experimental year.

The dryness in 2002 favoured the diminishing of the vine vigour and increased sugar accumulations, bigger with 20-25 g/l than those of the previous years.

INTRODUCTION

A major objective of modern viticulture is to ensure a qualitative yield, reducing production costs.

Along with choosing corresponding cultivars, soils adapted to grapevine culture, a very important part is also to establish the types of pruning which have a favourable influence on the qualitative and yield potential [1; 2; 3; 4].

The paper proposes to study the contribution of different types of pruning to optimize vine's qualitative potential.

MATERIALS AND METHODS

On the experimental plantation of the Viticulture and Vinification Department from the Faculty of Horticulture Bucharest, there were studied for three years (2000-2002), five types of pruning (multiple Guyot; Guyot with periodically renewed arms; Guyot on demi-high stem; Cazenave cordon; spur-pruned cordon), using Fetească regală cultivar grafted on Kober 5BB rootstock, planted in 1995 at a 2.2/1.2 m distance. There were given uniform bud loads of 15 buds / m^2 at pruning.

Observations and determinations were also made regarding the vigour of the vines, appreciated on the wood quantity removed at pruning, the grape yield and the sugar concentration in the must at harvest.

RESULTS AND DISCUSSIONS

The experimental period was characterized by heavy dryness periods (table 1). Thus, between 2001 October and 2002 March, there were registered only 105.7 mm rainfall, on the account of a previous deficit in 2000, when the yearly amount of rainfall was only 379.1 mm.

The rainfall deficit and the numerous tropical days have influenced the growth, fructification and quality of the crop.

From the analysis of the influence of the pruning type on the pruning weight (table 2) we can notice very significant differences as compared to the average in 2000 at Guyot with periodically renewed arms, and distinctly significant differences at Guyot on demi-high stem. A very significant lowering in vigour was noticed at Cazenave cordon. It was registered an increasing vigour at spur-pruned cordon in 2001 and at multiple Guyot in 2002.

Following the influence of the type of pruning on the grape's yield (kg/vine), there are registered considerable differences from one year to another (table 3). Thus, in 2000, the types of pruning multiple Guyot, Guyot with periodically renewed arms, Guyot on demi-high stem ensured a plus in the yield as compared to the average, while Cazenave cordon and spur-pruned cordon had negative differences.

In 2001, Cazenave cordon and spur-pruned cordon registered positive yield differences, unlike the results obtained in the previous year. In contrast, negative differences as compared to the average, were obtained at multiple Guyot, Guyot with periodically renewed arms and Guyot on demi-high stem.

In 2002, Cazenave cordon and spur-pruned cordon had a comparable behaviour, ensuring considerable yield differences as compared to the average; again, there were registered negative differences at multiple Guyot and Guyot with periodically renewed arms.

Regarding the sugar accumulation in grapes at harvest, the highest values are registered in 2002 (table 4) as a consequence of the favourable climatic factors. This year, the differences are quite reduced, obtaining a significant plus in sugar at multiple Guyot.

In 2000 and 2001, the highest sugar accumulations were obtained at Guyot on demi-high stem, with distinctly significant differences and very significant, respectively. Cazenave cordon accumulates lower concentrations of sugar.

Table 1

Main Climatic Index in the Experimental Period (2000-2002)

Climatic Index	2000	2001	2002	Normal
Average year temperature (°C)	11.6	10.8	10.9	11.0
Useful thermic balance (°C)	1726	1544	1528	1657
Real heliothermic index (IHr)	3.19	2.51	2.15	2.44
Hydrothermic coefficient (CH)	0.67	0.82	1.06	1.00
Viticultural bioclimatic index (Ibcv)	13.7	10.4	7.4	8.67
Amount of yearly rainfall (mm)	379	492	606	589
Amount of rainfall during the growth period (mm)	251	283	353	370
Rainfall deficit (DP - mm)	270	129	122	99
Amount of sunshine hours (Σir)	1850	1629	1413	1557

Table 2

The Influence of the Type of Pruning on Pruning Weight (2000-2002)

Type de of pruning	2000			2001			2002		
	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	1.07	-0.01		0.99	0.03		0.36	0.04	*
Guyot with periodically renewed arms	1.37	0.29	***	0.92	-0.04		0.29	-0.03	
Guyot on demi-high stem	1.24	0.16	**	0.95	-0.01		0.38	0.06	**
Cazenave Cordon	0.66	-0.42	000	0.88	-0.08	0	0.27	-0.05	0
Spur- pruned cordon	1.07	0.01		1.08	0.12	**	0.29	-0.02	
Average	1.08	0.00	Control	0.96	0.00	Control	0.32	0.00	Control
	DL5% 0.,08 DL1% 0.12 DL0.1% 0.19			DL5% 0.07 DL1% 0.11 DL0.1% 0.16			DL5% 0.04 DL1% 0.06 DL0.1% 0.09		

Table 3

The Influence of the Type of Pruning on Grapes' Yield (2000-2002)

Type de of pruning	2000			2001			2002		
	Yield (kg/vine)	Difference (kg/vine)	Significance	Yield (kg/vine)	Difference (kg/vine)	Significance	Yield (kg/vine)	Difference (kg/vine)	Significance
Multiple Guyot	5.34	0.50	***	2.83	-1.27	000	3.01	-0.71	000
Guyot with periodically renewed arms	5.43	0.59	***	3.52	-0.58	000	3.05	-0.67	000
Guyot on demi-high stem	5.36	0.52	***	3.49	-0.61	000	3.80	0.08	
Cazenave Cordon	3.71	-1.13	000	5.46	1.36	***	4.00	0.28	***
Spur- pruned cordon	4.38	-0.46	000	5.20	1.10	***	4.75	1.03	***
Average	4.84	0.00	Control	4.10	0.00	Control	3.72	0.00	Control
	DL5% 0,14 DL1% 0,20 DL0.1% 0,31			DL5% 0,09 DL1% 0,14 DL0.1 % 0,21			DL5% 0,09 DL1% 0,14 DL0.1% 0.21		

Table 4

The Influence of the Type of Pruning on the Sugar Concentration (2000-2002)

Type de of pruning	2000			2001			2002		
	Sugar (g/l)	Difference (g/l)	Significance	Sugar (g/l)	Difference (g/l)	Significance	Sugar (g/l)	Difference (g/l)	Significance
Multiple Guyot	171.16	0.01		168.00	1.86		196.60	4.69	*
Guyot with periodically renewed arms	173.89	2.74		170.50	4.36		191.50	-0.41	
Guyot on demi-high stem	177.73	6.58	**	178.26	12.12	***	190.03	-1.88	
Cazenave Cordon	166.66	-4.49	00	151.56	-14.58	000	189.73	-2.18	
Spur- pruned cordon	166.33	-4.82	00	162.39	-3.75		191.73	-0.18	
Average	171.15	0.00	Control	166.14	0.00	Control	191.91	0.00	Control
	DL5% 3.07 DL1% 4.47 DL0.1% 6.70			DL5% 4.47 DL1% 6.51 DL0.1% 9.76			DL5% 4.66 DL1% 6.79 DL0.1% 10.17		

CONCLUSIONS

1. The climatic particularities of the experimental years have a more important influence on the vines' vigour, on the yield and the sugar accumulation, as compared to the adapted types of pruning.
2. In two experimental years (2001-2002), at Cazenave cordon and spur-pruned cordon, there were obtained larger grapes' yields and more reduced sugar accumulations.
3. Vines' vigour was affected by the rainfall; in 2002, the pruning weight was approximate 30% of the one registered in the previous years.
4. Dryness in 2002 favoured increased sugar accumulations, bigger with 20-25 g/l than those of the previous years.

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GRAPE VINE' S GROWTH-YIELD BALANCE INDEX AND INFLUENCE ON QUALITY

L. DEJEU, MIHAELA GEANINA BELEA, DIANA MEREANU

Key words: grapevine; yield/pruning weight ratio; growth-yield balance index; quality

SUMMARY

This study presents the influence of five pruning types (multiple Guyot; Guyot with periodically renewed arms; Guyot on demi-hight stem; Cazenave cordon; spur-pruned cordon) and of three bud loads (10; 15 and 20 buds/m^2) on the vine's growth-yield balance with Fetească regală cultivar for obtaining the best qualitative performances. It was performed between 2000 and 2002, on a plantation established in 1995, with a plantation distance of 2.2 x 1.2 m.

To optimize the yield quality, there have been recommended those pruning types and bud loads which assure a medium quantity of wood removed at pruning (0.47-0.60 kg/vine), a "yield/pruning weight" ratio between 4.0 and 5.5, as well as a „growth-yield balance" index of 16-19.

INTRODUCTION

Pruning applied to grapevine ensures a balance between growth and fructification, with the purpose of normal, qualitative yield, not so much influenced by the environmental conditions.

The qualitative improvement of the yield represents a major objective of contemporary viticulture. The latest research evinced the importance of pruning types and that of bud loads on the vine's balance and the yield's qualitative optimization [1; 2; 3; 4; 5; 6; 7].

This study has been proposed to determine the way in which the pruning type and the bud loads contribute to the maintenance of the vine's growth-yield balance and to ensure the highest qualitative parameters.

MATERIALS AND METHODS

The experiment was realised between 2000-2002 in the didactic field of the Viticulture and Vinification Department from the Horticulture Faculty, Bucharest.

The vineyard vas established in 1995 with the Fetească regală cultivar, clone 21 Bl, on the Kober 5 BB rootstok, at row and vine spacing at 2.2 and 1.2 m respectively.

Five types of pruning were studied: multiple Guyot (low training); Guyot with periodically renewed arms; Guyot on demi-high stem; Cazenave cordon and spur-pruned cordon.

Within each type of pruning there were three bud loads: 10; 15 and 20 buds/m^2.

Pruning weight (kg/vine), grape yield (kg/vine) and sugar (g/l) were determined. „Yield/pruning weight" ratios were calculated and then they were correlated with the sugar concentration in the must at harvest.

It was established also the "growth-yield balance index" (Maccarone G., and Scienza A., 1996), quoted by [7].

The "growth-yield balance index" represents the ratio between pruning weight x 100/grape yield + pruning weight, and evinces the percent contribution of the vegetative part to the whole production.

The data represents the average of the 3 experimental years.

RESULTS AND DISCUSSIONS

Correlating the values of "yield/pruning weight" ratio with the concentration in sugar, it was obtained a parabolic correlation represented by the equation in the figure 1. The presence of a distinct significant correlation ratio was found. The highest sugar accumulations were obtained at the ratio's values of 4.0 -5.5.

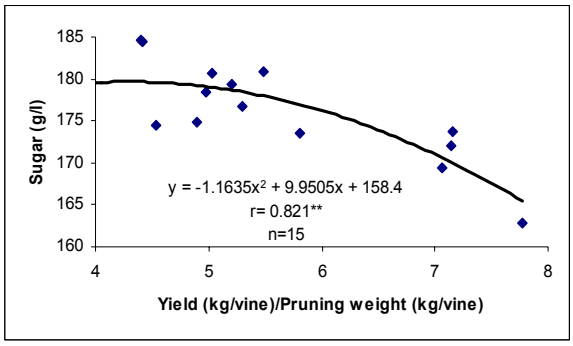

Fig.1 - Correlation between "yield/pruning weight" ratio and sugar concentration in grapes at harvest (2000-2002)

The data obtained is between the optimal values established by different authors: 2.28-4.30 [7]; 4.9-7.4 [2]; 3.2-6.8 [6]; 4.7-6.0 [5]; 2.0-7.0 [1].

Following to establish a relation between the vine's "growth-yield balance index" (GYBI) and the sugar accumulation in grapes, it was obtained a correlation presented in figure 2.

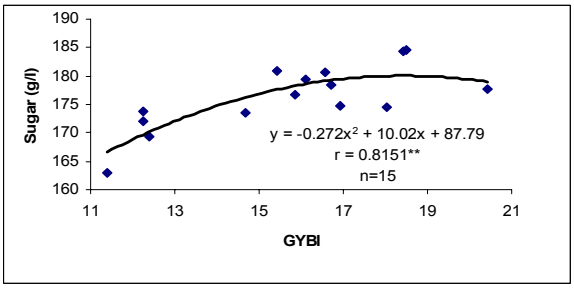

Fig. 2 - Correlation between vine's "growth-yield balance index" (GYBI) and sugar accumulation in grapes at harvest (2000-2002).

An increase in concentration of sugar was noticed, from 166 g/l to values like 11-12 for the „growth-yield balance" index, to 179 g/l, when this parameter's value is 18.

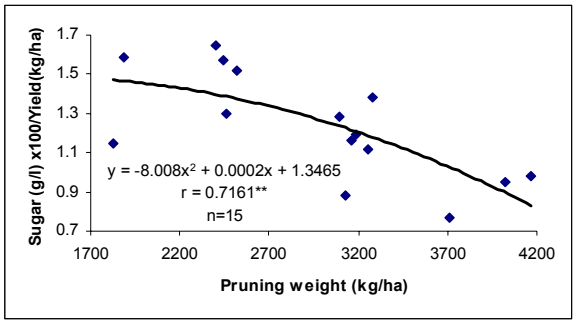

Fig. 3 - Correlation between pruning weight (kg/ha) and "sugar (g/l) x 100/ yield (kg/ha)" ratio (2000-2002)

This index evinces the percent contribution of the vegetative part of the vine on grapes' production; in the experienced conditions, its value was between 11 and 19, maximal values being favourable for sugar accumulation in grapes.

Establishing the type of relation between the pruning weight (kg/ha) and the "sugar (g/l) x 100/yield (kg/ha)" ratio, the regression represented in figure 3 was obtained. The maximal values of this ratio (1.4-1.6) which correspond to both quantitative and qualitative high yields were obtained under the conditions that, at pruning there were removed fewer quantities of wood (1 800 - 2 300 kg/ha, 0.47 - 0.60 kg/vine, respectively).

CONCLUSIONS

1. The types of pruning and the bud loads have modified the vine's growth and fructification, their yield and their quality.
2. The optimization of the vines' growth and fructification determines high yields under a qualitative and quantitative report.
3. With Fetească regală cultivar it was obtained an equilibrium of the wine when the "yield/pruning weight" ratio was comprised between 4.0 and 5.5, the "growth-yield balance index" reached values of 16 - 19, and the pruning weight did not go beyond 2300 kg/ha (0.60 kg/vine).

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THE INFLUENCE OF TEMPERATURE OVER FERMENTATION ACTIVITY OF SACCHAROMYCODES LUDWIGII STRAIN, ISOLATED FROM WINE

FELICIA DRAGOMIR

Key words: *Saccharomycodes ludwigii*, fermentation activity.

SUMMARY

Rarely sun on the grapes an in the fermentation grape juice or the wines, the yeast's which are from *Saccharomycodes ludwigii* species are characterized through the very big resistance to sulph dioxide, being this way specific to the grape juice kept with large doses from this antiseptic. It is considered the pathogen agent of sweet wines which challenge refermentation even they are very sulphites.

INTRODUCTION

This work presents the fermentation activity of the *Saccharomycodes ludwigii* strain isolated from white wine. The yeast isolated was included in the *Saccharomycodes ludwigii* species after the cover identification tests (morphological and physiological tests). The *Saccaromycodes ludwigii* strain was tested from the temperature resistance and osmotic pressure and was retained in yeast's collection of Microbiology laboratory (C.L.M.C).

MATERIALS AND METHODS

The biological material was represented by the *Saccharomycodes ludwigii* strain codified SL.B.M.1. The growth medium utilized was YMA (yeast's extract-malt extract-agar). The testing of temperature influence over fermentation activity of SL.B.M.1 was realized by using as medium the sterilized grape juice in autoclave. Strain insemination was done so it can be assured n x 10^9 cell/ml grape juice. The above mentioned was tested by the following temperatures 2-4°C; 18°C; 25°C; 35°C. The fermentation curves were traced on the base of metabolized sugar determination. In the same time with the fermentation activity of the SL.B.M.1 strains it was observed in addition the natural fermentation of the grape juice.

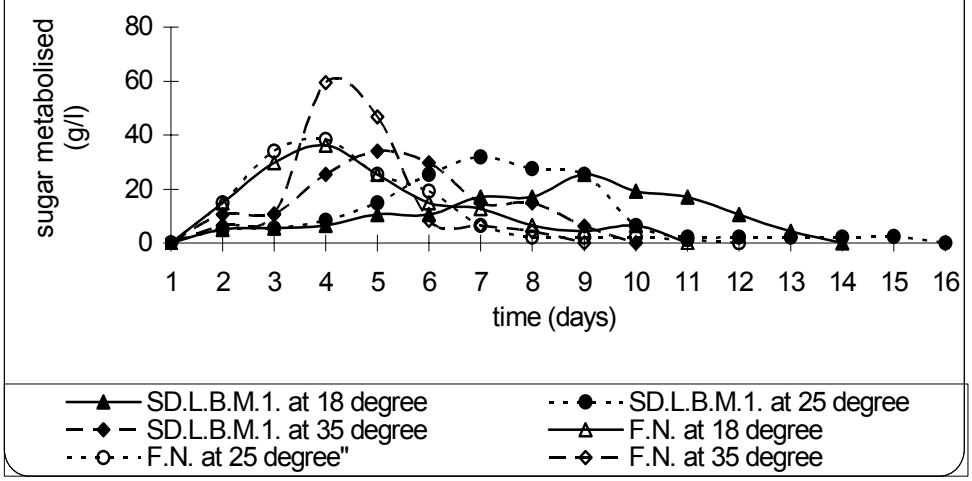
RESULTS AND DISCUSSIONS

At the 2-4°C temperature mentioned for 45 days the SL.B.M.1 strain didn't grow, this temperature affected negatively the fermentation capacity of the strain as will as viability, after thermo-stated for 10-12 days at 25°C the above mentioned strain didn't start the fermentation process.

