



BIOTERRA

BULLETIN OF SCIENTIFIC INFORMATION
NR. 15 JANUARY- JUNE 2008
(twice a year publication)

EDITORIAL BOARD

President :

NICOLAE Ion

Member of the Academy of Romanian Scientists
President of Agricultural Section

Members :

NICOLAE Floarea

MAREȘ Mihai

ATUDOSIEI Nicole-Livia

NEGUȚ Lucia

MANIU Maria

GAJO Paolo

ȘTEFĂNESCU Paul

(*Member of the Academy of Agricultural and Forestry Sciences*)

Scientific Coordinator :

STOIAN Viorel

VicePresident of the Academy of Agricultural and Forestry Sciences

BALTEANU Gheorghe

Member of the Academy of Agricultural and Forestry Sciences

Technical Editors :

Cristina NEDIANU

Office :

Nicolae Șuțu Street, no. 11-15,
Central building, second floor, room 9,
sector 1, Bucharest, Romania



BULLETIN OF SCIENTIFIC INFORMATION

- **REACTION OF “VICIA FABA” PLANTS TO SOIL AND FOLIAR N APPLICATION AND K NUTRITION**

RAZVAN COTIANU, MIHAELA PARVULESCU

- **ASPECTS ABOUT APPLY FERTILISERS IN ECOLOGICAL VINE GROWING**

COTIANU RAZVAN, ATUDOSIEI NICOLE LIVIA, CORFU GABRIELA

- **RESEARCHES REGARDING A QUANTITATIVE SPECIFIC FEATURES VARIABILITY FOR SOME CULTIVATED VARIETIES AND CLONES IN DRĂGĂȘANI VINEYARD**

DANIELA FANUTA MIHAELA, GABRIELA CÔRNELIA CORFU, M.CIOLACU, M. STOIAN, ROXANA MARILENA CIOBANU

- **THE IMPORTANCE OF THE INTEGRATED PEST CONTROL METHODS IN THE SUSTAINABLE SOIL MANAGEMENT**

NICOLE LIVIA ATUDOSIEI, MARIA MANIU, FLOAREA NICOLAE, CAMELIA GAVRILESCU, ION NICOLAE, MARIAN NICOLAE

- **VARIOUS ECOLOGICAL WAYS OF CAPITALIZING BLUEBERRIES FRUITS (VACCINIUM MYRTILLUS L.)**

NICOLE LIVIA ATUDOSIEI, FLOAREA NICOLAE, MARIAN NICOLAE, CONSTANTIN MANOLACHE, RAZVAN COTIANU, PAUL STEFANESCU

- **BIOTERRA UNIVERSITY’S ECOLOGICAL FOOD RANGE WITH NUTRITIONAL AND THERAPEUTIC VIRTUES**

NICOLE LIVIA ATUDOSIEI, ION NICOLAE, PAUL ȘTEFĂNESCU



BULLETIN OF SCIENTIFIC INFORMATION - NR.15 / 2008

**” BIOTERRA ” University Foundation
ROMANIA - BUCHAREST 2008**

ISSN : 1454 - 816 X

*Quoted from ”BIOTERRA Presentation Guide”, 4th Edition, BIOTERRA Publishing House, year 2000,
I.S.B.N.: 973-8114-10-1*



REACTION OF “VICIA FABA” PLANTS TO SOIL AND FOLIAR N APPLICATION AND K NUTRITION

RAZVAN COTIANU ¹, MIHAELA PARVULESCU ¹

Abstract: The effect of different rates and methods of fertilizer nitrogen application and potassium nutrition on the root nodule formation of *Vicia faba* plants and on their nitrogenase activity was studied. It was found that fertilizer N depressed the nodule formation and nitrogenase activity, but inhibitory effect of N was smaller when it was supplied to the leaves instead to the soil. Plants growing at higher K level were in a position allowing on better development of nodules and consequently higher N₂ - fixation.

Key words: nitrogenase activity, nitrogen nutrition, nodulation, potassium nutrition.

INTRODUCTION

Major decline in nitrogen fixation during reproductive growth has often been reported. This raises a question whether the amounts of nitrogen fixed symbiotically are sufficient to meet the needs related to seed setting and formation. Many authors showed a beneficial effect of ammonium nitrate on the seed yield of lucerne, *Vicia faba* and other legume plants. Addition of mineral nitrogen to the culture medium depresses, however, the root nodule formation and symbiotic nitrogen fixation.

The paper presents the results of the investigation on the effect of different rates and methods of N application, at two levels of potassium fertilization, on the root nodule formation of *Vicia faba* and on their nitrogenase activity at successive stages of plant development.

MATERIAL AND METHODS

The experiment was performed in greenhouse conditions at natural light, in pots filled with sand; *Vicia faba* seeds were inoculated with an active strain of *Rhizobium leguminosarum* and were sown in the middle of April.