Figure number 1 presents the SL.B.M.1 strain behaviour in the grape juice medium with a sugar concentration at 172.5 g/l, at the temperatures which

permitted the growth at the strain yeast (18, 25, 35°C), comparing with the natural fermentation.

Fig.1.The fermentative curves of the natural fermentation and with SD.L.B.M.1 at three temperature and 172.5 g sugar/l

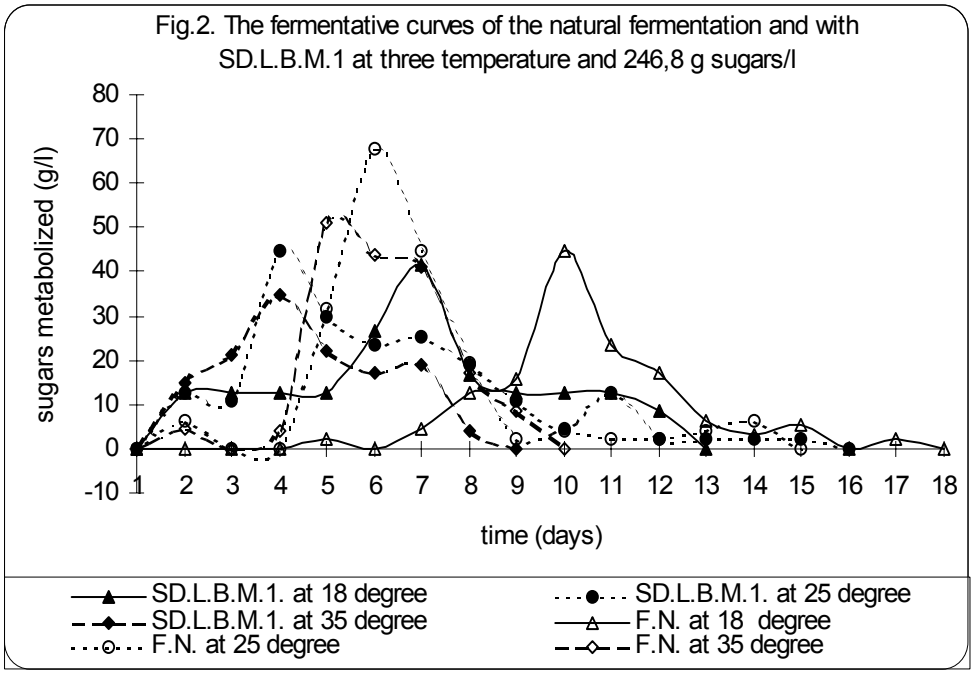


The temperature at 18°C permitted of the SL.B.M.1 strain to metabolize in six days from the insemination a nearby constant quantity of sugars. The maximum at metabolized sugars is registered after nine days from the beginning of the fermentation process. The duration at fermentation is 14 days, compared to natural fermentation which lasts 11 days.

At the temperature at 25°C the fermentation process starts after only two days from the strain insemination, maximum at metabolized sugar being registered after seven days from insemination (31.9 g/l). At a concentration at sugar 172.5 g/l, the strain SL.B.M.1 wasn't inhibited at temperatures at 30-35°C.

Figure number 2 presents fermentation curves at the strain SD.L.B.M.1 at a 248.6 g/l sugar concentration, at temperatures at 18-35°C. The growth at sugars concentration permitted to tested strain yeast to start the fermentation process after only a few hours, in the case at temperature 25-35°C and after 2 days in the case at 18°C temperatures.

The duration at fermentation is 9-16 days for the SD.L.B.M.1 strain, compared to natural fermentation which lasts 10-18 days (in the case of the 18, 25 and 35°C).

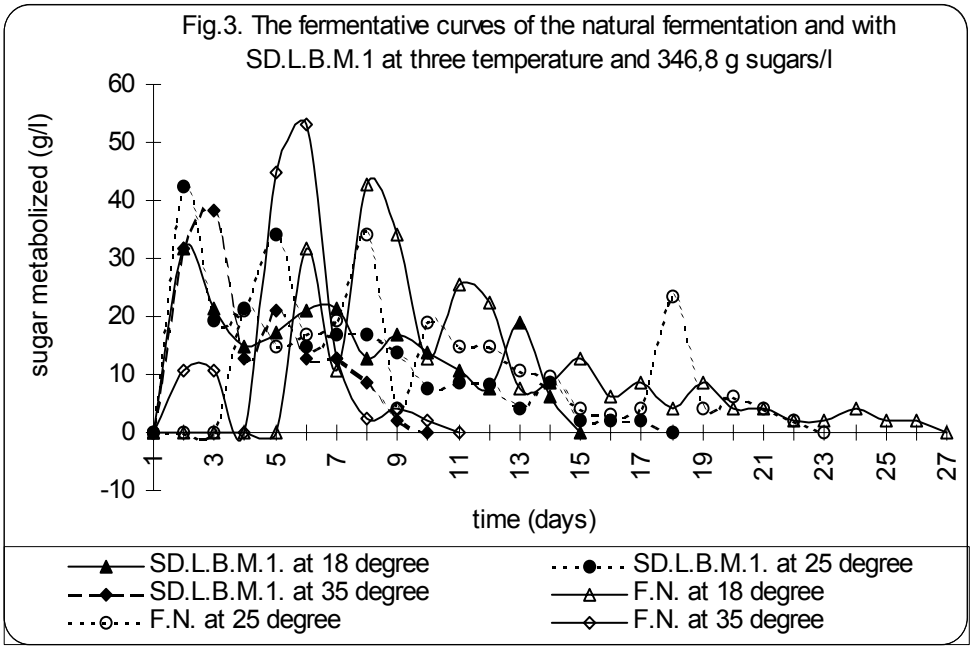


The maximum at metabolized sugars was registered in the case at 25°C temperatures which demonstrates that when the sugars concentration is higher, the SD.L.B.M.1 strain is inhibited at high temperatures.

A higher concentration at sugars 300 g/l stimulated at first hours the fermentative activity of the SL.B.M.1 strain which started the fermentation process very quickly at all tested temperatures (figure no. 3), this yeast species been recognized as the species which produces refermentation at sweet and sulphite wine.

Although it's registering numerous points at minimum of the fermentation curve traced for the temperature at 25 and 35°C, the fermentation activity at SL/D.B.M.1 strain is not inhibited. Maximum at metabolized sugars is recorded at temperatures at 25°C (42.7 g/l). And at this sugar concentration we observe that the temperature of over 35°C leads to the slowing of the fermentative activity.

SD.L.B.M.1 strain metabolized the sugars present in the medium 10 –18 days at those three temperatures tested, compared to natural fermentation which lasts 11-27 days.



CONCLUSIONS

1. SL.B.M.1 strain had slower metabolized the sugars at temperatures between 18-35°C, when the initial concentration in the medium was 172.5 g/l;
2. The growth at sugars concentration allow the intensification at fermentation activity at the SL.B.M.1 strain at temperatures between 18-25°C;
3. The temperature at 35°C leads to slower fermentation activity at SD.L.B.M.1 strain, when the initial concentration at sugar medium exceeds 250 g/l.

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PRELIMINARYS RESULTS CONCERNING THE EFFECT OF PHYSICS PROPERTYS IMPROVEMENT OF THE NOURISHMENT'S SORTIMENT WITH POLIACRYLAMIDS ON THE QUALITY OF WINE-GROWER'S MATERIAL

I.C. DUMITRIU, S. CHIVULETE, M.I. POPESCU, MARIA NASTAC-CURTESCU, STANCU R., MONICA FLEANCU, ADRIANA COSTESCU

Key words: polyacrilamids, Fitpol-C, physics and hydrophysics properties, hydrical stress

SUMMARY

The utility of Fitpol-C polyacrylamids in the purpose of the decrease of hydrical stress in substratum of rooted is effectuated for:
- Improvement of the physic properties of the nourishment's mixtures;
- Diminish the damps number both in the plaiting materials, both the finalize plantation;
- The stimulation growth and the plants development grow;

At the saint time, the impact of Fitpol-C is presents both in improvement hydrophysical and physical property of the nutritive substratum through:
- The diminish of bulk density (DA), in correlation with growth Fitpol C dose;
- The growth hydrolytic conductivity (K) concomitant with the growth of dose/plant;
- The resistance diminish to penetration (RP) is correlated directly and positive with the bulk density values, together with grow Fitful-C dose.

INTRODUCTION

This hydrophoil polymer was realized in 1984 like a polyacrylamid reticulate (ROMACRIL AGR), showing the follow characteristics features (Dumitriu I.C, 2002):

- ✔ granule with Ø de 2 - 4 mm;
- ✔ contend in active substance = cca. 90-95 %;
- ✔ absorbs 80 ml water/1 g produce;
- ✔ density = 0.3-0.7 g/cm^3;
- ✔ term stability –20^o C and + 120^o C;
- ✔ it is not degraded in time;
- ✔ is highly reduced almost non-existent.

The effect of Fitpol-C on the hydrophilic and physics properties of the nutritive substratum both and on the soil (when the wine grower's material is plants in nutritive flowerpot and field at the final place) was impasse by (billing): (Dejeu L. and

colab., 1997; Kelps C. and colab., 1989; Drăghici Elena, 1998; Dumitriu I. C. and colab., 2000; Dumitriu I. C. and colab., 2001):

- compaction is diminish by the lover of bulk density and resistance to penetration values (RP);
- the growth permeability was quantify by the height values of the conductivity hydrolytic (K);
- the number of the wets is diminish by the growth of the storage site of water.

MATERIAL AND METHODS

➧ The main object:

- the improvement of physical properties of the rooted substratum;
- the diminishes of the wet number;
- the growth of the efficiency of the STAS plants,

➧ Experimental factors:

a. Systems of plantation: a1-pvc flowerpot; a2-billow; a3-cubic nutritive substratum;

b. Fitpol-C doses: b1 = 0; b2 = 0.5; b3 = 1; b4 = 1.5;

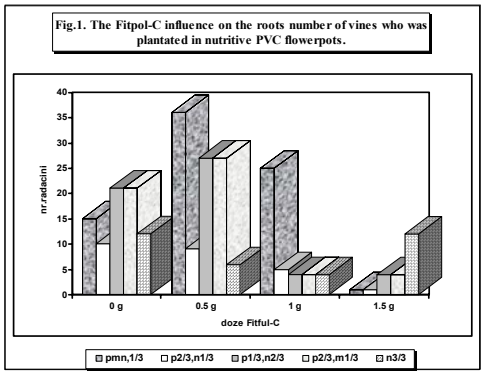
c. Nutritive mixture in PVC flowerpot: (P= earth; M= manure; N= silt)

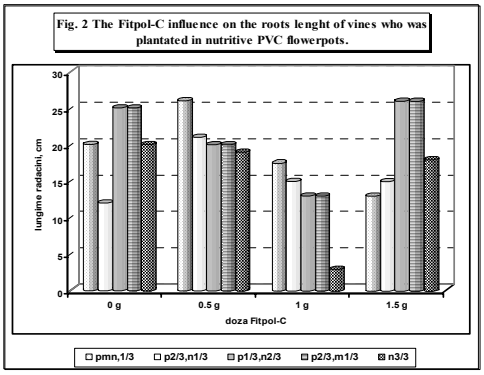
c1 = P.M. 1/3; c2 = P2/3 N1/3; c3 = P1/3 N2/3; c4 = P2/3 M1/3; c5 = N3/3;

PRELIMINARY RESULTS AND DISCUSSION

The bigger number of cutting of wine branch root and of the plants from PVC flowerpot was registered at P 2/3, N 1/3 where 0.5 g. Fitpol-C / plant is added (Fig. 1).

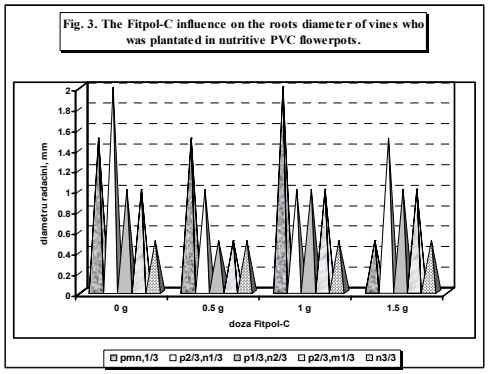
The Fitpol-C influenced positively the length of the root at doses 0 g, 0.5 g and 1.5 g/plant, from this results that the forts two doses were economic and they can be outlasted in production the big doses wasn't profitable by financier aspect (Fig. 2).

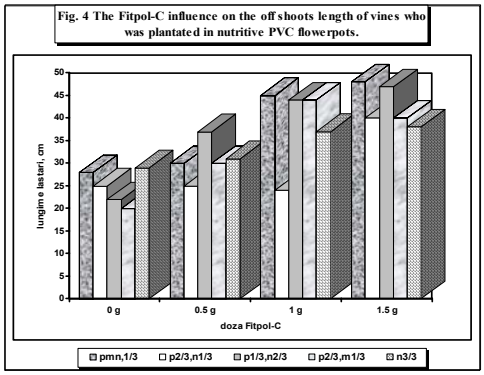


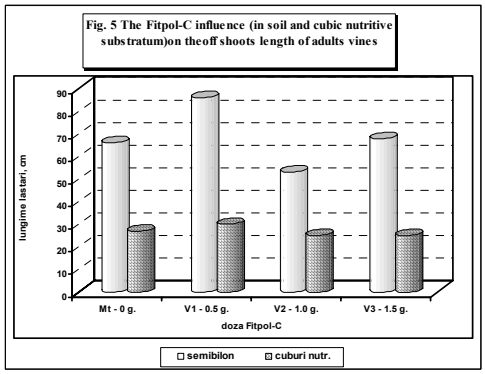


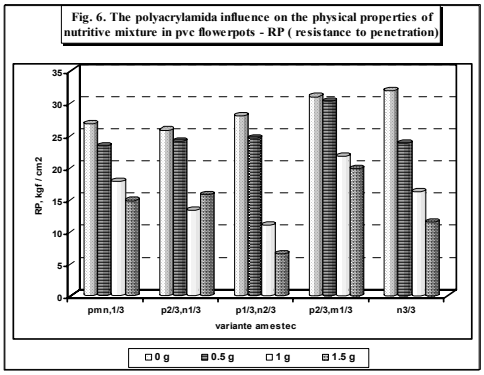
The diameter of roots wasn't influenced significant by Fitpol-C, the difference is put in evidence by the type of nutritive substratum, the bigger values was faint again at the types: PMN 1/3, and P2/3 N1/3 (Fig. 3).

The offshoots length was correlated directly and positively both with the Fitpol-C dose, both with nutritive substratum the values was specific for the 1-1.5 g., doses at PMN 1/3, P1/3 N2/3 and P2/3 M1/3 (Fig. 4).





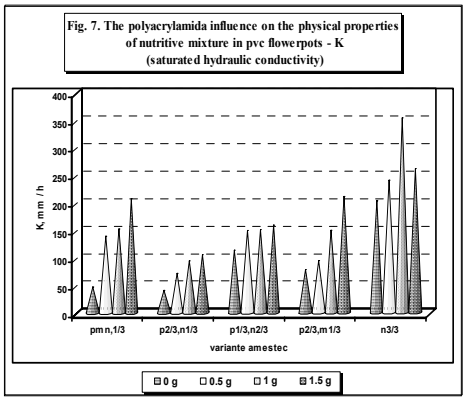




In case of plantation on the billow and in cubic nutritive substratum the off sooths length presented the bigger values (over 70 cm) at doses 0.5 g/plant on billow, but at nutritive cubic substratum wasn't the significance differences between the experimental doses from nutritive mixtures;

The polyacrylamide effect on the physical properties of nutritive mixtures from PVC flowerpots is visible, that is positive correlated with the growth of Fitpol-C; dose; the RP diminished in the some time with the growth of Fitpol-C dose / plant (Fig. 6).

The K was positively influenced by the experimental Fitpol-C doses, the bigger values of this indicator correlated (directly and positively) with the Fitpol-C doses. (Fig. 7)



PRELIMINARY CONCLUSION

The improvement of physics properties of rooted substratum of eye cutting of wine branch leads to the improvement of wine-branch quality, like the follow aspects:

- realization an hardly roots system;
- growing on superior off shoots number;
- guaranteed a favourable foliate surface that generated big leaf photosynthetic intensity.

The polyacrylamide impact on nutritive substratum is favourable to the wine root system because it ensure a significantly improvement of the physics properties, like RP and K.

Technically and economically aspect, the best results was at 0.5 g Fitpol-C / plant dose.

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THE STUDY OF CALLUSOGENESIS ON GRAPEVINE UNDER GAMMA RADIATION USING THE CORRELATION CURVES BETWEEN CALLUS MASS AND PHYSICAL FACTORS

DANIELA GIOSANU

Key words: gamma irradiation, "in vitro" culture, callus, grapevine, correlation curves.

SUMMARY

The aim of this paper is to study the influence of physics factor (gamma radiations) upon grapevine callusogenesis by using the correlation curves between callus mass that has been obtained and dose of irradiation.

The research was performed on four grapevine variety: Cabernet-Sauvignon, Avgustovski, Negru de Ialoveni and Muscat de Ialoveni. The explants were inoculated on a Murasige Skoog (1962) basal medium supplemented with optimal concentrations of AIA and BAP and gamma irradiated from the first day, for each explant, in different doses; we also used a not-irradiated control lot.

The interpolare curves were, in all the cases, polinome of three degree. Their equations have significant differences between the control and the other experimental lots. One noticed a negative correlation between the radiation dose and the callus mass that has been obtained.

INTRODUCTION

Although initially, there was a theoretical field, the "in vitro" culture method represents a necessary instrument in agriculture, biology and medicine. In this way it is possible to obtain new biologic forms, of high productivity, resistant to many diseases or to environmental unfavourable conditions.

The regeneration and the study of the manifestation degree of the same mutation on the level of the entire plant, proceeded from "in vitro" culture, could lead to the detection and selection of the same agronomical potentially useful mutants.

The use of gamma radiations like physics mutagen agent determines the possibility to obtain new genotype, with morpho-physiological modifications. These mutations lead to the creation of new forms, with a great interest for amelioration. For that reason, the effect of gamma radiations on callusogenesis is very important, like a start point of development and evolution plants.

The purpose of this paper is to present the action of gamma radiation on the evolution of callusogenesis in grapevine culture.

MATERIALS AND METHODS

In order to study the influence of gamma radiations upon the induction and development of callus, we used for research four different sorts of grapevine: Cabernet –Sauvignion (well-known, a traditional sort from France, a sensitive

species to both drought and frost) and new sorts: Avgustovski, Negru de Ialoveni and Muscat de Ialoveni (created by National Institute of Wine, from Chisinau, Republic of Moldavia). The experimental sorts are for wine production, except the Avgustovski sort, which is universal.

The experiments were done in The National Institute of Genetics, Chisinau (Republic of Moldavia).

One of the most important steps in technology of in vitro culture is the election and preparation of convenient culture medium.

One used basic culture medium Murashige Skoog (MS-1962), supplemented with 2.25 mg/l BAP, 0.2 mg/l AIA and 2 mg/l 2.4 D (diclorphenoxiacetic acid). Internodal segments (3-4 mm) were inoculated on this medium. Culture was incubated in a growing chamber, at 26°±2°C temperature, 16 hours daily lighting.

Gamma irradiation was made separately from the first day, for each explant in doses of 1Gy, 5Gy, 10Gy and 50 Gy. The source of the gamma-radiation was Co^{60} and the irradiation was done evenly, in one phase (whit the RHKM-20 device). We also used a not -irradiated (control) lot.

RESULTS AND DISCUSSIONS

It was remarked that the optimal medium for callusogenesis was Murashige Skoog (MS-1962), supplemented with 2.25 mg/l BAP, 0.2 mg/l AIA and 2 mg/l 2.4 D (diclorphenoxiacetic acid). For this medium, the percent of survive and development, after gamma irradiation, was higher (90%), comparative with other experimental lots (50 – 60 %) with different concentrations of BAP and AIA.

The irradiation of explants with gamma radiations determined the apparition of some differences between irradiated lots and the control (non-irradiated). These differences regard the form, the colour and the type of callus formatted. It was observed that the lower doses (1-5 Gy) were stimulating, determining an early initialization of callus, a better development and even differentiation processes sometimes. The embryogenesis points appear from 1 Gy, but from 10 Gy and up (50, 100 Gy) one remarks light necrozations or the stopping of evolution of callus. For this reason, in the following experiences was studied the effect of gamma radiations in doses of 1-5 Gy.

The gamma radiation treatment shows that Negru de Ialoveni and Avgustovski sorts are characterized by a higher ability to forming the callus, comparative with the others two studied sorts: Cabernet-Sauvignon and Muscat de Ialoveni. (See photo 1).

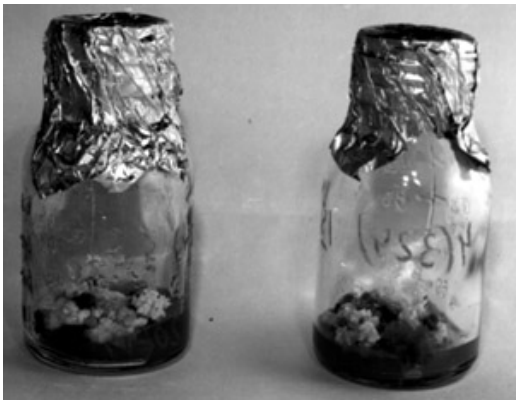

Photo1: The callus obtained after 3 Gy gamma irradiation for Negru de Ialoveni variety, comparative with the control (0 Gy)

An important step in our investigations was the influence of lower doses of gamma radiation (1-5 Gy) on callus mass (table 1).

Table 1

The variation of callus mass with gamma radiation dose

Gamma dose (Gy)	Medium mass (mg)			
	Cabernet - Sauvignon	Muscat de Ialoveni	Avgustovski	Negru de Ialoveni
0 (control)	129.03	120.08	120.42	121.78
1	128.79	118.38	119.23	122.32
2	119.61*	116.18	118.41	120.38
3	117.56***	115.48*	116.80*	117.85
4	117.21***	116.35	116.09*	116.47*
5	116.01***	115.17*	115.71**	115.84**

Note: *, **, *** - are significant differences for DL ≥ 5 %, DL ≥ 1 %, DL ≥ 0.1%,

Table 1 proved a negative correlation between callus mass and the irradiation dose; comparative with the control lot, the callus mass from the treated gamma lots is significantly diminished. But, the gamma irradiation determined an initialization of callus with 2-3 days before the callus forming from the non-irradiated lots.

In figure 1 the correlation between callus mass and gamma dose is represented, for each studied sorts. The correlation curves were polynomes of three degree. Their equations have significant differences between the control and the other experimental lots.

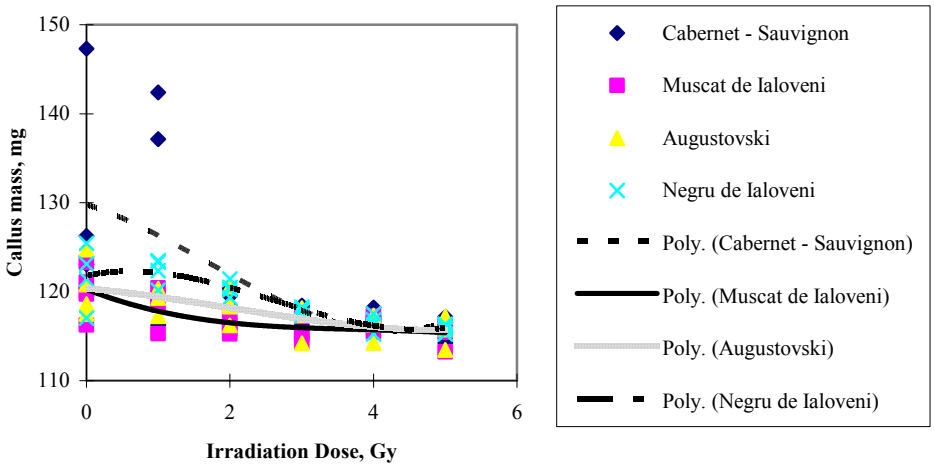

Figure 1: The correlation curves between callus mass and gamma dose

The lower doses were stimulated the forming callus process by the activation of metabolic processes, of membrane permeability and cell division. These experiences confirm the fact that a cell is more sensitive to gamma radiation if irradiation is done in an earlier stage of cellular division and the cell is less differentiated.

CONCLUSIONS

1. Different doses of gamma radiation demonstrated a selective influence upon the callusogenesis process from *in vitro* grapevine culture. It has been established that the efficient doses of the gamma radiations for the callusogenesis process are those of 1- 5 Gy, while the high doses (50 Gy and 100 Gy) are lethal;
2. The studied sorts of grapevine have a different answer to gamma treatment. For example, the Cabernet-Sauvignon variety has a relative lower reaction (38%) to gamma action; the Negru de Ialoveni variety was strong influenced by gamma radiations (74%);
3. After gamma treatment, the callus mass was diminished, but the callus initialization was earlier with 2-3 days, comparatively with control lot.

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THE ESTABLISHMENT OF THE ORIGIN FOR SOME AUTOCHTONOUS VINE VARIETES BY MULTI-VARIABLE STATISTICAL METHODS

ADRIANA INDREAŞ, MARINELA STROE,
LILIANA ROTARU, ALINA MĂRCUŢĂ

Key-words: varieties, vine, cluster analysis, main components analysis

SUMMARY

One has tried the origin establishment of some varieties belonging to the *Galbenă series* by using some statistical multi-variable methods. One has measured some mature leaf elements, established according to O.I.V. codes, counting 65 for 30 leaves of the 12 studied varieties. Out of the dendrograme analysis, one has determined strong links among varieties groups such as *Zghihară* and *Galbenă de Odobeşti, Alb de Moldova,* and *Cabasmă albă* as also *Bătută neagră* with *Alb românesc*. The only variety not linked to the others is Berbecel variety.

INTRODUCTION

Among the white wine autochthonous varieties, a special place is taken by the *Galbenă series*, out of which *Galbenă de Odobeşti*, *Galbenă verde, Zghihară de Huşi, Bătută neagră* and other varieties such as *Plăvaie.* When burgeons fall, all these varieties present a fluffy rosette and also a mature fluffily leaf (belonging to Proles Pontica) as lobelet for example *Galbenă, Zghihară, Plăvaie* present a whole leaf or three-lobeleted, the reddish of nervures distinguishes the first two varieties of the latter. As origin, they are spread in different vineyards from Oltenia and Moldova. In the present work, we propose a research using the main components analysis and the cluster one in order to determine the dependency among varieties which make up this series and later by DNA determination to establish exactly this dependency.

MATERIALS AND METHODS

One has researched a series of old varieties with the basic representative-*Galbenă de Odobeşti* variety which is cultivated only in Romania and in the coterminous areas. These varieties are: *Alb de Moldova, Alb românesc, Bătută neagră, Berbecel, Cabasmă albă and C. neagră, Cruciuliţă, Galbenă uriaşă, Galbenă verde, Plăvaie, Zghihară de Huşi.*

One has initiated the research with the idea of the kinship of the varieties expressed by similar morphological features (lobelet, the vilositty of the limb, the shape of petiole sinus, the nervures colour and other differences etc.). The cluster analysis is initiated by the basic concept of the distance among elements (cases) subjected to grouping and it allows the division of the studied varieties, in branches according to existent similitude or dissimilitude. The determinations have been

effected during 2002-2003, within the ampelographical collection of the viticulture and vinification department on 30 leaves (65 elements of each variety were measured. The ampelometrical analysed sizes of the vine leaf were: the length of the main nervures (N1, N2, N3, N4); the distance among the basis lateral sinus and the petiole point (U, O) the opening of the lateral sinus (SS, Si) and of the petiole sinus (SP); length (ALT) and the width (AN) of the limb; external contour of the leaf (ENS, ENM, ENI, NL); the internal contour of the leaf (DS1, DS2, DS); the angle between median nervure and the end of the inferior lateral lobelet (ABE); the angles among main nervures (A,B,C), the angle which defines the form of median lobelet; the reports between the lateral sinus basic and the nervures, the sinuses are propped up (UN2, ON3); the report between the length and width of the limb (L-A).

RESULTS AND DISCUSSIONS

In table no. 1 the values of concatenation index are found; showing the dissimilitude among the aggregated groups, one establishes:

-the closest varieties as leaf architecture were *Cruciulită* with *Galbenă verde* which have the value of dissimilarity index equal to 2.3078;

-the following variety which aggregates, being similar from architectural point of view with the other variety is *Plăvaie*, with a value of 4.6922;

The first group made of 4 similar varieties is *Cruciuliță, Galbenă verde, Plăvaie*, *Cabasmă neagră* (8.2575). The following group is made of *Cabasmă albă* and *Alb de Moldova.* (8.8179). The other one is represented by *Zghihară de Huşi* and *Galbenă de Odobeşti* (11.3084) Similar to the first group is *Galbenă uriaşă* (15.1026). Another group is made of *Bătută neagră* and *Alb romanesc.*

Table 1 The values of concatenation varieties

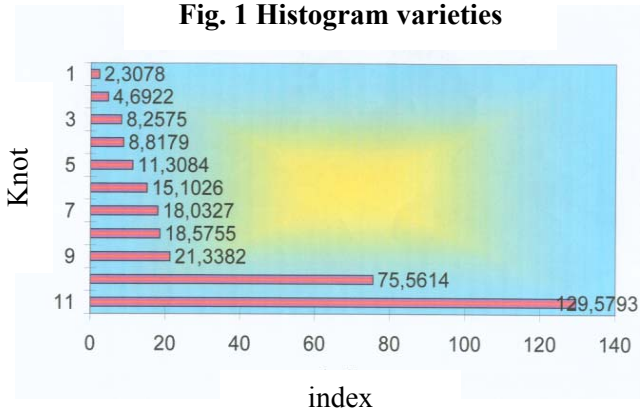
Knot	Varieties	No. varieties in the knot	Value index
1	7~12	2	2.3078
2	4~7~12	3	4.6922
3	4~7~12~11	4	8.2575
4	2~10	2	8.8179
5	1~9	2	11.3084
6	4~7~12~11~6	5	15.1026
7	1~9~2~10	4	18.0327
8	3~5	2	18.5755
9	3~5~4~7~12~11~6	7	21.3382
10	1~9~2~10~3~5~4~7~12~11~6	11	75.5614
11	1~9~2~10~3~5~4~7~12~11~6~8	12	129.5793

As a consequences of the cluster analysis it resulted a histogram (fig.1) of the hierarchical classification of the varieties but also a dendrograme (fig.2) represented three branches, with index comprised among 0-150.

This index shows us the value which initiates the definitive separation of the varieties (~ 49). We have 11 knots, out of which the knot no.10 and 11 shows us their very big index, comprised among 76-129.5, namely the lack of similarity among varieties.

Knot no.1 is represented by the varieties is *Cruciuliță* and *Galbenă verde*, with an index of 2.3078, as this value is reduced, it indicates a great similarity among them. The second knot is made of *Plăvaie* variety which aggregates to knot no.1 and it has a value of 4.6922. Knot no. 3 is made of the *Cabasmă neagră* variety which aggregates to knot no. 2, the index value is of 8.2575. Knot no. 4 indicates the link among the *Cabasmă albă* and *Alb de Moldova* varieties, whose index is of 8.8179. Knot no. 5 is made of *Zghihară de Huşi* and *Galbenă de Odobeşti* with an index of 11.3084. Knot no. 6 is represented by *Galbenă uriaşă* variety which aggregates to knot no. 3, with an index of 15.1026. Knot no. 7 out of the aggregation of knot no. 5 to knot no. 4, having a value of 18.0327. Knot no. 8 is made the *Bătută neagră* and *Alb românesc* varieties, this aggregates to knot no. 6 and has a value 18.5755, the knot no. 9 being formed with an index of 21.3382. Knot no. 10 is made of the aggregation of the knot no. 7 and no. 9, having an 75.5614. Knot 11 is represented by *Berbecel* variety, with an index of 129.5793, which indicates the lack of similarity with other varieties. The total inertia of the analysed varieties assembly is of 129.5793 and the value of dissimilarity indexes are mirrored also upon the hierarchical classification histogram of vine varieties (Fig.1).

Fig. 1 Histogram varieties



Varieties classification and dendograme elaboration. The elaboration of the hierarchical dendograme of the varieties has been effected according to the principle of the ''minimal loss of inertia''. Out of the dendrograme analysis one establishes the existence of a slit level between knots no. 10-11. A branch is made of the *Berbecel* variety, branch B is made of many varieties*: Cruciuliță, Galbenă verde, Plăvaie, Cabasmă neagră, Galbenă uriasă and Bătută neagră with Alb*

românesc. The third branch C is made of *Cabasmă albă, Alb de Moldova and Zghihară de Husi, Galbenă de Odobeşti.*

The three main branches may be characterized in the following way (Fig. 2):

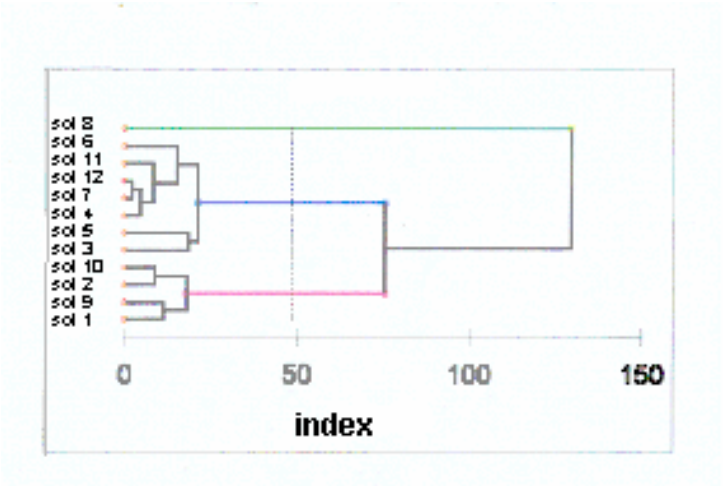


Fig. 2 Dendrograme of the hierarchical classification of the varieties

The weakest branch is A branch, because the dissimilarity index is very big – 129.5793. It is represented by the *Berbecel* variety which presents a different leaf, tronconic one, from the others.

B branch shows us a similarity among variety no.12 (*Cruciuliță*), 7 (*Galbenă verde*), 4 (*Plăvaie*), and 11 (*Cabasmă neagră*) and another between the variety no.5 (*Bătută neagră)* and 3(*Alb românesc*) and it is a bit more stable, as the value of dissimilarity index is less than 21.3382. Architecturally speaking, here are framed varieties with the leaf easily cordiform, and the value of the ampelometrical sizes within the studied varieties assembly, were medium.

Branch C indicates similarity among varieties 10 (*Cabasmă albă*), 2 (*Alb de Moldova*) and 9 (*Zghihară de Huşi*), 1 (*Galbenă de Odobeşti*) and it has the highest homogeneity (8.8179), presenting high value of ampelometrical sizes.