¹ Bioterra University of Bucharest



Five plants were grown in each pot (7.8 kg of sand). The following rates of nitrogen and potassium were applied: 110 (N-1), 550 (N-2), 1100 (N-3) mg N/pot; 250 (K1) and 1000 (K2) mg K/pot. The other mineral nutrient components were given in amounts appropriate to assure the normal growth of *Vicia faba* plants and amounted to: 700 mg P, 250 or 1000 mg K, 260 mg Mg, 50 mg $\text{Fe}(\text{C}_6\text{H}_5\text{O}_7) \times 3\text{H}_2\text{O}$, 10 mg H_3BO_3 , 10 mg $\text{MnSO}_4 \times 4\text{H}_2\text{O}$, 1 mg $\text{CuSO}_4 \times 5\text{H}_2\text{O}$, 1 mg $\text{ZnSO}_4 \times 7\text{H}_2\text{O}$, 0.5 mg $(\text{NH}_4)_6\text{Mo}_7\text{O}_{24} \times 4\text{H}_2\text{O}$, and 0.5 mg CoCl_2 per pot. The medium was limed with 5000 mg CaCO_3 per 7.8 kg of it.

The first group of plants received the total amount of fertilizer N to the soil, in the form of ammonium nitrate - half of it before sowing and half at budding stage. The second group of plants received half of the nitrogen dose to the soil, before sowing, as ammonium nitrate, and the remaining one - to the leaves as urea N, sprayed in five small portions every day, starting at budding stage. Nitrogenase activity was measured in tile excised nodulated roots and expressed as the amount of ethylene formed, as a result of acetylene reduction, at successive stages of plant development. After each nitrogenase assay nodules were separated from the roots for their dry matter determination. Measurements were performed in 3 replications with 5 plants in each of them.

RESULTS AND DISCUSSIONS

It is well known that mineral nitrogen given to the leguminous plants, as a soil fertilizer, depresses the root nodule formation and symbiotic nitrogen fixation (Kage, 1995).

Data show, that (at both potassium levels) *Vicia faba* plants, which received total fertilizer nitrogen as ammonium nitrate given to the soil, produced, in general, lesser dry matter of root nodules, than the plants, which received half amount of fertilizer N (as NH_4NO_3) before sowing to the soil, and half of it (as urea N) to the leaves, at the generative phase of plant development. Also in our earlier research the inhibitory effect of fertilizer N on nodule growth was greater when it was supplied to the soil than to the leaves (Kocon, 1999).

Potassium treatment had, in general, a positive effect on root nodule formation, at both methods of N management, especially, at the highest nitrogen rate. Increased K dose as well as foliar N application increased nodules/roots ratio (table). Dry matter of root nodules increased with plant age, independently of K and N level and the method of N management. Increase in nodule number and flesh weight of nodules per plant and the average weight of the nodules with increasing K-supply in soybean was found by Premaratne and Oertli (2004) and in jack bean by Lynd (1999).



The suppressed nodule growth at the lower K level may be attributed to the reduced photosynthate supply to the developing nodules, related to the lowering of photo-synthetic rate under a deficient level of K supply.

Table 1:

The value of nodule d.m. to the root d.m. ratio
(K1=250 mg K per pot, K2= 1000 mg K per pot)

Harvest time	N level - mg per pot											
	110				550				1100			
	K1		K2		K1		K2		K ₁		K ₂	
	soil N	leaves	soil N	leaves	soil N	leaves	soil N	leaves	soil N	leaves	soil N	leaves
I	0.107	0.147	0.136	0.184	0.081	0.091	0.075	0.100	0.044	0.052	0.051	0.074
II	0.130	0.147	0.155	0.173	0.070	0.110	0.080	0.118	0.045	0.052	0.053	0.064
III	0.113	0.142	0.138	0.169	0.092	0.107	0.124	0.150	0.072	0.068	0.086	0.098
IV	0.099	0.123	0.137	0.176	0.127	0.099	0.126	0.110	0.075	0.091	0.082	0.091
Average	0.112	0.140	0.142	0.176	0.093	0.102	0.101	0.120	0.059	0.066	0.068	0.082

Results show that, with both potassium treatments, fertilizer nitrogen supplied in both methods of its management depressed the nitrogenase activity in the root nodules, which is a well known fact. The inhibitory effect of fertilizer N was in general smaller, when nitrogen was supplied in part to the leaves, than in the case when the whole dose of nitrogen was given to the soil, as observed earlier (Kocon, 1999).

At low and medium fertilizer nitrogen dose the highest enzyme activity was measured in younger plants - at the beginning of flowering - and it diminished with age. Gradual decline in nitrogenase activity throughout the ontogenesis of pea was observed by Vikman and Vessey (1998).

Farrington (1999) reported that N₂ fixation in *Lupinus angustifolius* did not occur until 35 days after sowing, reached maximum rates at the beginning of flowering, and ceased during the period of rapid grain filling. In contrast, Trinick (2000) observed that N₂ fixation in *L. angustifolius* continued from flowering and seed set until the death of the plant. In *Lupinus luteus* maximum nitrogenase activity was measured at full flowering.



At the highest dose of fertilizer N, the highest nitrogenase activity was measured in older plants. It means that the inhibitory effect of fertilizer N becomes less visible some time after its application. In later stages of plant development even the new nodule formation was observed.

The effect of the potassium treatment on nitrogenase activity was, in general, very positive. It is worth noting here, that at a low potassium level no typical K deficiency symptoms were visible. This positive effect of K fertilization on the nitrogenase activity increased with an increase of nitrogen dose. It suggests that favourable soil fertility is a prerequisite for effective legume - *Rhizobium* interaction.