The position of each variety in the initial matrix is found in Table 2

Variety denomination	Dendograme position
1.Galbena de Odobeşti	1
2.Alb de Moldova	3
3.Alb românesc	5
4.Plăvaie	7
5.Bătută neagră	6
6.Galbenă uriaşă	11
7.Galbenă verde	8
8.Berbecel	12
9.Zghihară de Huşi	2
10.Cabasmă albă	4
11.Cabasmă neagră	10
12.Cruciuliţă	9

CONCLUSIONS

1. The present research makes reference to 11 autochthonous varieties, whose leaf morphological features, as main ampelografical organ have been studied by ampelometrical way, and the resulted data have been processed within the multidimensional statistics system. By means of this, one has technical literature, as a first phase of establishing the polifiletical origin of the autochthonous vine varieties. The following series have resulted:
   - the series *Galbenă de Odobeşti, Zghihară de Huşi, Bătută neagră*;
   - the series *Cruciuliţă, Galbenă verde, Plăvaie, Cabasmă neagr*ă;
   - the series *Cabasmă albă, Alb de Moldova.*

2. The most similar varieties from phenotipycal point of view and adult leaf architecture, because the value of dissimilarity index is the least, they are divided in three groups such as*: Cruciuliţă, Galbenă verde, Plăvaie, Cabasmă neagră*,(group I), *Cabasmă albă, Alb de Moldova* (group II), and *Zghihară de Huşi, Galbenă de Odobeşti* (group III), excepting the first group, the other two were already known as morphological similar.

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CHARACTERISTICS OF PHYSICO-CHEMICAL COMPOSITION FOR SEVERAL WINE PRODUCTS OBTAINED FROM BIANCA VARIETY

ION M., KONTEK A., DANIELA PREDA

Key words: concentrated must, grape juice, low alcoholic beverage, wine-brandy

SUMMARY

The recently developed studies emphasised the suitability of several varieties more or less biologically resistant to diseases and pests for being used both as table grapes, and for producing alcoholic/non-alcoholic beverages and wine-brandy.

The research works undertaken at ICDVV Valea Călugărească within 2000-2002 inside RELANSIN Program aimed at finding out the possibility of using the grapes of the resistant variety Bianca as: concentrated must, juice, low alcoholic beverages of wine-cooler type produced from wine and concentrated must, wine-brandy.

INTRODUCTION

The studies developed under different conditions reveal that most of the resistant grapes are suitable for a successful commercial crop and for producing high quality wines comparable to those obtained from "noble" varieties, as well as for obtaining different non-alcoholic beverages. The increased resistance to the main cryptogamic diseases is worth being added to these characteristics (Reynelda et al., 1985; Alleweldt, 1990; Găină and Grigorovski, 1990 etc.).

Besides the Romania's famous vineyards, grapevine culture is practised also in other areas belonging to the private farms, where the grape varieties endowed with biologic resistance to diseases, pests and damaging weather conditions may be highly valuable. The research works developed at ICDVV Valea Călugărească within the 2000-2002 period inside RELANSIN Program gave the possibility of finding out technological clues concerning the grapevine culture and the processing of the raw material for Bianca variety.

MATERIAL AND METHODS

Bianca grapes were processed according to different technologies for obtaining must used as a raw material for producing concentrated must, CO_2-impregnated grape juice, low alcoholic beverages of wine-cooler type and wine-brandy.

The must concentration was accomplished by using special installations having the capacity and the flow at the level of a pilot-station, the vacuum at the level of 0.9 bars, the upper level of temperature being of 35°C.

The technologies elaborated by ICDVV Valea Călugărească have been used for producing CO_2-impregnated grape juice and low alcoholic beverages of wine-cooler type.

Obtaining wine-brandy was achieved by using the double distillation technique with separate collecting of re-distilled fractions. Wine distillation and re-distillation was performed in a distillation installation of discontinuous type. The analyses concerning the physico-chemical composition and the sensory assay were carried out only for the "middle" fraction, by applying the methods of usual analysis.

RESULTS AND DISCUSSIONS

In order to put into value Bianca grapes as CO_2-impregnated grape juice and low alcoholic beverages of wine-cooler type, the main component part had to be obtained, namely the concentrated must. The main characteristics of the concentrated must are rendered in Table 1.

Table 1

Physico-chemical composition and sensory assessment of the concentrated must produced from Bianca grapes

Characteristics	Values
Total sugars	885 g/l
Density	1.366 g/m^3
Colour DO (420)	0.172
Total polyphenols	1.307 g/l
DO (280)	30.90
DO (320)	15.15
Total SO_2	386 mg/l
Free SO_2	-

The concentrated must obtained from Bianca variety presents the following characteristics: content in total sugars – 885 g/l, density – 1.366 g/m^3, colour (optic density) DO (420) – 0.172, content in total polyphenols – 1.307 g/l and content in SO_2 – 386 mg/l. It is a syrupy liquid of viscous consistency, a little troubled, of yellow-greenish colour, very pleasant, without any trace of caramel. The taste is delicious, sweet-soury without undesired organoleptical characteristics.

The concentration must be achieved up to a minimum level of 750 g/l sugar, for assuring a biological stability of this intermediary product. For a sugar concentration of 750 g/l, the preservation under the conditions of the cellar temperatures (12-13°C) proves to be the best. The lower the preservation temperature, the more favoured would be the deposits of tartrates and of other oxydisable compounds.

The laboratory analyses established that the most successful variant of CO_2-impregnated grape juice was the one having a sugar content of 70-80 g/l sugar from which ½ represents glucose and ½ fructose. The total CO_2 free acidity of 2.35 g/l H_2SO_4 is quite adequate for giving the product a delicious well-balanced taste.

By impregnating CO_2, this total acidity reaches levels of 3.55 g/l H_2SO_4, respectively 5.43 g/l when expressed in tartaric acid. In order to correct the acidity when it is necessary, it is advisable to use citric acid. For improving the aroma it was added a plant macerate. It was established that additions of 0.3% - 0.4% representing the plant macerate offered the grape juice an extremely pleasant flavour. The CO_2-impregnated grape juice has the following specific features:

- **appearance** : *clear*
- **colour** : *yellow-greenish*
- **odour** : *slightly flavorous, specific to the plant macerate*
- **taste**: *sweetie, fruitful, harmonious, well-balanced, pleasant*
- **content in sugars**: *70-80 g/l*
- **free total acidity of CO_2** : *2.35 g/l H_2SO_4*
  3.5 g/l tartaric acid
- **aciditatea totală (cu CO_2)** *3.55 g/l H_2SO_4*
  5.43 g/l tartaric acid
- **free SO_2** -
- **total SO_2** ~ 30 mg/l
- **alcohol** -
- **CO_2 pressure of bottling** : *4 bars*
- **the ratio in which the main sugars appear** : *1/1*

The specific features of the wine-cooler produced from Bianca grapes used as a raw material are rendered below:

alcohol: *6-6.5 % vol.*
total acidity: 4.5-*5 g/l, H_2SO_4*
sugars: *50-60 g/l*
carbon dyoxide: *at least 2 bars*
aroma: *moderated as intensity*
technological stability: *ensured for 90 days by using 25-30 mg/l free SO_2 and 150-200 mg/l sorbic acid.*

The main groups of volatile compounds contained by the wine-brandy obtained from Bianca grapes (Table 2), other than the ethanol presents relatively low values, but these are at the level of allowance concerning the quality conditions imposed for the product having the denomination of "Wine-brandy".

Concerning the content in methyl alcohol, this one reaches the limit allowed for the alcohol obtained from raw materials originating in viticulture and winemaking. The copper content of the wine-brandy produced under the conditions already presented ranges under the upper value allowed by the legal norms concerning the quality of brandy-type beverages of viti-vinicultural origin.

Table 2

Characteristics of physico-chemical composition of the wine-brandy produced from Bianca grapes

Characteristics	U.M.	Values obtained
Alcoholic concentration	% vol. at 20°C	71.5
Total acidity	in CH_3COOH, mg/100 ml a.c.	23.5
Aldehyides	in acetic aldehyde, mg/100 ml a.a.	9.1
Esthers	in ethyl acetate, mg/100 ml a.a.	44.3
Methylic alcohol	g/100 ml a.a.	0.054
Furfural	mg/100 ml a.a.	0.5
Free SO_2	mg/l	4.7
Total SO_2	mg/l	53.8
Copper	mg/l	1.6

CONCLUSIONS

Both the high capacity of accumulating sugars and the resistance to diseases of Bianca variety represent good reasons for obtaining valuable raw materials which are necessary for producing concentrated must, juices and low alcoholic beverages.

The concentrated must produced from Bianca grapes presents the quality parameters required for being used in the winemaking process in order to adjust the level of sugar content according to the existing legislation, as well as for producing grape juices and low alcoholic beverages.

The production of CO_2-impregnated grape juices and low alcoholic beverages of wine-cooler type aims at a superior valorisation of the wines and concentrated musts obtained from Bianca grapes.

The wine-brandy reaches the allowable level of the quality conditions required for the type of wine-brandy product.

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THE CHARACTERIZATION OF THE ECOCLIMATIC RESOURCES OF "DEALURILE CRAIOVEI" (CRAIOVA HILLS) VINEYARD BY USING THE MULTICRITERIAL METHOD AND BY ESTABLISHING ITS VOCATION FOR SUPERIOR WINE MAKING

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Key-words: grapevine, regioning, thermo-hydric balance of oenoclimatic aptitudes

ABSTRACT

The appreciation of the climatic favourability of Dealurile Craiovei vineyard by means of multicriterial methodology of ecoclimatic indexes ((IH, IS, IF) leads to the conclusion that Dealurile Craiovei vineyard is, by its vocation already confirmed, a producer of superior red wines, especially Cabernet Sauvignon and Pinot noir.

INTRODUCTION

Under the ecoclimatic conditions of our country, the selection of the grape variety range has been extensively studied based upon this offer (Oprean M., Olteanu I., 1983, Teodorescu Şt. & collaborators, 1987, Oşlobeanu M. & collaborators, 1991, a.o).

The characterization of the ecoclimatic resources by using a sole synthetic indicator is not reliable therefore, the multicriterial methodology is needed. This methodology uses three synthetic indicators, namely the drought index, IS, (Ch. Riou & collaborators, 1994), the hydrothermic index, IH, (P. Huglin, 1998) and the night cooling index, IF, (J. Tonietto, 1999). For each synthetic indicator size classes are used.

MATERIAL AND METHODS

The recording of the climatic data was made at Craiova based weather station. The other observations and measurements were specific to the related methods. For the characterization of the viticultural climates there were used size classes of the drought index (IS), the heliothermic index (I.H.) and the night cooling index (I.F.) (Tonietto I & Carbonneau A., 2000).

REZULTS AND DISCUSSIONS

The first condition set on a viticultural area is the existence of ecoclimatic resources providing, for the cultivated varieties, the grapes development at superior quality levels in order to allow the establishing of profitable production approaches.

For the estimation of the photosynthetic capabilities of the grape vine, criterions for the appreciation of the climatic favourability are used, especially as synthesis of several positive climatic factors, as well as deficits or excesses (see table 1).

Tab1e 1

The main ecoclimatic indicators (average figures per years 1960-2000)

Viticultural Centre	Hygrohydrothermic Index	Bioclimatic Index	Oenoclimatic aptitude Index
Banu Mărăcine	4.39	9.94	4947
Brădeşti	4.82	8.69	4716
Brabova	4.76	8.71	4782

The analysis of the climate synthetic indexes correlated with the limit levels imposed on the basic territorial unit shows the achieving of the limit climatic conditions for D.O.C. and D.O.C.C. wine making at 66.8%.

Nevertheless, limited possibilities of using these climatic indexes in any other viticultural area and any production year were also discovered.

As consequence, it was imposed the application of indexes for reliable estimation of ecoclimatic resources, which led to the utilization of the multicriterial method meaning the simultaneously use of a number of three synthetic ecoclimatic indicators, i.e. the drought index (IS), the heliothermic index (IH) and the night cooling index (IF). In case of Dealurile Craiovei vineyard, there were studied the size classes where the three viticultural microareas fitted, thus establishing the specific climate (see table 2).

Table 2

Types of viticultural climates established by using the multicriterial method at "Dealurile Craiovei" vineyard (1970 – 2003)

Vineyard	Viticultural Centre	Drought Index (IS)	Heliothermic Index (IH)	Night Cooling Index (IF)
Dealurile Craiovei	Banu Mărăcine	IS_1	IH_4	IF_3
	Brădeşti	IS_1	IH_4	IF_3
	Brabova	IS_1	IH_4	IF_3

One may notice that, within the multicriterial classification, the climates of the viticultural centres at Dealurile Craiovei vineyard fit the IS1, IH_4 and IF_3 types.

According to the size classes, such type of climate is defined as a climate with moderate drought, temperate warmth and September cool nights. The climate character for the drought index shows a certain drought level. Also, the warm temperate character given by the heliothermic index offers the possibility to

cultivate black grapes with high quality potential (such as Cabernet Sauvignon, Pinot noir). The night cooling index (IF_3) creates the character of the climate with cold nights and yet with a night thermic balance favouring the development of black grapes and accumulating significant amounts of polyphenols.

By summarizing the results obtained and by developing several theories on the way that each characteristic of the fitoclimate considered (see table 3) influence the grape developing process, the production capacities of each viticultural microarea were defined, reconfirming its vocation for high-quality viticulture, and decisions for the establishing of the grape variety were taken.

Table 3

Physio-geographical conditions influencing the soil hydrothermic resources at Dealurile Craiovei vineyard

Class	Classification criterions			Resource	
	Climate	Ground-water table	Relief	Hydric	Thermic
HT1	warm	present	plane	moderate	provided
HT2	drought	absent	depression	moderate	
HT3			plane	low	
HT4			inclined	very low	

Table 4

The main elements of quality potential of white and black grape varieties during cropping (1970-2000)

Variety		Viticultural Centre								
		Banu Mărăcine			Brabova			Brădeşti		
		1971-1980	1981-1990	1991-2000	1971-1980	1981-1990	1991-2000	1971-1980	1981-1990	1991-2000
Italian Riesling	G	195.3	197.0	194.8	201.3	202.0	194.0	198.6	203.0	200.0
	A	4.6	6.0	4.4	4.4	4.3	4.0	4.9	4.3	4.1
Sauvignon	G	209	194.4	195.3	208.6	204.0	198.0			
	A	4.1	5.3	4.6	4.5	4.0	4.3			
Caberne Sauvigno	G	209.6	215.5	209.7	208.7	214.0	206.2	208.0	214.5	205.6
	A	4.8	4.6	4.8	4.6	4.5	4.5	5.2	4.5	4.4
Merlot	G	207.5	207.0	224.0	200.0	207.0	210.0	205.3	208.0	210.0
	A	4.7	4.1	4.2	4.2	4.1	4.0	4.9	4.4	4.2
Pinot noir	G	221.3	225.6	230.2				217.0	222.5	220.5
	A	4.2	4.0	4.5				3.9	3.9	3.8

G = glucides g/l; A = total acidity g/l H_2SO_4.

Each viticultural year is characterised by periodical variations of the climatologically factors and also by accidental variations overlapping the periodical ones. In this respect, each variety interacts with the complex influences of the climatic phenomena, expressing its qualitative potentiality in a specific way (see table 4).

The thorough study of the production quality of each grape variety emphasizes an exceptional behaviour of black grapes. All the years long, black grapes have been cropped at minimum 200 g/ l glucides, thus meeting the first strict condition for making D.O.C. wines. In terms of this parameter, the observance of the conditions for D.O.C.C. wine making has also been frequent.

One should notice that the abundance of climatic possibilities, of which the viticultural centres at Dealurile Craiovei vineyard enjoy, does not result in excessivity features, but in the special quality level of wines, mostly red wines.

CONCLUSIONS

1. The appreciation of the oenoclimatic aptitudes of a viticultural region by using the criterions of exclusive appreciation of the climatic favourability, although suggestive, does not capture the positive aspects in their whole.
2. The large range of each synthetic index used by the multicriterial methodology defines the specific viticultural climate type, situating the respective microarea in a geo-viticultural assembly (the viticultural climate type of Dealurile Craiovei vineyard, $IS_1IH_4IF_3$).
3. Although having a suggestively limited expression, the interpretation of the climatic indicators leads to the conclusion also confirmed by the multicriterial methodology of ecoclimatic indexes, namely that Dealurile Craiovei vineyard is, through its already confirmed vocation, a producer of superior red wines, especially Cabernet Sauvignon and Pinot noir.

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IN VITRO EMBRYO RESCUE OF ABORTIVE OVULES IN BREEDING TABLE GRAPES

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Key words: *Vitis viniferae,* ovule culture, zygotic embryos, seedless hybrids.

SUMMARY

Immature embryos derived from crosses between seeded genitors (Muscat of Alexandria and Coarna neagra, 1-40-7, 1-39-53 clones) and seedless genotypes (Calina and 1-48-25 clone) were cultured *in vitro* in order to obtain new seedless varieties, adapted to different wine-growing areas and presenting qualities demanded by the market. The influence of pollen source, harvest date and media composition on the germination and seedling development were analysed during *in ovulo* embryo culture. From a total number of 1762 ovules inoculated on three different media, an average of 14 % of *in vitro* germinated embryos was obtained. The number of viable embryos was significant higher with ovules provided from crosses with Coarna neagra used as female plant. The best results of *in vitro* germination were obtained with zygotic embryos harvested after 55 days (21.7 %) and inoculated on medium containing IAA and BA, (21.9%). Somatic embryos were observed on the surface of zygotic embryos obtained from Coarna neagra x Calina and 1-40-7 x Calina crosses. They presented normal growth and converted into plants on a specific medium for embryogenesis.