The positive effect of K nutrition on N₂ fixation in this study can be interpreted without assuming that K activates the enzyme nitrogenase. Plants with an optimal K status may have translocated higher amounts of photosynthates from the leaves to the roots and root nodules, thus providing ATP and electrons required for nitrogen reduction. At the same time a better potassium supply stimulates the transport of nitrogenous compounds from root nodules to other parts of the plant, allowing the *Rhizobium* to remain more active for further reduction of N₂.

On the other hand, an adequate K status may be necessary for N₂ fixation by directly activating the nitrogen assimilating enzymes. Several authors have demonstrated direct involvement of K in the activation of nitrogenase.

CONCLUSIONS

It can be assumed from this study that:

a) fertilizer N depressed the nodule formation and nitrogenase activity, but the inhibitory effect of N was smaller when it was supplied to the leaves instead of the soil,

b) plants which received a sufficient supply of potassium were in a position to synthesise more carbohydrates by photosynthesis, resulting in a rapid turnover of carbohydrates, thus allowing better development of nodules and consequently a higher N₂-fixation.



REFERENCES

1. **Barta A.L., 1992** - *Response of symbiotic N₂ fixation and assimilate partitioning to K supply in alfalfa*. Crop Sci. 22: 89-92.
2. **Farrington P., Greenwood E.A.N., Timanis Z.V. Trinick M.J., Smith., 1999** - *Fixation, accumulation, and distribution of nitrogen in acrop of Lupinus angustifolius cv. Unicrop*. Aust. J. Agric. Res. 128: 237-248.
3. **Hardy R.W.F., Holsten R.D., Jackson E.K., Burns R.C., 1988** - *The acetylene - ethylene assay for N₂ fixation: laboratory and field evaluation*. Plant Physiology 43: 1185-1207.
4. **Hardy R.W.F., Burns R.C., Holsten R.D., 1993** - *Application of the acetylene - ethylene assay for measurement of nitrogen fixation*. Soil. Biol. Bioch. 5: 47-81.
5. **Kage H., 1995** - *Interaction of nitrate uptake and nitrogen fixation in faba beans*. Plant Soil. 176: 189-196.
6. **Kocon A., 1999** - *Effect of mineral nitrogen treatment of faba bean plants on symbiotic nitrogen fixation and seed yield*. Fragmenta Agron. 4: 169-170.
7. **Lynd J.Q., Odell G.V. (Jr) and McNew R.W., 1999** - *Soil potassium effects on nitrogenase activity with associated nodule components of hairy vetch at anthesis*. J. Plant Nutr. 4:303-318.
8. **Premaralne K.P., Oertli J.J., 2004** - *The influence of potassium supply on nodulation, nitrogenase activity and nitrogen accumulation of soybean (Glycine max L. Merrill) grown in nutrient solution*. Fertiliser Research 38: 95-99.
9. **Trinick M.J., Dilworth M.J., Grounds M., 2000** - *Factors affecting the reduction of acetylene by root nodules of Lupinus species*. New Phytol. 77: 359-370.
10. **Vikman P.A., Vessey J.K., 1998** - *Gas-exchange activity, carbohydrate status and protein turnover in root nodule subpopulations of field pea (Pisum sativum L. cv. Century)*. Plant Soil 151: 31- 38.



ASPECTS ABOUT APPLY FERTILISERS IN ECOLOGICAL VINE GROWING

COTIANU RAZVAN¹, ATUDOSIEI NICOLE¹, CORFU GABRIELA²

Abstract: *Ecological viticulture is mainly a system that corresponds to the healthy and high quality foods request. Also, ecological wine crop provides the breeding and protection of natural resources on long term for the benefit of future generation. In order to practice the system of ecological viticulture is important to reduce the environment pollution and to promote cautiously the intensive systems of viticulture productions taking into account the use of industrial inputs do not produce pollution over the limits, issued by the food safety standards.*

Key words: *compost, ecological viticulture, food safety, mineralisation*

INTRODUCTION

The Romanian Department for the Agriculture is funding nation-wide compost application trials covering all major grape-growing regions. These trials are not primarily targeted at promoting organic viticulture but rather to support the development of markets for recycled organics. Nevertheless, the use of compost as a management tool with a wide range of beneficial effects is very relevant for the organic grape growing industry. The use of compost in viticulture can, as in other agricultural/horticultural applications result in a wide range of positive effects. However, there is also scope for potentially detrimental effects.

MATERIAL AND METHODS

We used statistical data and the results of the analysis methods. This research was compiled which presents an international overview of the current level of knowledge and the state of play of compost use in viticulture.

² Bioterra University Bucharest



RESULTS AND DISCUSSIONS

Supply of plant nutrients:

Compost contains all macro and micronutrients essential for plant growth. However, not all nutrients are readily available in mineral forms for plant uptake. Considerable amounts of nitrogen and phosphorus are organically bound in the compost and are released only once the organic matter is mineralised through microbial activity. The level of readily available mineral nitrogen contained in compost and the degree of nitrogen release due to the mineralisation process following compost application are of particular interest.

The nutrient budget in Table 1 shows that a compost application of approximately 10 t dm/ha (20 m³/ha) should be sufficient to meet the demand of grapevines, except for nitrogen. However, the apparent lack of nitrogen in the budget is alleviated through airborne nitrogen deposits (30 - 50 kg/ha per year in Germany), through mineralisation of soil humus reserves or through leguminous cover crops.