Isoenzyme analyses of peroxidases confirmed the zygotic origin of the regenerated plants obtained from seeded x seedless crosses and showed that all plantlets produced by somatic embryogenesis from a single zygotic embryo were genetically uniform.

INTRODUCTION

The main objectives of grapevine improvement program are to obtain new table genotypes, ripening over the whole harvest period, with specific features, such as seedlessness, unique flavour, and large berries. Embryo rescue is currently applied as a routine method in the breeding for seedlessness, starting from seeded x seedless or seedless x seedless crosses (Ramming *et al*., 2000; Lu and Lamikanra, 1996). This method also proved to be the most efficient one in obtaining new varieties with certain degree of seedlessness (Popescu *et al.,* 2001; Celik and Karliilbay, 2003). The origin of new germinated plant from zygote is usually verified at the seedling stage by using isoenzyme analysis. This method has been applied for distinction of grape cultivars (Altube *et al*., 1991), or to determine the genetic origin of the new plants resulting from specific crosses (Bachmann, 1994).

The purpose of this research was to establish the most efficient *in vitro* methodology for obtaining new genotypes starting from a Romanian seedless variety (Calina) and to determine the genetic origins of young grape seedlings resulting from controlled crosses by using isozymic polymorphism.

MATERIALS AND METHODS

The clusters from controlled crosses between seeded genitors (Muscat of Alexandria and Coarna neagra, 1-40-7, 1-39-53 clones) and seedless genotypes (Calina and 1-48-25 clone) were collected after 45 and 55 days from pollination. The berries were surface disinfected for one minute in 70% ethanol and 15 minutes in 0.1% mercuric chloride. The ovules were excised from berries and cultured on three different solid media: 1) modified Murashige-Skoog (MMS) medium with casein hydrolysed and glycine; 2) MMS medium with casein hydrolysed and cysteine; 3) MS medium containing indole-3-acetic acid (IAA) and 6-benzylaminopurine (BA). The vessels with embryos were maintained in darkness and 22± 2^{o} C temperature till germination. Then, the plantlets were transferred on media with the same composition and cultured under cool-white fluorescent light and 16 h photoperiod.

Isoenzyme analysis was carried out by electrophoresis. Extracts were prepared by grinding fresh leaves in 2 volumes of extraction buffer, centrifuged at 4000 r.p.m and maintained in freezer till analyses. The proteic fractions were separated in polyacrylamide gels and electrophoresed at 250 V and 25-30 mA.

RESULTS AND DISCUSSIONS

The germination frequency obtained from all cross combination (14.0 %) is comparable to the best results reported so far by other authors. The germination of the immature embryos was shown to be not simultaneously, but sequential. Therefore, the first embryo-derived plantlets were obtained after 3 months in culture, and the last ones after more than 5 months.

Statistical analysis showed that the ability of the ovules to continue their morphological development and physiological maturation until germination was significantly influenced by the female parent and very significantly by the male one (Table 1). So, Coarnă neagră, a Romanian variety, used as female parental plant, showed the highest potential of germination for the zygotic embryos (the mean value was 24.3 %), in comparison with all the other crosses (*in vitro* germination varied between 10.5 and 13.3 %).

The development of immature embryos excised before their abortion and cultured *in vitro* until germination was also influenced by the moment of harvesting the fertilized ovules (Table 1). The best germination percentage was obtained with clusters harvested after 55 days from pollination. However, when the grapevine hybrid 1-48-25 was used as male parent, a good percentage of immature embryos which developed until germination (20.3 %) were obtained for all crossings, even when fertilized ovules were harvested 45 days after pollination.

Comparison of *in ovulo* culture media demonstrated that significantly more plants were obtained on medium containing cytokinine and auxine. The great differences in germination of recovered embryos among hybrid combinations could be explained as the result of genotype and media composition interaction.

Table 1

Factors with important effects on immature zygotic embryo germination

Specification	Ovules (no)	Germination (%)	Duncan test
A. Female genotype	* * *	DL 0.5% = 0.92	
Muscat of Alexandria	508	13.3	B
Coarnă neagră	296	24.3	A
1-40-7	518	10.5	B
1-39-53	440	13.2	B
B. Male genotype		DL 0.1% = 0.55	
Călina	1054	13.8	A
1-48-25	708	14.3	A
Interaction A x B	* * *	DL 0.1% = 0.75	
Muscat of Alexandria x 1-48-25	258	15.3	B
1-40-7 x 1-48-25	253	12.8	C
1-39-53 x 1-48-25	197	15.5	B
Muscat of Alexandria x Călina	250	11.3	C
Coarnă neagră x Călina	296	24.2	A
1-40-7 x Călina	265	8.7	D
1-39-53 x Călina	243	11.0	C
C. The moment of harvesting (♂ Calina)	* * *	DL 0.1 % = 0.95	
after 45 days	549	5.9	B
after 55 days	505	21.7	A
The moment of harvesting (♂ 1-48-25)	* * *	DL 0.1 % = 0.82	
after 45 days	333	8.4	B
after 55 days	375	20.3	A
D. Media composition (♂ Calina)	* * *	DL 0.1 % = 0.93	
1. MMS + CH + glycine	367	7.6	C
2. MMS + CH + cysteine	314	11.9	B
3. MS + IAA + BA	373	21.9	A
Media composition (♂ 1-48-25)	* * *	DL 0.1 % = 0.95	
1. MMS* + CH** + glycine	244	10.96	B
2. MMS + CH + cysteine	228	10.90	B
3. MS + IAA + BA	236	21.18	A

MMS* – Modified Murashige-Skoog medium; CH**- casein hydrolysed

The peroxidase isozyme patterns proved to be useful for distinguishing hybrid plants, as new genotypes, from their parental variety or clones. Thus, all electrophoretic patterns in plants regenerated from rescued embryos showed 2 common bands with the parents and 2-5 distinct bands, intense coloured and different distributed in the gels. The high degree of variability among the hybrids

and the presence of common bands with ascendants could be a genetic proof of the zygotic origin of the new plants.

In the cases of Coarna neagra x Calina and 1-40-7 x Calina crosses, the zygotic embryos produced multiple somatic embryos on their surface. The highest incidence of somatic embryogenesis occurred on medium containing IAA and BA and continuation of their development from white pre-embryo to cotyledonary embryos and seedling was obtained on a specific medium for embryogenesis. The isoenzymatic analysis with these plants, regenerated by somatic embryogenesis, revealed that the same disposition of isoenzymatic bands in the gel could represent, to some extent, a proof of genetic uniformity of all the new plants regenerated from a single zygotic embryo.

CONCLUSIONS

In ovulo embryo culture was successful in our attempt to obtain seedless genotypes using Romanian cultivars as parental plants and would be efficient to promote new variety with different degree of seedlessness. However, the conditions for optimum development of zygotic embryos and their germination are still to be improved in order to achieve a higher frequency of grapevine plants recovery.

The use of isoenzymes peroxidases to select the plants with zygotic origin before to transfer them into field proved to be a simple, objective and fast identification method of the hybrids.

These results allowed us a better understanding of the genetic and environmental factors controlling seedlessness and also having great implication in successful regeneration of seedless hybrid grapevines through immature embryo rescue.

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BEHAVIOUR OF THE RESISTANT VARIETY „BIANCA", UNDER THE SPECIFIC CONDITIONS OF VALEA CALUGAREASCA VINEGROWING CENTRE

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Key words: resistant variety, ecological grape, wine products

SUMMARY

The varieties included in the "resistance" group are quite close to the so-called "ideal vines" that should be productive, qualitative, resistant to diseases and frost. Growing such varieties might be a "reply" to the directly producing hybrids, being recommended for being planted in the small private plantations. The resistant varieties may represent a background for the ecological viticulture and for the ecological final products obtained from grapes.

At the Research & Development Institute for Viticulture and Oenology Valea Călugărească The behaviour of Bianca variety was studied, this variety showing a very good resistance to diseases and pests, having at the same time a high potential of sugar accumulation in grapes that is quite useful in the winemaking process.

INTRODUCTION

The creation of grape varieties with increased resistance to environmental stress factors, productivity and quality features almost similar to those obtained with the noble varieties and to which the phytosanitary treatments should be totally or at least partially suppressed, represents an issue of great actuality (Oşlobeanu, 1971; Neagu et al, 1978). During the last fifty years, in several European countries new grape varieties resistant to diseases and frost were created, giving good grape yields and being quite close to vinifera varieties in respect of their quality. The varieties that proved to be valuable were tested in different countries. In Switzerland it was studied into culture the behaviour of three grape varieties originating from Hungary: Bianca, Lilla and Nero (Spring, 2003; Basler, 2003).

In Romania, several resistant varieties having a complex genetic origin, mainly French creations of Seyve Villard and varieties created in The Republic of Moldova were introduced in our germplasm collection. They have been studied for assessing their breeding and genetic value (Gorodea, 1975; Georgescu et al, 1980; Ţârdea and Radu, 1990).

MATERIALS AND METHODS

Within 2000-2002, the behaviour of Bianca variety in the vineyard was thoroughly studied at the Research and Development Institute for Viticulture and Oenology Valea Călugărească.

Bianca variety created in Hungary by crossing Seyve Villard 12-375 x Bouvier (Csizmazia, 1995) was studied in the experimental plots comparatively with the Romanian variety called Brumăriu.

The determinations included: the study of the agronomic and technologic value, the technologic featuring of the raw material, remarks and assessments concerning the biological resistance to diseases, pests and low temperatures, as well as evaluations concerning the wine.

RESULTS AND DISCUSSIONS

Experimental lay-out

The experimental plots were set-up on a flat land, with a brown eumesobasic mollic soil having a loamy sandy texture. The planting distance was of 2.2/1m, and the training system used was double cordons periodically renewed. Within 2000-2002, the climate of Valea Călugărească vinegrowing centre was characterised by a variable helyothermic and pluviometric regime, the values of the climatic indicators determining the quantity and quality of the grape yield ranging in between normal limits for producing high quality white wines.

Agrobiological and technological specific features

Bianca is a highly vigorous variety, its canes being longer than 2 m. Its wood maturation is quite good, the average thickness of the canes being of 8-10 mm for more than 75% of the total length of the vine cane.

Bianca budbreak and flowering values were quite close to the values registered for Brumăriu variety taken as a control (Table 1). The technological maturity of the grapes was reached in the fifth epoch.

Table 1

Phenological data (2000-2002)

Variety	Budbreak	Flowering	Beginning of veraison	Technological maturity
Bianca	April 27- May 2	May 3- June10	August 1- August 6	Sept. 16 – Sept. 28
Brumăriu	April 27- May 2	June 1- June 9	August 5- August 16	Sept. 17 – Sept. 29

The percentage of fertile shoots is of 79.7% for Bianca compared to 52.3% for Brumăriu variety taken as a control (Table 1). The fertility coefficient is relatively great in case of Bianca compared to the control. The average weight of a bunch is of 107 g for Bianca compared to 147 g in case of Brumăriu, the productivity indexes being consequently influenced (Table 2).

Table 2

Fertility and productivity (2000-2002)

Variety	Fertile shoots %	Fertility coefficient		Productivity indexes		Weight of a single bunch
		Relative	Absolute	Relative	Absolute	
Bianca	79.7	1.14	1.43	122	153	107
Brumãriu	52.3	0.74	1.42	109	209	147

The grape yield by vine is of 3.8 kg/vine in case of Bianca compared to 3.2 kg for Brumăriu (Table 3). The grape yield by hectare is of 14.4 tons for Bianca and 12.1 in case of Brumăriu. The chemical composition of the must presents higher sugar content in case of Bianca variety (242 g/l) in comparison with Brumăriu variety taken as a control, and equal values concerning the acidity of the must (4.1 g/l).

Table 3

Grape yield and quality of the must (2000-2002)

Variety	Grape yield		Quality of the must	
	kg/vine	kg/ha	Sugar g/l	Acidity g/l H_2SO_4
Bianca	3.8	14.4	242	4.1
Brumãriu	3.2	12.1	182	4.1

The wine produced from Bianca grapes presents a high alcoholic potential of 14.1 vol % and a low acidity of 3.2 g/l H_2SO_4 (Table 4).

Table 4

Physico-chemical characteristics of the wines (2000-2002)

Variety	Alcohol vol. %	Residual sugar g/l	Total acidity g/l H_2SO_4	Not-reducing extract g/l	Glycerol g/l	Final mark given by the tasting panel
Bianca	14.1	2.6	3.2	22.2	9.2	17.5
Brumãriu	10.5	1.8	4.7	17.8	6.8	15.4

The not-reducing extract is greater in case4 of Bianca variety (22.2 g/l), comparatively with Brumăriu variety taken as a control (17.8 g/l). The wine obtained from Bianca variety presents a high content in glycerol (9.2 g/l), surpassing Brumăriu variety in case of which the value of the content in glycerol is of 6.8 g/l. The wine produced from Bianca variety was well appreciated for its organoleptical specific features, obtaining the score of 17.5 as a final mark.

Bianca's resistance to frost, diseases and pests is very good, as it may be noticed in Table 5.

Table 5

Resistance to frost, diseases and pests (2000-2002)

Variety	Frost	Downy mildew	Powdery mildew	Grey rot	Phylloxera galicola
Bianca	FR	FR	FR	FR	FR
Brumãriu	R	R	R	R	S

FR – very resistant; R – resistant; MR – middle resistant; S – scarcely resistant.

Both the great capacity of sugar accumulation and Bianca's resistance to diseases represents a clue for obtaining cheap raw material of good quality which is necessary for producing concentrated must, grape juice and low alcoholic beverages.

CONCLUSIONS

1. Bianca variety is characterised by the following: a green season of 168-185 days allowing the grapes to reach their full maturation; a high yielding potential positively correlated with the high capacity of accumulating sugars (242 g/l); a special biologic resistance to frost, downy mildew, grey rot and phylloxera galicola;
2. Bianca variety may replace the directly producing hybrids, being suitable for being planted in the small plantations of the private farmers, associations and commercial enterprises for producing concentrated must, grape juice, low alcoholic beverages, table wines and wine-brandy.

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THE BEHAVIOR OF SOME WINES GRAPES VARIETIES RECOMMENDED FOR MURFATLAR VINEYARD IN 2003 YEAR CONDITIONS

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Key words: climatic factors

SUMMARY

The 2003 was warmer and dryer than multiyear mean, fact who affected mainly the quantity of production. Even the vegetative period started later with 2-3 weeks, the harvest time was the same.

INTRODUCTION

The Murfatlar vineyard biotope, by climatic, pedologic and relief factors had a strong influence on the physiological and biochemical vine process in all period of viticulture year. The climatic factors are those that have many variations who influenced in direct way harvest quality and quantity in each year.

MATERIALS AND METHODS

The research was made at Murfatlar in the 2003 year. In this period observations and determinations were performed in entire vegetative period at the following varieties: Pinot gris 13 Mf, Chardonnay 25 Mf, Columna, Pinot noir, Merlot and Mamaia.

RESULTS AND DISCUSSIONS

The climatic characterization of viticulture year (November 2002-October 2003)

The viticulture year 2002-2003 was warmer than multiyear mean (table 1). The mean daily temperatures registered in winter season was higher than the normal with 2-3 ^{0}C, in addition, the passage from cool season to the warm one was made suddenly existing, in fact, only two main season (the great amplitude between diurnal and nocturnal temperatures). For example, on the 16-th November –3 ^{0}C were registered at the soil level in the night and +28 ^{0}C in the day, and on the 02 of June it was registered +2 ^{0}C in the night and +53 ^{0}C in the day.

The start of vine vegetative period was delayed with 2 to 3 weeks, after 01 May, due of sultry temperatures in May (on the 03 May was registered al the soil level +42 ^{0}C, a specific value for July month).

The maximal absolutes temperatures were situated between 10.8 ^{0}C on 30.12.2002 and 36.5 ^{0}C on 02.07.2003 and absolutes minimal from the winter period didn’t binge about buds losing.

The sum of total temperature degrees was bigger in viticulture year 2002+2003 than the normal last 50 years, attending 4930.3 ^{0}C values in comparison with 4340.7 ^{0}C – the normal, the effective temperatures outrunning with over 200 ^{0}C the normal. It was summed 2050.8 ^{0}C given the normal (1737.2 ^{0}C).

The pluviometric regime shows that this year has a precipitation sum of 517.7 mm given the normal with 419.8 mm but with a precipitations repartitions outside of the vegetative period (table 1).

It is raining in November and December 2002 – 73.6 mm, in January was registered 60.5 mm, in February only 12.0 mm and in March fallowed 28.2 mm precipitations.

The pluviometric regime was poor in 07.04-09.09, registering only 102 mm precipitations and from second decade of September followed 167.4 mm, rains that recovered the water deficit in soil.

The air relative humidity was 87% in 2002-2003 viticulture years in comparison with normal value – 73%.

Table 1: Thermal and pluviometrical regime in viticulture year 2002-2003 at Murfatlar

Month	Year	Monthly mean		Precipitations		No. of raining days
		Normal	2002-2003	Normal	2002-2003	Over 10 mm
XI	2002	7.2	10.0	40.4	27.9	-
XII	2002	2.3	1.4	34.0	45.7	1
I	2003	0.5	0.8	31.0	60.5	2
II	2003	1.3	-4.3	33.0	12.0	-
III	2003	4.2	3.4	21.7	28.2	2
IV	2003	10.2	9.0	33.5	24.2	1
V	2003	16.2	21.2	50.2	7.8	-
VI	2003	20.4	24.2	53.2	22.4	2
VII	2003	22.6	25.2	35.6	31.4	1
VIII	2003	22.6	24.7	31.6	16.1	-
IX	2003	17.6	16.3	41.6	167.4	6
X	2003	12	11.5	30.2	74.1	4
∑ per year	-	-	-	419.8	517.7	-
Average per year	-	11.0	11.9	-	-	-

Soil humidity – characterization

Due to the hard dryness of the studied varieties vegetative period, the soil content in water was registered, finding thus out greats deficits in entire period, influencing mainly the harvest quantity (table 2).