Most, or a high proportion of phosphorus, potassium, magnesium and calcium found in recycled organics compost is available to plants immediately or becomes plant-available over time. Approximately 20 % of phosphorus in compost react like P in mineral fertilisers and are immediately available for plant uptake while the remainder is more strongly bound and will become available later. Virtually all potassium supplied with compost can be used immediately by plants.

Table 1

Availability and supply of nutrients contained in
20 m³/ha of an average bio-waste compost in comparison
to the nutrient demand of grape vines

Nutrient	Nutrient level (% dm)	Nutrients available to plants in kg/ha and as percentage of total (in brackets)		Nutrient demand of vines (kg/ha per year)
		In first year	Within four years	
N	1.2	10-20 (10-15%)	approx. 50 (approx. 40 %)	45-80
P₂O₅	0.7	20 - 30 (30 - 40 %)	70 (100%)	16-23
K₂O	1.2	70- 100 (65-85%)	120 (100%)	83-100
MgO	1.8	10-30 (5-15%)	7	10-151
CaO	6.0	sufficient	sufficient	15-40



The situation is more complex with nitrogen of which only a small proportion is directly available to plants initially and the remainder being mineralised and released only over time (3-4 years). As a rule of thumb it is generally assumed that approximately 5 % of the total amount of nitrogen found in recycled organics compost is present in a mineral form and hence directly plant available and that annually approximately 10 % of the total nitrogen is mineralised over the next few years. It is estimated that in total approximately 40 % of all nitrogen contained in compost at the time of application will become available to plants.

In order to reconcile conflicting research results and to solve many open questions related to nitrogen availability and the mineralisation of organic matter, which is important both from a plant nutritional and environmental point of view, a 10 year long-term, cooperative research project was established. It aims to provide a better understanding of the long-term dynamics of mineralisation and nitrogen supply potential of compost.

However, most available data relate to temperate climatic conditions in Europe and it has to be expected that nitrogen dynamics associated with compost use are quite different in climatically different wine growing regions. An assessment of nitrogen availability from composted chicken manure and slaughterhouse waste in conditions showed that compost is not necessarily a slow release fertiliser. Surprisingly, according to plant growth results, composted chicken manure provided more nitrogen than urea during the first seven weeks of the trial and generated a flush of growth which peaked after nine weeks simultaneously with that of urea fertilised plants and at almost the same level (fig. 1). Considerably more research is warranted to examine the effects of using compost in various climatic conditions.

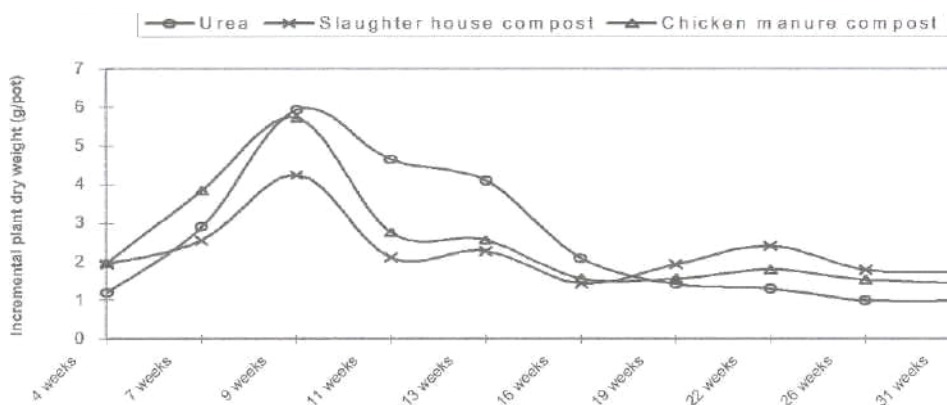


Fig. 1 - Effect of inorganic and organic nutrient sources (2 g N/12 lt. pot from each source) on plant growth (grass)



Improvement of soil physical, chemical and biological properties

In many experiments it was shown that compost use could substantially improve soil physical, chemical and biological properties, which are often important factors in determining its fertility status. The improvement of these soil properties results often in indirect benefits such as reduced erosion, ease of cultivation or a reduced disease incidence.

Crop yield and quality effects

Compost use showed inconsistent effects on grape yields, depending on the type of compost used, the vineyard soil and the control it was compared against. A 3-year trial in an organic production system started to show beneficial long-term effects of compost use in the last year of the experiment.

The use of compost as mulch resulted in substantial yield increases in some Australian trials. An observed three-fold yield increase was primarily due to increased survival of bunch numbers in very dry growing conditions (fig. 2). Additional nutrient supply through the use of mulch was not looked at.