Table 2: The soil humidity deficit (m^3/ha) at Murfatlar, 2003

Year	Depth cm	Month						
		IV	V	VI	VII	VIII	IX	X
2003	0-20	-290	-190	-326	-328	-415	-396	-289
	20-40	-331	-289	-463	-419	-597	-431	-327
	40-60	-376	-389	-450	-449	-758	-678	-617
	60-80	-478	-657	-718	-760	-1071	-975	-928
	80-100	-626	-841	-862	-1037	-1425	-1410	-1245

The phenophasis characterization (table 3)

The active period was developed between 04.05 – 01.11.2003, having 182 days in comparison with 185 days in a normal year. The bud-burst started on 03.05 given the 24.04 in a normal year. The flowering was developed between 03-11.06 given the 30.05-08.06 in the normal years, shortening due to the high temperatures and air humidity. The ripening corresponded with the data of a normal year, being situated between 15 and 20.08. The full maturation was attended inn the 10-17.09 interval being very close of normal (18.09).

Tabel 3: Development of phenophasis at the main varieties located in the Murfatlar vineyard, 2000 – 2003 period

Variety	Year	The starting of mains phenophasis				
		Bud-burst	Flowering	Ripening	Complete maturing	Leaves falling
Chardonnay Clone 25Mf.	normal	09. 04	29. 05	08. 08	15. 09	30. 10
	2003	5. 05	11. 06	15. 08	17. 09	26. 10
Pinot gris Clone13 Mf.	normal	22. 04	06. 06	09. 08	11. 09	29. 10
	2003	2. 05	7. 06	16. 08	17. 09	26. 10
Columna	normal	16. 04	17. 05	10. 08	13. 09	25. 10
	2003	6. 05	9. 06	8. 08	10. 09	26. 10
Mamaia	normal	22. 04	29. 05	20. 08	18. 09	14. 10
	2003	6. 05	5. 06	8. 08	10. 09	26. 10
Merlot	normal	20. 04	27. 05	19. 08	17. 09	11. 10
	2003	6. 05	7. 06	14. 08	15. 09	26. 10
Pinot noir	normal	20. 04	06. 06	15. 08	16. 09	05. 11
	2003	3. 05	6. 06	14. 08	15. 09	26. 10

The fertility coefficients and productivity indexes

The potential fertility and productivity was generally good, with values closed with multiyear means.

Phytosanitary estate

The winter reserve of diseases and pests was kept.

The downy mildew was manifested late in plantations, after 13.07. The powdery mildew was presented in each plantation with various intensities in concordance with number of treatments and type of fungicides applied. The grey dote was observed mainly on the Pinot gris grapes. The grapes mouth developed all three generations with attack frequency over 20 % .

Harvest - the quantity and the quality (table 4)

Mainly the quality of harvest was bigger in 2003 year conditions.

Table 4: Production data and technological indexes – Murfatlar 2003

Analyzed elements	Year	Variety					
		Pinot gris	Chard.	Columna	Mamaia	Merlot	Pinot Noir
Production t/ha	2003	3.0	2.8	3.5	3.5	2.2	2.9
1.Grape structure index	X	20.8	18.1	20.5	20.6	20.2	18.2
	2003	23.4	22.3	21.1	22.5	30.3	27.6
2.Berry index	X	91	78	59	55	90	75
	2003	76	61	47	52	73	77
3.Berry composition index	X	7.2	7.3	6.8	6.7	6.0	8.0
	2003	6.8	7.8	3.9	6.5	5.4	4.4
4.Grapes efficiency index	X	3.4	3.5	4.5	5.0	3.4	3.4
	2003	5.1	5.6	3.0	5.2	4.5	3.7

CONCLUSIONS

Due to the pronounced dryness from grapes varieties vegetative period greats water deficits were observed, affecting the intensity of the mains physiological processes (the registered precipitations in the summer month being almost inexistent - only 3 utile rains). All these increased mainly the quality of harvest.

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THE MULTICRITERIONAL CLIMATIC CLASSIFICATION CONCERNING THE MOLDAVIAN HILLS REGION AND THE WALLACHIAN AND OLTENIAN HILLS REGION

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Key words: viticultural climate, climatic group

SUMMARY

In order to make a rational classification, useful in point of viticultural region on Terra, J. Tonietto and A. Carbonneau (2000) suggested the climatic class notion, each settled class being in the position of representing, in a realistic mode, some climatic differences which will give the right reply of the grape vine or of the obtained production, all of this in point of a synthetic indicator.

So, it was suggested a *multicriterional climatic classification*, using three criterions, which are represented by three synthetic indicators: IS, IH and IF. The utilisation of those indicators allowed making an opinion about climatic variability of the viticulture and the adequate settlement of the classification and of the climatic grouping for different viticultural region.

MATERIAL AND METHOD

In order to make this study, there have been utilised ecoclimatic dates concerning the heliothermal resources and the hydric resources from the conventional vegetation period, from a number of 53 viticultural centres from the Wallachian and Oltenian Hills Region.

The obtained data base was used for calculating the three synthetic indicators which have an ecoclimatic character and are used by the multicriterional method: drought index (IS), heliothermal index (IH) and night cooling index (IF).

RESULTS AND DISCUSSIONS

The obtained dates for the two studied regions allowed, using the three synthetic indicators, the establishment of the viticultural centres and of the climatic groups, including the situation of this last ones also.

1.***The viticultural climat of the viticultural centres from the Moldavian Hills Region***

The viticultural climate in the 53 viticultural centres of this region varies inside a large area delimited by the drought index, between IS_{00} and IS_2, and inside a limited area for the heliothermal index, delimited by IH_3 and IH_4, and for the night cooling index with a variation between IF_4 and IF_3. More illustrating is the situation inside the variation spectrum of each index (table 1).

Table 1

Indicators ►	Specification	IS				IH		IF	
		IS_{00}	IS_0	IS_1	IS_2	IH_3	IH_4	IF_4	IF_3
Viticultural centres	No.	1	7	41	4	45	7	52	1
	%	2	13	78	7	87	13	98	2

Significant differences are found in case of each synthetic index. So, if concerning the drought index, the major indicator IS_1 has 75% from the total, as the major heliothermal index is concerned, IH_3 has 87%, and in case of night cooling index, IF_4 has a balance of 98%.

2. ***Viticultural climate of the viticultural centres from the Wallachian and Oltenian Hills Region***

The information from table 2, which concerns this time a number of 37 viticultural centres, shows similar situation, the number of classes concerning the drought index being reduced by the disappearance of a very important class as the IS_2 is.

Table 2

Indicators ►	Specification	IS				IH		IF	
		IS_{00}	IS_0	IS_1	IS_2	IH_3	IH_4	IF_4	IF_3
Viticultural centres	No.	1	12	24	-	6	31	24	17
	%	2	33	65	-	16	84	65	35

So it is obvious that the drought index IS_0 has a bigger value (33%, comparative with 13% in the previous table), the heliothermal index has also a bigger value (84% comparative with the same 13%), and the night cooling index IF_3 too (35% comparative with 2%).

3. ***The climatic groups concerning the viticultural centres from the Moldavian Hills Region***

The 53 viticultural centres of this region belong to a number of 6 climatic groups. Concerning the number of the constitutive viticultural centres, these groups are unequal made, beginning with variations from those presenting a single viticultural centre, as IS_{00} IH_2 IF_4 is (viticultural centre Bozieni) or as the IS_2 IH_4 IF_3 is (viticultural centre Smârdan), and finishing with the climatic group IS_1 IH_3 IF_4 (which includes 38 viticultural centres).

For the climatic rapport, the 6 climatic groups cover a large area of situations, starting with the cool humid climate with very cold nights (climatic group IS_{00} IH_2 IF_4 which belongs to viticultural centre Bozieni) and ending with the droughty climate, warm temperate, with cold nights (the climatic group IS_2 IH_4 IF_3 which integrates the viticultural centre Smârdan).

4. ***The climatic groups concerning the viticultural centres from the Wallachian and Oltenian Hills Region***

We see that the 37 viticultural centres (even though less than the previous region with a number of 16 viticultural centres), belong to a number of 7 climatic groups. As the number of viticultural centres belonging to each climatic group is concerned, there is a great diversity of situations. So, we find climatic groups that present only one viticultural centre as IS_{00} IH_3 IF_4 is (viticultural centre Jiblea) or as the IS_0 IH_3 IF_4 is (viticultural centre Boldeşti), but we find climatic groups which have 11 viticultural centres (the IS_1 IH_4 IF_4 group) and even 12 viticultural centres (IS_1 IH_4 IF_3 group).

Even though this viticultural region is made of a great number of climatic groups, they cover a smaller area, which is included in the interval between IS_{00} IH_3 IF_4 and IS_1 IH_4 IF_3. As we can see the climatic groups with droughty conditions as the IS_2 IH_4 IF_4 and IS_2 IH_4 IF_3, which are found in the previous region, are missing.

5. ***The situation of the climatic groups***

Table 3

THE MULTICRITERIONAL CLIMATIC GROUPS SITUATION
for 53 viticultural centres from the Moldavian Hills Region

The nigh cooling index	IS_{00}	IS_0	IS_1		IS_2		Obs.
	IH_2	*IH_3*	*IH_3*	*IH_4*	*IH_4*	*IH_4*	
IF4	*1*	*7*	*38*	*3*	*3*		
IF3						*1*	
IF2							
IF1							

38: number of viticultural centres
5.0% of the 120 theoreticaly posible groups.

Table 4

THE MULTICRITERIONAL CLIMATIC GROUPS SITUATION
for 37 viticultural centres from
the Wallachian and Oltenian Hills viticultural region

The nigh cooling index	IS_{00}	IS_0			IS_1		
	IH_3	*IH_3*	*IH_4*	*IH_4*	*IH_3*	*IH_4*	*IH_4*
IF4	*1*	*4*	*7*		*1*	*11*	
IF3				*1*			*12*
IF2							
IF1							

7: number of viticultural centres
5.8% of the 120 theoretically possible groups.

CONCLUSIONS

1. The association of the centres with the same viticultural climate inside the climatic groups allows us to identify the crap areas which present similar qualitative and quantitative viticultural abilities;
2. Concerning the Moldavian viticulture's conditions, the representative classes are IS_1 (78% from the total of the viticultural centres), IH_3 (87%) and IF_4 (98%). A special situation is encountered in the viticulture's conditions of the Muntenian and Oltenian Hills Region, where the IS_1 can be found in the 65% of the viticultural centres which exist in this region, the IH_3 is identified in only 16% of the cases (considering the great value of 84% which IH_4 has), and IF_4 has only 65% (comparative to 98% which is encountered in the first studied region).

From all this, great differences are developed, concerning the hydric and heliothermal conditions, and the temperature conditions during the September nights;

3. The 53 viticultural centres of the Moldavian Hills Region are distributed in 6 climatic groups, each class presenting very different sizes, starting from one to 38 viticultural centres, and for each group an average of 8.8 viticultural centres.

In their turn, the 37 viticultural centres of the Wallachian and Oltenian Hills Region make up a number of 7 climatic groups, which have one to 12 viticultural centres, from all this resulting an average of 5.3 centres in each climatic group;

4. For the Moldavian viticulture the dominant climatic group is the IS_1 IH_3 IF_4 which has 38 viticultural centres, meaning 71% from the 53 viticultural centres of this region. The rest of 5 viticultural groups have 1 to 7 viticultural centres, which together mean 29% from the total;
5. The situation is different in the conditions of the viticultural Wallachian and Oltenian Hills Region where we find two major climatic groups as the IS_1 IH_4 IF_4 and the IS_1 IH_4 IF_3 is those two climatic groups have, together, 62% from the 37 viticultural centres of this viticultural region. A bigger difference is encountered when we take into account that the 2 major groups which we mentioned are in the climatic sequence with the biggest heliothermal resources and the smallest hydric resources.

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THE ESTIMATION OF THE ECOCLIMATERICAL CONDITIONS IN THE VITICULTURAL REGION OF THE TRANSYLVANIAN PLATEAU, USING THE SYNTHETIC INDICATORS

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Key words: grape vine, ecoclimat, synthetic indicators

SUMMARY

The ecoclimate is important for the viticulture especially when we refer to temperature, sunstroke and humidity quantification. These three ecoclimaterical factors are analysed taking into account the daily added values from the conventional vegetation period. The added values or the average of these values can be used, first of all, to evaluate the resources of temperature light and humidity from different vineyards and viticultural centres, and the favourability degree of a certain grape vine cultivation area also depends on those.

Knowing that the above mentioned factors do not act in a singular mode, but always depending on each other, in the last few years, in both international and national level, it has been studied the possibility and the utility of using more synthetic indicators, which integrates one, two or sometimes even three ecoclimaterical factors.

MATERIAL AND METHOD

In order to evaluate the ecoclimaterical conditions during the conventional vegetation period, the following synthetic indicators were used (for those 19 viticultural centres of the Transylvanian plateau region):

- *heliothermal index (IH)* suggested by J. Branas and co (1946);
- *hydrothermal index (CH)* suggested by G.T. seleaninov (1936);
- *the grape vine bioclimatic index (Ibcv)*, which was introduced in the speciality literature by Gh. Constantinescu and co (1964);
- *oenoclimatic ability index (Iaoe)* recommended by Şt.C. Teodorescu (1977).

RESULTS AND DISCUSSIONS

Examining the data base we ascertain that we are in a viticultural region with a typical cool temperate climate, in which we find the fallowing values of the bioclimatic indexes taken into study:

- *heliothermal index* has taken low values between the minimum value IH=1.31 (in the independent viticultural centre Dej) and the maximum value IH=1.77 (in the viticultural centre Sebeş), from all this results that this index can take lower values than the minimal value IH=1.35, value which was communicated by M. Oşlobeanu and co (1980).
- *hydrothermal index* has taken, also, its own values and its own area which was delimited by the minimal value CH=1.22 (in the viticultural centres Blaj and Alba Iulia) and the maximal value CH=1.66 (in the viticultural centre Valea

Nirajului). So, we find out that this ecoclimateric indicator do not reach the maximal value CH=1.80 which was given by M. Oşlobeanu and co (1980).

- *the grape vine bioclimatic index* also takes low values, as part of a limited area, between Ibcv = 4,52 (in the viticultural centre Valea Nirajului) and Ibcv = 6,24 (in the viticultural centre Alba Iulia). So, It results that in this synthetic indicator case, the value is inferior (Ibcv < 5,0), as minimal value which can be found in the speciality literature in our country.

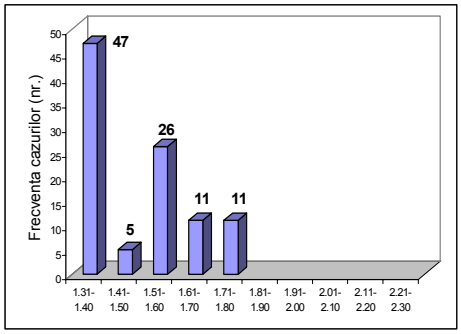

Fig. 1 The heliothermal index's value for the viticultural centres from the Transilvanian Plateau Region

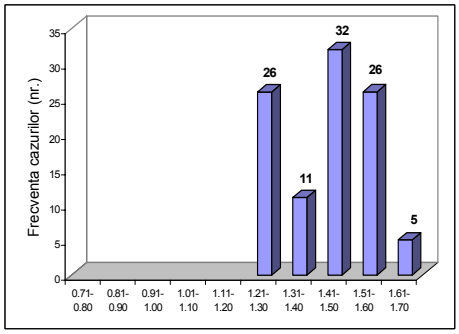

Fig. 2 The hydrothermal index's value for the viticultural centres fromthe Transilvanian Plateau Region

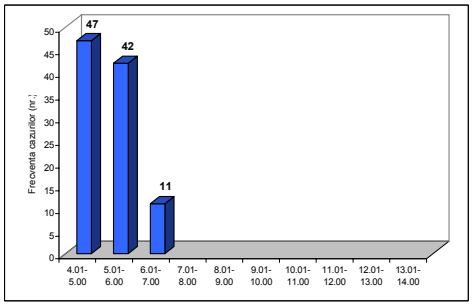

Fig. 3 The bioclimatic index's value

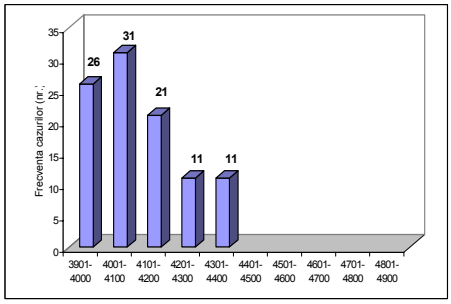

Fig. 4 The oenoclimatic ability index's value

- *oenoclimatic ability index* has varied between the minimal limit Iaoe = 3.979 (in the viticultural centre Valea Nirajului) and the maximal limit Iaoe = 4.328 (in the viticultural centre Alba Iulia), included in a disparity of only 9%.

We must say that Iaoe didn't reach the minimal value which was given for our country, value which represents 3.700 units, as it was communicated by Şt.C. Teodorescu (1977).

● From the first fig.1 we ascertain that for the viticultural region of the Transilvanian Plateau, the histogram concerning the frequency of the *heliothermal index* is gradually descendant, meaning that it presents a maximum of 47% (IH class = 1.31-1.40), after this the frequency suddenly lows to 11% (class 1.71-1.80). We realise that we are in a viticultural region which has the lowest heliothermal resources from the whole Romania's viticulture, in this region are obtained flavoured wines as "Muscat Ottonel", quality calmly wines and frothy wines.

● For the *hydrothermal index* from the Transylvanian Plateau Region, there are five variation classes, between CH = 1.20-1.30 and CH = 1.61-1.70. The highest values of the hydrothermal index (defined as a faction between the rainfall quantity and the sum of the active temperature degrees), are sustained on the one hand by the cool temperate climate and on the other hand by the rich rainfall conditions, without being excessively though, the best conditions for the grape vine growth can be found in the first two variation classes (classes CH = 1.21-1.30 and CH = 1.31-1.40);

● The histogram concerning the values of the grape vine *bioclimatic index* for the viticultural centres of the above region shows a peculiar appearance (fig. 3) the cases frequency being concentrated in a number of three variation classes which are under the lowest values of the grape vine bioclimatic index (Ibcv = 4.01-5.00; Ibcv = 5.01-6.00 and Ibcv = 6.01-7.00);

● We ascertain that the histogram for this viticultural region has a number of five variation classes, as part of the limited area of the oenoclimatic ability index, which has values between the extreme classes: Iaoe = 3.901-4.000 and Iaoe = 4.301-4.400.

CONCLUSIONS

On the basis of the fourth synthetic indicators that we've studied, it results that the cold's pole in the Romanian viticulture is the viticultural centre Valea Nirajului. We also ascertain that the vineyard with the lowest heliothermal resources is the Lechința vineyard. In the same way it results that the highest heliothermal resources and the lowest hydrical resources are in the viticultural centres Alba Iulia and Sebeş.

Ecoclimaterical conditions sketched by the fourth indicators explain that in this viticultural region can be successfully cultivated only: the Vitis grape vine kind, which hasn't passed the fourth grape's maturation era, as the Muscat Ottonel, White Fetească, Pinot gris, Sauvignon, Pink Traminer, Royal Fetească etc. It is

well justified the fact that in here we find the best ecoclimaterical conditions for obtaining the frothy wines.

The ecoclimat of this viticultural region is 100% restrictive concerning the grape's culture for the red wines. We also consider that the Transylvanian Plateau's viticulture doesn't have the biggest natural proclivity in obtaining the aged distillates made of wine. This way of production requires the cultivation of some specialized kind and a less cool ecoclimat, as the one present in the viticultural departments Cognac and Armagnas from France.

In this evaluation, a special role goes to oenoclimatic ability index which allows us to estimate that the crop of some grape king for red wines is represented by only a few ha which are occupied by Oporto kind (with the grape's maturation during the third era), even though this kind can't be found in the viticultural tanning books for the Transylvanian Plateau Region.

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IMPLICATION OF EUROPEAN ORGANIC VITICULTURE IN ROMANIAN VITICULTURE

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Key words: organic area, organic viticulture, organic wine, organic wine market.

SUMMARY

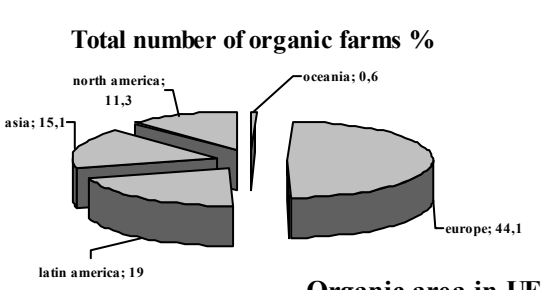
In Europe the organic agriculture is a thriving sector, and in some countries 10 % of agricultural area is organic.

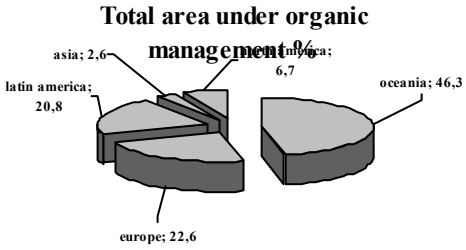
For organic viticulture the percentage of land compared to all vineyards is lower than for organic agriculture. This is because there are some constraints in the sector of production techniques, in marketing, legislation and state support.

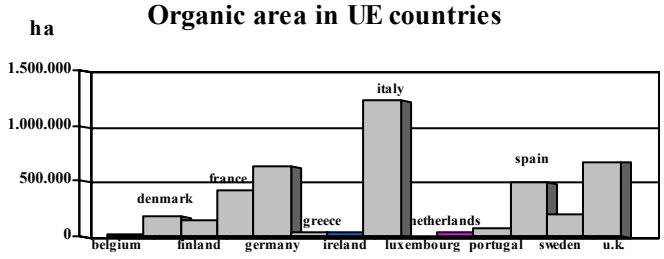
GENERAL OVERVIEW

According to the Swiss Research Institute of Organic Agriculture (FiBL), by the 31.12.2001 in the 15 EU-countries, 4,442,875 hectares were managed organically by 142,348 farms.

The total organically managed area is more than 22 million hectares world-wide. In addition, the area of certified "wild harvested plants" is at least a further 10.7 million hectares, according to various certification bodies. Organic farming is practised in approximately 100 countries of the world and the area under organic management is continually growing.





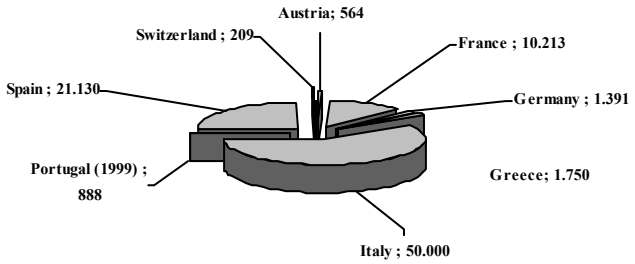


ACTUAL SITUATION IN EUROPEAN ORGANIC VITICULTURE

In Europe almost 60 000 hectares of vineyards are managed organically (end 2000) corresponding to ca. 1.6 percent of all vineyards. The main producing countries are Italy, with 300,000-500,000 hl/year wine in 100 biological areas, followed by France with 180,000-200,000 hl/year wine in 350 biological arias. Highest percentages of organic vineyards compared to conventional vine land are reached in Italy and Portugal (both 3.4 %). Growth of the organic vineyards is, however, not as fast as that of organic land in general.

The majority of the wine is marketed as bottled wine directly to the final consumer or to retailers (catering trade, organic shops).

Vineyards under Organic Management in the Countries of Europe (Willer /Zanoli 2000) (ha)



ITALY

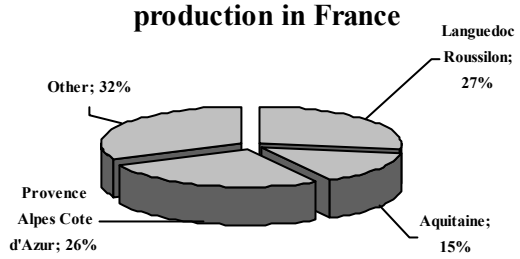
In Italy certain professionals estimate between 48 000 and 54 000 ha for the organic vineyard (including conversion) for the year 2000.

The main reason for such a development is the fact that many Italian regions chose to apply EU regulation 2078/92 that grants subsidies, which range from 600 to 900 Euro per hectare. 55 to 65 % of the organic wine production is exported. Organic wine production represents almost 25% of total wine production

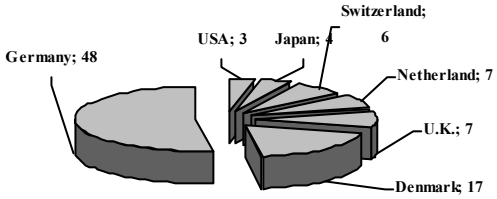
FRANCE

In France it amounts to 13,400 hectares (2001). Wine production stemming from organic farming exists in the majority of French vineyards.

Distribution of organic wine production in France



French organic wine exports

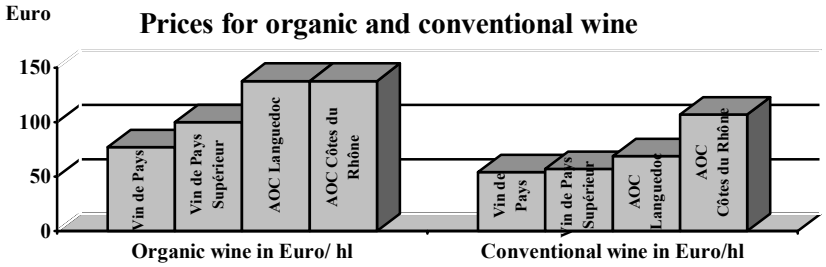


This program was created in 1997 to increase organic farming in France, proposing attractive incentive subsidies for farmers involved into conversion, according to EEC 2078/92 regulation.

The amount of the subsides is decreasing with an increasing area (maximum limit: 50 ha):

Surface in ha	*Subsidy in Euro*
10	838.5
20	587
30	411
40	287.5
50	201

The division amongst the types of wine is: 70 % red, 25 % white, 5 % rosé.

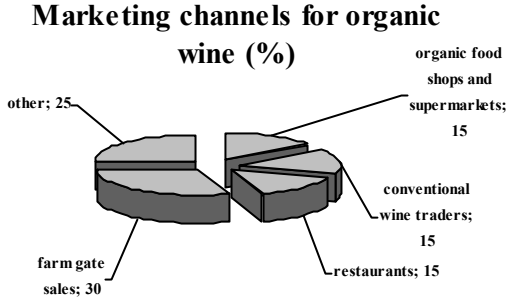


GERMANY

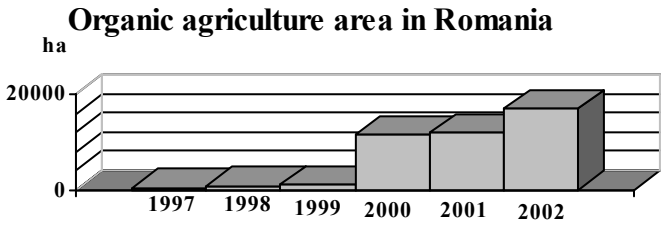
There are more than 300 organic vine growers for 1 400 ha and the national production covers only 30 to 35 % of the demand.

After an exponential growth at the beginning of the 90s, today there is stagnation.

Germany is one of the biggest markets in the world for wine. 55 % of the wine consumed in Germany is imported from France. It is also one of the biggest and best markets for organic wine.



ROMANIA



According to Romania accession to European Union, Romania has to adapt its organic grape and wine harvest, witch has a small surface, to European Union organic viticulture requirements.

In order to reach the EU requirements, Romania has to apply the latest regulations regarding the organic products, meaning supporting the producers to convert their classic vineyards into organic ones, controlling and labelling the organic products and so on.

CONCLUSIONS

To conclude, Romania authorities have to give the producers the necessary subsidies to convert their vineyards into organic once. In this way, our producers will be able to take advantage from this type of viticulture. With these subsidies winegrowers can produce an ecological wine with less costs being able to obtain a better profit to reinvest in this kind of business.

In order to reach the requirements of European Union, Romania can take advantage from the organic viticulture because in this way our country will obtain good quality viticulture products at reasonable costs, will improve and maintain the quality of medium and will reduce the pollution sources.

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THE STUDY ABOUT DISTRIBUTION OF TERPENES COMPOUND IN DIFFERENT CONSTITUENTS PARTS AT GRAPE

FELICIA STOICA, ELENA HEROIU

Key words: terpenes compound, peel, grape

SUMMARY

This study emphasize that the content of grapes in the terpenes compound, the fundamental constituents of flavour, are different by variety.

Thus, the Tămâioasă românească and Muscat Ottonel variety have a high content in terpenes compound than Sauvignon variety.

INTRODUCTION

The repartition of odorants substances in grape is different. At the most varieties, they are localized in the solids parts. The solids parts but more the peels are twice rich in terpenes compounds than the core.

In the core, the odorants substances are localized particularly, lengthways fascicle which are traversed (Elena Heroiu, 1998).

The bound fraction is more plentiful in the peel compared to the rest of constituents' parts of grape.

The free fraction is in big quantity in the peel than in the core and juice, the proportion between terpenols is different. For example, the geraniol and nerol have a high concentration in the grape peel than the core (Baumes R., 1994).

MATERIALS AND METHODS

The study was effectuated on flavour and *semiflavour* grapes varieties Tămâioasă românească, Muscat Ottonel and Sauvignon in Drăgăşani vineyard.

We observed: the free terpenes compound, the bound terpenes compound at the juice, core and peel of grapes.

The determination was effectuated using the high precision apparatus – gas chromatograph – with the recommendations of the national and international speciality forum.

RESULTS AND DISCUSSIONS

The repartition at the free and bound terpenols in a different constituent part of grapes by variety is presented in table 1.

Table 1

The distribution at terpens compounds in a different constituent parts of grapes

Variety	Juice + core		Peel	
	TVL	TLP	TVL	TLP
Sauvignon	450	50	600	190
Muscat Ottonel	1350	1980	3450	5620
Tămâioasă românească	700	2230	3110	5770

By this point of view, at Muscat Ottonel variety is a high distribution at flavoured compound in juice + core fraction comparative with the values at other two varieties.

At Tămâioasă românească variety is a big quantity at bound terpens in juice + core fraction comparative with the values at other varieties.

At Muscat Ottonel variety and Tămâioasă românească variety the content in bound terpenes at peel is superior the content at juice + core, with better values at Tămâioasă românească.

Although they are near like aromatic potential at peels, Muscat Ottonel and Tămâioasă românească varieties are different in the must terpenols compounds, differentials which can be at complex enzymatic systems of these varieties.

At Sauvignon variety, the report of 2 categories of terpenes is favourable at free terpenes by peel. In this case, it is interesting to study the technology of these compounds extraction by peel to obtain a better quality of wine.

The free terpens distribution in the grape is different by variety (tabel 2).

Tabel 2

The distribution of the free terpens in a grape at a different variety

Variety	Linalol μg/kg	α-terpineol μg/kg	Geraniol μg/kg
Sauvignon			
Juice + core	130	215	90
Peel	310	290	100
Muscat Ottonel			
Juice + core	895	90	193
Peel	1495	362	443
Tămâioasă românească			
Juice + core	210	400	102
Peel	810	2100	198

The α-terpineol and the geraniol are localized in the grape peel at all three varieties; the linalol is repartition in near quantity between two grape fractions in case of Muscat Ottonel variety.

At Tămâioasă românească variety the predominant compound is α-terpineol in juice + core and the peel, but the report (comparative with Muscat Ottonel variety), in peel is more (fig. 1 and fig. 2).

Fig.1

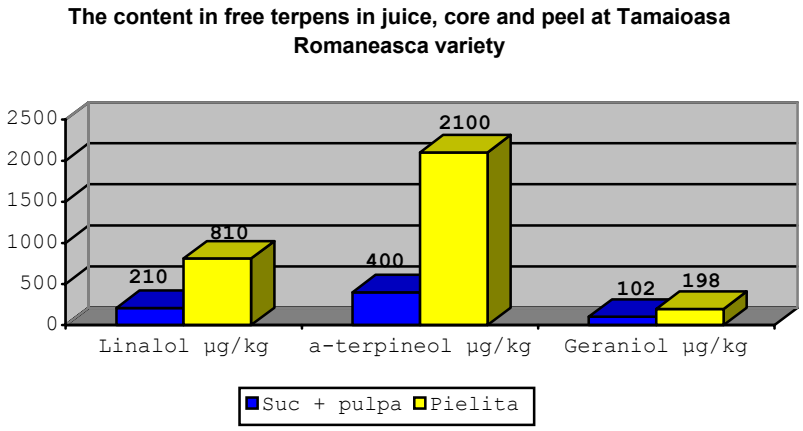
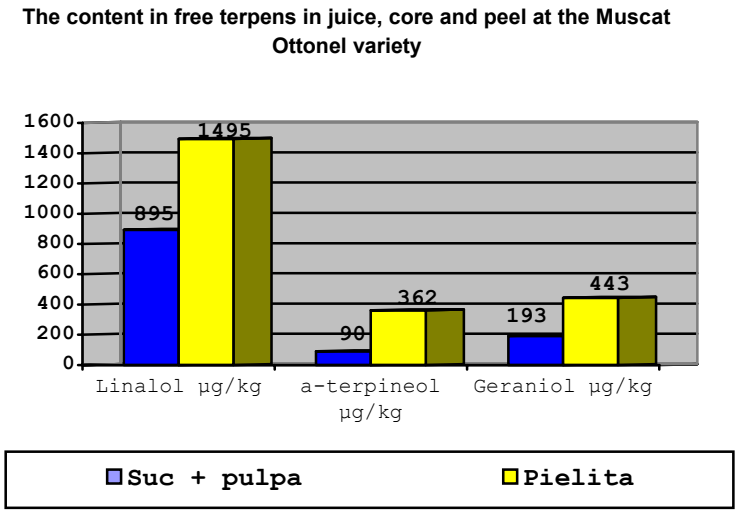


Fig.2



All the varieties content the same flavoured elements, localized especially in the peel. The different between the intensity and the quality of the flavour at these varieties is in the proportion at the compound.

In other way, the composition of the grape flavour is not the same in all constitutive parts of the grape. The peel flavoured may be different by the flavoured of the must not like intensity but like quality.

The high level at monoterpens at the grapes peel supposed the hypothesis that the hypoderm cells of the different technology in wine elaboration.

The existence in the grape at the consistent aromatic potential, like forerunner unflavoured, free polioli, hydrolysis glycoside which are release by enzymatic or acid hydrolysis, open a large expectation for technological application in the extraction and release at this flavour in the must and the wine.