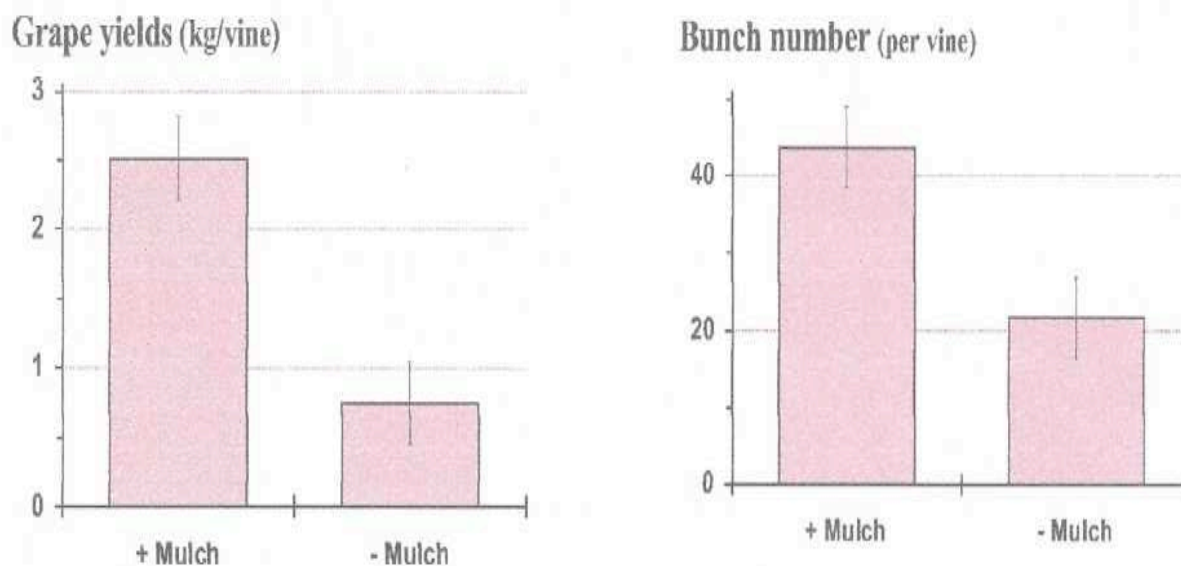


Fig. 2 - Effect of 7.5 cm mulch layer (50 cm wide) on grape yield and bunch survival in 18 month-old vines (conventional production)

According to the available literature, compost use on grapevine makes relatively little difference to the quality of the must or wine generated from these grapes.



CONCLUSIONS

Most of the obtained research data and information on the use of compost in viticulture originates from Europe. A wide range of positive effects can be attributed to the use of compost, some of which were also shown in vineyard trials. Compost provides essential plant nutrients but their release over time seems unpredictable. This is why research efforts in Europe now focus on this aspect which is important both from a plant nutritional as well as environmental point of view. Research in other regions has focused on the use of compost to redress the most pressing local problems, for example water shortage. However, future research into the use of compost should also investigate aspects such as nitrogen mineralisation from compost in warmer climatic conditions and the release of nitrogen and phosphorus from compost to assess its nutritional value over time and its potential detrimental effects if used inappropriately.

REFERENCES

1. **Bernaz G., Dejeu L., 1999** - *Fertilizarea viilor și întreținerea solului*, Editura Ceres, București
2. **Borlan Z. și colab., 1995** - *Ingrășăminte simple și complexe foliare-tehnologii de utilizare și eficiența economică*, Editura Ceres, București
3. **Chantelot E., 2001** - *Înnierbarea permanentă a solului din vie: alegerea corectă a speciilor de plantat*, phytoma nr. 544
4. **Condei G. și colab., 1987** - *Abordarea ecologică a sistemului integrat de întreținere și fertilizare a solului din plantațiile viticole*, Buletin I.C.V.V., nr. 4
5. **Cotea D.V. și colab., 2003** - *Podgoriile și vinurile româniei*, Editura Academiei Române, București
6. **Davidescu D., Davidescu Velicica, 1994** - *Agricultura biologică - o variantă pentru exploatațiile mici și mijlocii*. Editura Ceres, București
7. **Dejeu L. și colab., 1999** - *Viticultura și principiile agriculturii biologice*, Hortinf, VIII, 1/77
8. **Dejeu L., Matei Petruța, 1996** - *Viticultura biologică*, Centrul editorial-poligrafic U.S.A.M.V., București
9. **Dejeu L., Petrescu C, Chira A., 1997** - *Hortiviticultură și protecția mediului*, Editura Didactică și Pedagogică, București
10. **Fregoni M., 1998** - *Viticultura di qualita*, Ed. informatore agrario srl
11. **Oșlobeanu M. și colab., 1980** - *Viticultura generală și specială*, Editura Didactică și Pedagogică, București
12. **Papacostea P., 1981** - *Agricultura biologică*, Editura Ceres, București
13. **Papacostea P., 1994** - *Ferma biodinamică*, Editura Ceres, București
14. **Târdea C., Dejeu L., 1995** - *Viticultura*, Editura Didactică și Pedagogică, București.



RESEARCHES REGARDING A QUANTITATIVE SPECIFIC FEATURES VARIABILITY FOR SOME CULTIVATED VARIETIES AND CLONES IN DRĂGĂȘANI VINEYARD

**Daniela Fanuta Mihaila³, Gabriela Cornelia Corfu¹, M. Ciolacu⁴,
M. Stoian⁵, Roxana Marilena Ciobanu¹**

Abstract: To Drăgășani S.C.D.V.V. has been studied a quantitative specific features variability applying a different types of pruning and load harvest for the following varieties and clones: Italian Riesling; Sauvignon 62 Dg; Pinot Gris; Selected Crâmpoșia, Cabernet Sauvignon 7 Dg and Romanian Muscat 104 Dg. For Italian Riesling and Pinot Gris it was applied a speronate type of pruning and semnificative deficiencies were established. For Selected Crâmpoșia and Romanian Muscat 104 Dg Clone were obtained semnificative positive results applying Guyot type of pruning on mid stem. A load harvest influenced a quantitative specific features for studied varieties, thus, applying a load of 10 eyes/m² to Italian Riesling was established a semnificative deficit. In case of Selected Crâmpoșia varieties and Romanian Muscat clone 104 Dg, load harvest had 29 eyes/m² and were established a very good results. For control, it was used a medium production of varieties.