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THE COMPARATIVE RESEARCH OF SOME PINOT NOIR CLONES IN THE CONDITIONS OF THE ŞTEFĂNEŞTI-ARGEŞ VINEYARD DURING 2002-2003

MARINELA STROE, I. NĂMOLOŞANU,
ARINA OANA ANTOCE, C. POPA

Key words: rootstock, clones, Pinot Noir, yield, Ştefăneşti

SUMMARY

Obtaining quality wines represents an important goal for the present Romania viticulture. The wine quality mostly depends on the production technologies, the applied treatments and last, but not least on the grapes quality. The present work refers to the influence of the cultivation year and of the rootstock on the quality and the yield of three Pinot Noir clones from the Ştefăneşti – Argeş vineyard.

INTRODUCTION

The great popularity and world wide spreading of Pinot noir variety has prompted its cultivation in many countries, including Romania. However, this variety has become a research topic in the Ştefăneşti – Argeş vineyard only starting with the year of 1997. Concerning the variation in yield, the intensity colour and the resistance against diseases, Pinot noir is known as a difficult variety. The quality of its wines is deeply influenced by the production quantity and quality and these are determined by different factors like: the clone, the year, the agrotechnical procedures, the rootstock and so on, each factor having a certain influence on the final product, as far as the polyphenol composition and the overall sensory characteristics are concerned. The present work shows the first experimental data regarding the influence of the year (2002 and 2003) and the type of the rootstock (SO-$_4$-5, 3309-111) on the quality and quantity of the grapes of 3 clones of Pinot noir, cultivated under the conditions of Ştefăneşti – Argeş vineyard.

MATERIALS AND METHODS

In order to evaluate the behaviour of three selected clones of Pinot noir variety grafted on SO-$_4$-5 and 3309-111 rootstocks, a clone grafted on Kober 5 BB was used as the control. The 6 experimental varieties and the control are presented in Table no.1.

The training system chosen was the Cordon de Cazenave, an Italian and French system used for fertile soils, with 16 buds/m^2, and planting distance of 2,5/0,9 m (4445 vines/ha). The clones were cultivated in the experimental research field of S.C.D.V.V. Ştefăneşti – Argeş in1997 and began to bear fruit in 2000.

Table 1 - Tested Pinot noir clones

Clone of Pinot Noir /rootstock	Clone description
CONTROL– Pinot noir/ Kober 5 BB	
777A/SO_4-5 777A/3309-111	High quality clone Origin: Morey St. Denis (Cote d'or) Selection centre: A.N.T.A.V., 1981
115B/SO_4-5 115B/3309-111	Quality clone Origin: Morey St. Denis (Cote d'or) Selection centre: I.N.R.A., 1971
375C/ SO_4-5 375C/3309-111	Quality clone Origin: St. Denis de Vaux (Saone et Loire) Selection centre: A.N.T.A.V., 1974

The observations and analyses made were as following: the offshoot fertility and productivity, the grapes yield (kg/vine), the sugar accumulation in the grapes and the anthocyans content. The weather data were taken from the weather station of S.C.D.V.V. –Ştefăneşti – Argeş.

RESULTS AND DISCUSSIONS

The weather conditions of the two culture years (2002-2003) were atypical for this region. Thus, in 2002, after a winter and spring lacking in precipitations, the summer proved to be very hot and droughty, while in 2003, after a winter with very low temperatures, which damaged the buds viability, another droughty summer and autumn followed, obviously influencing the quantity and the quality of the harvest. Generally, the years of 2002 and 2003 may be considered however favourable to viticulture.

Offshoot fertility and productivity

Generally, Pinot noir variety has an average vigour, its fertility being always influenced by the weather conditions and by the rootstocks on which is grafted. Our researches in 2002 (Fig. 1a) led to the conclusion that the rootstock 3309-111 was more favourable for the formation of the fertile offshoots. In comparison, the clone 115B the fertility was 75.51% while the control showed only 66.31%. Consequently, on that clone we obtained a bigger yield, with 36 grapes per trunk, representing a production of 2.44 kg/trunk. The fertility is also favoured in the combinations 777A/SO_4-5 and 375C/SO_4-5 (72.86%-72.51%) but the obtained grapes are smaller and the yield is, accordingly, lower (1.76 – 1.94 kg/trunk).

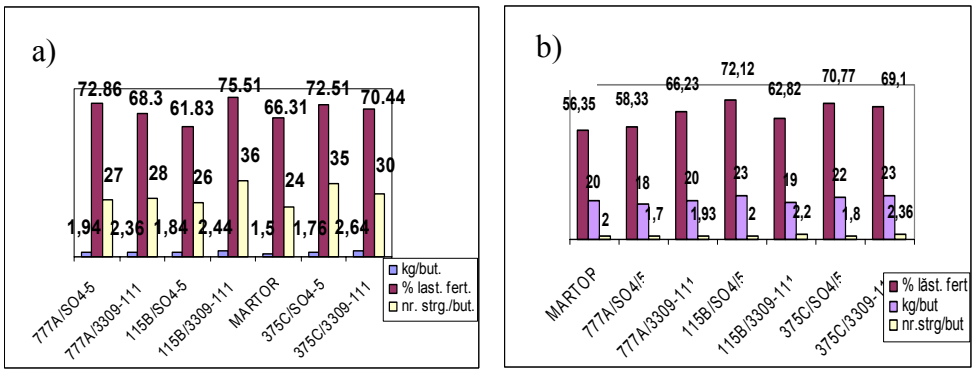

Fig. 1 The fertility and productivity of some Pinot noir clones, grafted on different rootstocks; a) year 2002, b) year 2003

For 2003, (Fig.1b) taking into account the low temperatures registered during the winter of 2002/2003, the combination 115B/SO_4-5 is the one which shows the largest percent of fertile offshoots, 72.12%, while the control had only 56.35%. However, the biggest yields are obtained for the clones grafted on 3309-111 (1.93-2.36 kg/trunk).

Quantity and quality of the grape production. The grapes yield and their quality were influenced by the weather conditions and the rootstocks the clones are grafted on. Analyzing the sugars accumulation during both years (Fig.2a, Fig.2b), one can notice that they were relatively constant, in the limits of the biological potential of the variety, irrespective of the clone or rootstock. Regarding the accumulated anthocyans, (Fig.3a, Fig.3b), their content was much bigger in 2003, compared to 2002. As far as the rootstock influence is concerned, the three clones grafted on SO_4-5 showed anthocyan content comprised between 888.1 and 1077.7 mg/l, with an extraction yield of 48.08-51.00%.

CONCLUSIONS

Year influence: The weather conditions recorded for the years 2002 and 2003 influenced the fertility of the offshoots, the average yield of grapes/trunk, as well as the content of sugar and anthocyans accumulated in the berries. The fertility was influenced by the weather conditions during the year, while the accumulation of the sugar and colour pigments were not so much affected.

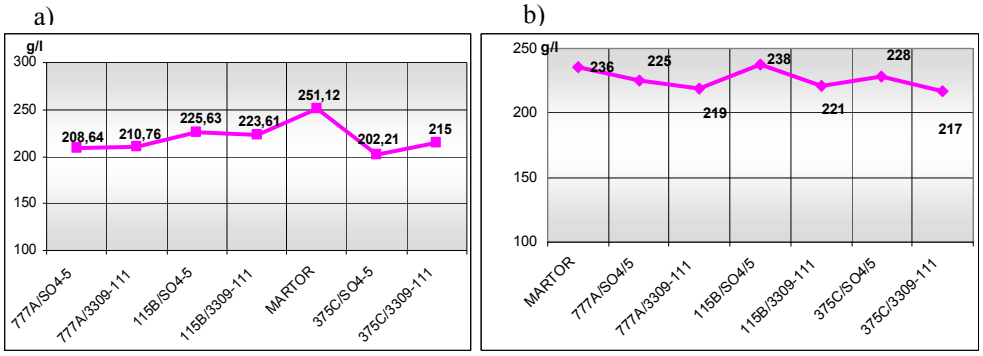

Fig.2 The sugar content of the Pinot noir clones at the moment of harvest; a) year 2002, b) year 2003

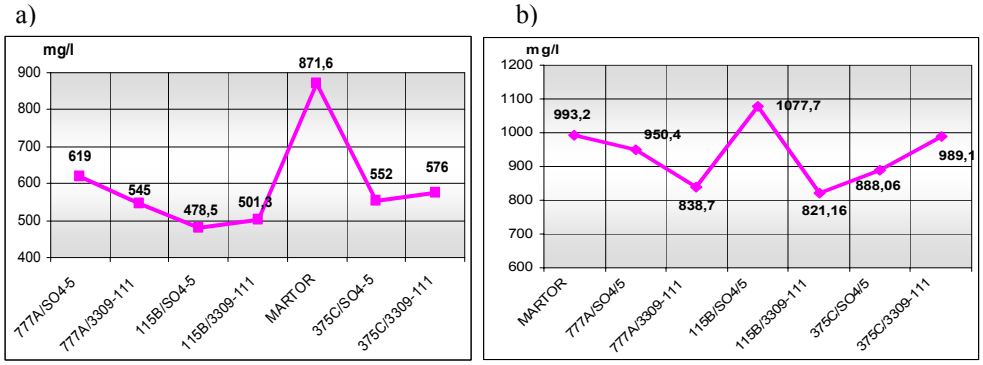

Fig.3 The antocyans content of the Pinot noir clones at the moment of harvest; a) year 2002, b) year 2003

Rootstock influence: The combinations 777A/SO_4-5, 115B/SO_4-5, 375/SO_4-5 proved to accumulate higher amount of sugar and anthocyans than the clones grafted on the other rootstock. However, the clones grafted on 3309-111 led to higher yields in both 2002 and 2003.

Clone influence: Although all the clones proved to be suitable for the cultivation in the viticultural centre of Ştefăneşti-Argeş, our researches proved that the clones 777A and 115B grafted on SO_4-5 attain a good balance as far as both the quality and the quantity are concerned.

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STUDIES REGARDING THE ABILITY FOR RETURNING TO MULTIPLICATION POTENTIAL AFTER *IN VITRO* CONSERVATION TO LOW TEMPERATURE ON GRAPEVINE

EMILIA VIŞOIU, ELENA BUCIUMEANU,
CARMEN FLORENTINA POPESCU

Key words: grapevine, *in vitro* conservation, multiplication.

SUMMARY

Grasa de Cotnari 45Pt, Valeria, Donaris and Italia varieties exhibited a different behaviour after 35-40 days of low temperature treatment, depending on their stage of development and stock conditions. The multiplied material (adventitious buds, multiplicities and rooted shoots) that was conserved to 0-1°C necroses in a proportion of 62-77% after their transfer to 25°C. On the contrary, the conservation of plant material to a temperature of 3-4°C proved to be very efficacious for conservation of shoots primordial and adventitious buds (100 %), although a certain degree of necroses were observed to growing tops and the upper leaves of the shoots.

The vital functions became slowly during a longer period of low temperature treatment (50-60 days more) and plant material was able to return to a normal rate of multiplication after their transfer to normal condition of temperature and light.

INTRODUCTION

The germplasm collections in greenhouses and fields with grapevine planting material are often affected by climate stress and pathogens from air (cycads and spiders) or soil (Bouquet and Boursiquot, 1996; Boursiquot 1997).

In vitro culture as a routine technique for grapevine multiplication reduced these risks and in the same time is considered an efficient method for storage of valuable grapevine plant material. *In vitro* conservation without freezing means as a diminution, or a temporary stand of the vital functions, and these involve periodically transferees of the explants (to long period of time) on fresh media (Cachiţă-Cosma, 1987).

The purpose of this study was to test the capacity of returning to regenerative potential of grapevines material, which had been *in vitro* multiplied and rooted, after a low and positive temperature treatment.

MATERIALS AND METHODS

The biological materials used in this study were selected in multiplication phase (adventitious buds, shoots primordia and shoots) and rooting phase (4.0- 4.5 cm long rooting shoots). Primary cultures were established from three virus-free varieties (Grasa de Cotnari 45 PT., Donaris and Valeria cvs.), and also from one leafroll virus infected cultivar (Italia). For *in vitro* cultures were used specific

media for multiplication (M&S + 0.5 mg/l BAP + 0.5 mg/l AIA) and for rooting (1/2 M&S + 1.5 mg/l AIA + 0.022 kinetine).

For each variety and type of plant material two treatments were applied to low temperature, 0-1°C and 3-4°C for a period of 90-100 days. The material was transferred on fresh media with the same composition after 45-50 days of conservation.

In order to be sure that the photosynthetic processes are able to continue after the absence of light during low temperature treatment, it was necessary to stop this regime to every 35-40 days and transferr the plant material to normal condition of culture (25±1° C and 2500-3000 Lx light). The conditions were changed in time, starting with 10-15° C and low light intensity (1000-1500 Lx).

The observations regarding *in vitro* evolution of the explants after temperature treatments and their capacity to come back to normal potential of multiplication were quantified only after the whole period of conservation. The degrees of affections of the shoots (leaves and roots) were morphologically evaluated.

RESULTS AND DISCUSSIONS

Plant material belonging to Grasa de Cotnari 45Pt, Valeria, Donaris and Italia showed a different behaviour depending on phase of development and the storage temperature (Fig. 1, 2). Plant material, multiplied and rooted, necrosed in proportion of 62-72 % when was transferred to 25±1° C after 35-40 days of low temperature storage at 0-1°C. Our observations, at each stages of development, revealed that low temperature affected especially high shoots (more than 2 cm) in a proportion of 80-100% by browning and after that drying up of the shoots. The shoots primordia and adventitious buds showed a better resistance to low temperature and survived in a proportion of 25-55% after their transfer to normal conditions of culture.

Although Italia was infected with virus particle, the healthy status was not a limitative factor for resistance to low temperature treatment. So, 25% viable structures were obtained with this variety.

The temperature of 3-4°C for storage conditions proved to be efficient for conservation in any stages of multiplication. The growing tops and the upper leaves of shoots were affected in a proportion of 75-83%. In the case of rooted shoots, was partially affected root system (long roots with the I-st and II-nd order ramifications). In this case was necessary to hurry up the acclimatization of the plantlets.

The *in vitro* plant material was also able to survive and restart the vital processes after prolonged the low temperature treatment to 90-100 days. So, the regenerative processes of the cultivars were significantly improved by multiplication of the adventitious buds and shoots primordia in normal environmental conditions (25±1°C). In this way it was possible to obtain plants

with those varieties presenting crowded buds without raising shoots (Grasa de Cotnari 45Pt. and Valeria).

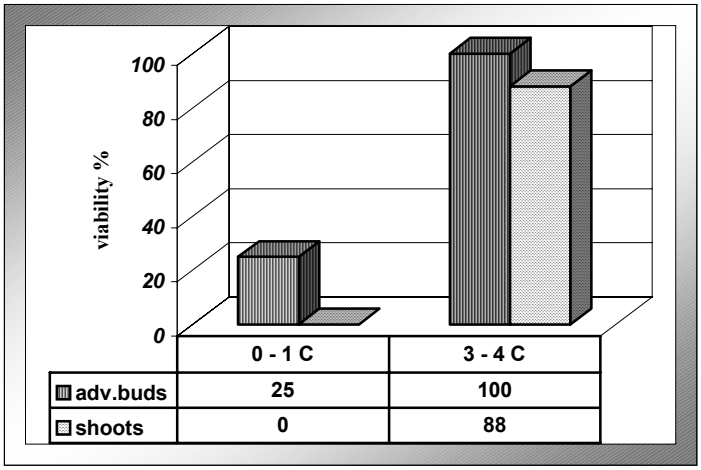

Fig. 1 Resistance to low temperature of the biological material depending on the type of explants

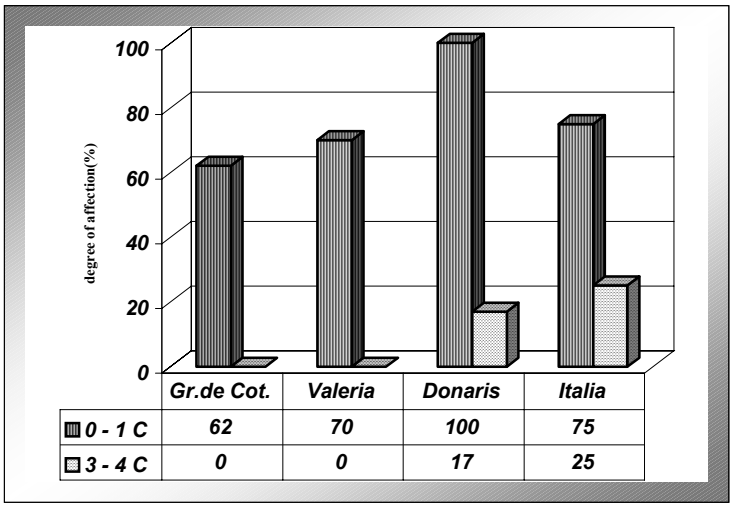

Fig 2. Cultivars behaviour to low temperature treatment

CONCLUSIONS

1. In the case of 0-1°C temperature treatment for 90-100 days it is possible to maintain the vital processes to the survival threshold only for the vegetative formations in an early stage of development (adventitious buds and shoots primordia).
2. The maintenance of the plant material to 3-4°C for 35-40 days assured a proper conservation of shoot primordia and adventitious buds. The shoots were affected in a proportion of 75-83 %.
3. Temperature of 3-4°C slowed down the vital processes, affected different organs of plantlets, but the vegetative structures returned to a rapid process of regeneration after transferred to normal conditions of culture.
4. A prolonged period of conservation is recommended only to a temperature of 3-4°C and by frequently medium replacement for multiplication.

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