Key words: clone, type of pruning, harvest load.

INTRODUCTION

To practice a modern viticulture means to adopt technologies of cultivation on different areas and production directions, especially a rational location in land of vine varieties which capitalize with best results a concrete ecological offer of it.

New plantation must accomplish a durable development requirements and the most important is competitiveness in range, and quality.

³ Universitatea Bioterra Bucuresti

⁴ S.C.D.V.V. Dragasani

⁵ I.N.C.D.V.V. Valea Calugareasca



Drăgășani vineyard have demurrages, capable to capitalize, supply a specific features, for cultivated varieties and for this, it must find solutions to provide competitiveness and a good position of Drăgășani vineyard.

Varieties and clones cultivated here which find a very good conditions of cultivation are: Italian Riesling, Sauvignon Petit 62 Dg, Pinot Gris, Selected Crâmpoșia, Cabernet Sauvignon 7 Dg, Romanian Muscat 104 Dg, Muscat Ottonel and others.

There are a lot of researchers which related about cultivated varieties behaviour, in Drăgășani vineyard like Alexandrescu I.C. (1994), Varga N. and contributors (2005), Stoian V. (2001). Technological descriptions of these varieties were also mentioned in Homage Book, "A fifty years of scientific activity in name of viticulture and vinification" (1986), published by Drăgășani Viticulture and Vinification, Research Development Station.

Other authors presented fertile sort agrotechnics like Alexandrescu I.C. and contributors (1981), Băniță E. (1994), Oșlobeanu M. and contributors (1980), Oprea A., Adriana Indreas (2000), Stănescu Doina (1998) and others.

A quantitative specific features variability for some cultivated varieties and clones in Drăgășani vineyard we will present you in the following pages.

MATERIAL AND METHODS

A research method was the one forseen by Valea Călugărească I.C.D.V.V. Theme card recommended on 1998 for the experiment. To establish a base elements in case of cultivation technologies (formation aspect cutting systems) for new varieties and in the some time for those introduced in cultivation to obtain table grape and wine. Biological material has been studied in production plantations from Drăgășani Viticulture and Vinification, Research Development Station.

By Oșlobeanu M. and contributors (1980) the type of pruning is mixture between one cutting system, vine formation aspect (low, semi-high, high) and production cords formation aspect.

The type of pruning is assigned by a name.

The system of short pruning of grape vine that we used it, had short elements of production plugs of 2 eyes (table 1).

The system joint pruning of grape vine that we also used it, had short and long elements of production (figure 2 and 3).

For the belt of 70 cm high, semi-high vine formation aspect, vine nutrition space by $2.2 \text{ m} \times 1.2 = 2.64 \text{ m}^2$ corresponding to a 3787 vine/ha, were established the following load settings and types of pruning:



1. The system of short pruning of grape vine, the type of speronate belt with the load settings 10, 15 and 20 eyes/m².
2. The system of joint pruning of grape vine with two types of pruning (cutting).
3. The type of Cazenave belt pruning with, the load settings; 10,15 and 29 eyes/m², with cords of 4 eyes;
4. The type of Guyot pruning on mid-stem with the load settings; 10,15 and 20 eyes/m².

There were also any differentiations:

- for the load setting 10 eyes/m² or 26 eyes/vine we used a double Guyot type of pruning, with 2 harvest link and for the load settings 15 eyes/m² and 20 eyes/m² we used a modified Guyot, type of pruning with 4 and also 5 harvest link. According to vine nutrition space by 2,64m² and the type of pruning, an adequate number of harvest elements for one vine is mentioned in table 1, 2 and 3. To locate in field a experience on types of pruning and load settings were included isolation area, so that an experience results couldn't be influenced.

We have made importance to varieties and clones behavior on years of research. To characterize the variants it was chosen like a witness, a medium production of these.

Table 1

**Structure and number of harvest elements/vine for speronate belt,
type of pruning**

Load setting eyes/m ²	Load setting eyes/vine	An adequate number of harvest elements/vine		
		Plugs of 2 eyes	Cords with 4 eyes	Cords with 8 eyes
10	26	13	-	-
15	40	20	-	-
20	52	26	-	-



Table 2

**Structure and number of harvest elements/vine for Cazenave belt,
type of pruning**

Load setting eyes/m ²	Load setting eyes/vine	An adequate number of harvest elements/vine		
		Plugs of 2 eyes	Cords with 4 eyes	Cords with 8 eyes
10	26	5	4	-
15	40	8	6	-
20	52	10	8	-

Table 3

**Structure and number of harvest elements/vine for Guyot mid-stem,
type of pruning**

Load setting eyes/m ²	Load setting eyes/vine	An adequate number of harvest elements/vine		
		Plugs of 2 eyes	Cords with 4 eyes	Cords with 8 eyes
10	26	5	-	2
15	40	4	-	4
20	52	6	-	5

RESULTS AND DISCUSSIONS

Our research studied three types of relations production to hectare / types of pruning, production to hectare / load setting and production to hectare / year of research.



Relationship between grapes's production to hectare and the type of pruning.

A different vine formation aspects, types of pruning and load settings has an impact over specific features of varieties and it helps us to know them, an essential thing to publish a monograph.

A limited differends which were calculated after applying of t values for 5%, 1% and 0,1% are also by 1.149, 1.561 and 2.116 t/ ha.

The statistics interpretation of grapes's production to hectare (after methods N. A. Saulescu 1967, N. Cepoiu 1968 and Data Analysis Exel, 2005) show that Italian Riesling and Pinot Gris varieties by applying a speronate type of pruning have a semnificative deficits comparative with 9.23 t/ha a general mean.

For Selectioned Crâmpoșia variety and Romanian Muscat clone 104 Dg with Guyot mid-stem, type of pruning we established a semnificative positive results (table 4).

For another varieties and clones by the type of pruning hadn't been obtained a remarkable results.

Variants like Italian Riesling with Cazenave and Guyot types of pruning, Selected Crâmpoșia and Romanian Muscat 104 Dg with speronate belt, type of pruning , Cabernet Sauvignon 7 Dg with Cazenave and speronate, type of pruning hadn't been obtained no significance and statistical mathematical point of view it is thought that are equal with a general mean.

For Sauvignon Petit 62 Dg with speronate, type of pruning and Pinot Gris with Cazenave type of pruning hadn't been obtained a semnificative results comparative with a general mean .

From the studied variants, became remarkable Selected Crâmpoșia variety and Romanian Muscat 104 Dg clone with Cazenave type of pruning and results were distinct semnificative positive;

The Cabernet Sauvignon 7Dg clone has one simple semnificative positive significance for the Guyot type of pruning.

Relationship between grapes's production to hectare and load of setting.

The analysis variation for studied varieties regarding a relationship between grapes's production to hectare and load of setting showed that are big differences between variants.



About statistical interpretation for grapes's production to hectare (after a method N.A.Săulescu,1967,N.Ceapoiu 1968 and Data Analysis Excel,2005),it comes out that Italian Riesling variety with a load of setting by 10 eyes/m² presented a very semnificative deficit of production.

For variants like Selected Crâmpoșia and Romanian Muscat 104 Dg with 20 eyes/m² load of setting had been obtained a semnificative positive results.

To another varieties with different load of setting had been obtained an intermediate results.Variants like Italian Riesling with 15and 20 eyes/m² load of setting,Sauvignon 62 Dg and Pinot Gris with 20 eyes/m² load of setting and the others variants hadn't been registered a semnificative productions.

For Pinot Gris and Muscat Ottonel varietes with 10eyes/m² and 15eyes/m² load of setting,it were obtained a semnificative negative results (Table 5).

A variant Cabernet Sauvignon 7Dg had been presented good results with 20 eyes/m² load of setting.

Relationship between grapes's production to hectare and the year of research.

The analysis of variation for studied varieties regarding a relationship between grape's production to hectare and the year of research showed that are big differences between variants especially because of the year 2006.

About statistical interpretation for grape's production to hectare it comes out that Italian Riesling (years 2005, 2006),Sauvignon Petit 62Dg (2006) Pinot Gris and Muscat Ottonel (2006) varieties have a very semnificative deficits.

The year 2007 excels with positive results,thus Sauvignon 62Dg,Selected Crâmpoșia,Cabernet Sauvignon 7Dg and Romanian Muscat 104 Dg have a very semnificative positive productions. For another varieties and years are an intermediate results.

Variants like Italian Riesling and Pinot Gris (2007), Selected Crâmpoșia (2006), Cabernet Sauvignon 7Dg and Muscat Ottonel (2004), hadn't been received no significance.

Selected Crâmpoșia (2005) like a variant is positive significance and Cabernet Sauvignon 7Dg (2006) variant is simple negative significance (Table 6). All statistical-mathematical reckonings had like a support a general mean by 9,23 t/ha.



Table 4

**The statistics interpretation over grape's production depending on variety,
clone and type of pruning (Drăgășani 2005-2007)**

No. var.	Variety Varieties/Types of pruning	Mean t/ha	Difference by a general mean, mt	A relative mean, %	Significance of differences by a general mean
1.	It.Riesling, speronate	5.87	-3.36	63	000
2.	It.Riesling, Cazenave	8.43	-0.8	92	
3.	It.Riesling, Guyot	9.00	-0.23	98	
4.	Sauvignon 62, speronate	7.22	-2.01	78	00
5.	Sauvignon 62, Cazenave	8.23	-1	89	
6.	Sauvignon 62, Guyot	9.10	-0.23	99	
7.	Pinot gris, speronate	7.02	-2.21	76	000
8.	Pinot gris, Cazenave	7.40	-1.83	80	00
9.	Pinot gris, Guyot	8.23	-1	89	
10.	Selected Crâmpoșia speronate	10.13	0.9	110	
11.	Selected Crâmpoșia Cazenave	11.13	1.9	121	**
12.	Selected Crâmpoșia Guyot	13.30	4.07	144	***
13.	Cabernet S7 speronate	8.57	-0.66	93	
14.	Cabernet S7 Cazenave	9.20	-0.03	99	
15.	Cabernet S7 Guyot	10.52	1.29	114	*
16.	Romanian Muscat 104 speronate	9.70	0.47	105	
17.	Romanian Muscat 104 Cazenave	10.80	1.57	117	**
18.	Romanian Muscat 104	12.17	2.94	132	***
19.	Muscat Ottonel, speronate	8.42	-0.81	91	
20.	Muscat Ottonel, Cazenave	9.27	0.04	101	
21.	Muscat Ottonel, Guyot	10.28	1.05	111	
	Media	9.23	0	100	
		DL 5%= 1.149			
		DL 1%=1.561			
		DL 0.1%=2.116			



Table 5

**The statistics interpretation over grape's production depending on variety,
clone and harvest load (Drăgășani 2005-2007)**

No. var.	Variety Varieties/Types of pruning	Mean	Difference by a general mean, mt	A relative mean, %	Significance of differences by a general mean
0	1	2	3	4	5
1.	It.Riesling, 10 eyes/m ²	6.32	-2.91	68	000
2.	It.Riesling, 15 eyes/m ²	7.70	-1.53	83	
3.	It.Riesling, 20 eyes/m ²	9.28	0.05	101	
4.	Sauvignon 62, 10 eyes/m ²	7.14	-2.09	77	0
5.	Sauvignon 62, 15 eyes/m ²	7.53	-1.70	82	0
6.	Sauvignon 62, 20 eyes/m ²	9.89	0.66	107	
7.	Pinot gris, 10 eyes/m ²	7.00	-2.23	76	00
8.	Pinot gris, 15eyes/m ²	7.37	-1.86	80	0
9.	Pinot gris, 20 eyes/m ²	8.28	-0.95	90	
10.	Selected Crâmpoșia 10 eyes/m ²	9.97	0.74	108	
11.	Selected Crâmpoșia 15 eyes/m ²	10.50	1.27	114	
12.	Selected Crâmpoșia 20 eyes/m ²	14.10	4.87	153	***
13.	Cabernet S 10 eyes/m ²	8.27	-0.96	90	
14.	Cabernet S 15 eyes/m ²	8.67	-0.56	94	
15.	Cabernet S 20 eyes/m ²	11.35	2.12	123	*
16.	Romanian Muscat 104 10 eyes/m ²	9.50	0.27	103	
17.	Romanian Muscat 104 15 eyes/m ²	10.17	0.94	110	
18.	Romanian Muscat 104 20 eyes/m ²	13.00	3.77	141	***
19.	Muscat Ottonel, 10 eyes/m ²	7.23	-2	78	0
20.	Muscat Ottonel, 15 eyes/m ²	9.22	-0.01	100	
21.	Muscat Ottonel, 20 eyes/m ²	11.52	2.29	125	**
	1	2	3	4	5
	Media	9.23		100	
			DL 5%= 1.149		
			DL 1%=1.561		
			DL 0.1%=2.116		



Table 6

The statistics interpretation over grape's production depending on variety and year (Drăgășani 2005-2007)

No. var.	Variety	Year	Mean	Difference by a mean	A relative mean, %	Significance of differences by a general mean
1.	It.Riesling,	2005	6.80	-2.4	74	000
2.		2006	5.60	-3.6	61	000
3.		2007	10.20	1	119	
4.	Sauvignon 62 Dg	2005	7.50	-1.7	82	00
5.		2006	4.50	-4.7	49	000
6.		2007	12.50	3.3	136	***
7.	Pinot gris,	2005	7.30	-1.9	79	00
8.		2006	4.40	-4.8	48	000
9.		2007	10.20	1	111	
10.	Selected Crâmpoșia	2005	10.70	1.5	116	*
11.		2006	8.80	-0.4	96	
12.		2007	15.60	6.4	170	***
13.	Cabernet Sauvignon 7 Dg	2005	8.50	-0.7	92	
14.		2006	7.80	-1.4	85	0
15.		2007	12.20	3	133	***
16.	Romanian Muscat 104 Dg	2005	11.50	2.3	125	***
17.		2006	7.50	-1.7	86	00
18.		2007	14.10	4.9	153	***
19.	Muscat Ottonel	2005	8.20	1	89	
20.		2006	6.80	-2.4	74	000
21.		2007	12.30	3.1	134	***
	Media		9.23		100	
			DL 5%= 1.149			
			DL 1%=1.561			
			DL 0.1%=2.116			

Synthesis regarding a technological characterization of grapes

A quantitative specific features of varieties.

Apart from varieties by a medium productions of grapes to hectare obtained are the Selected Crâmpoșia (11,7t) and Romanian Muscat 104Dg(11t), comparative with varieties mean by 9,2t/ha, table 7 and figure 1.

Apart from this with the smallest productions of grapes are Pinot Gris with 7,3t/ha and Italian Riesling with 7,5t/ha, table 7 and figure 1.

The biggest weight for a grape was obtained to Selected Crâmpoșia with 177grams and the smallest was obtained to Italian Riesling and Pinot Gris by 102 grams (table 7 and figure 1).



A qualitative specific features of varieties.

The best quality had Pinot Gris variety with 216g/l sugar and Muscat Ottonel with 210g/l. By another part is Selected Crâmpoșia with 192g/l sugar (table 7), comparative with varieties mean by 203g/l. This could be join in the most situations in category called, "current wines". Images regardings vines of this varieties are presented in figure 2-8.

Table 7

**Synthesis regarding a technological specific features of grapes
(Drăgășani, medium dates, 2005-2007)**

No.	Variety	Grapes production t/ha	Sugar content g/l	Acidity content g/l	Weight of grape	Weight of 100 grape berry
1	Italian Riesling	7.5	204	4.1	102	120
2	Sauvignon p. 62 Dg	8.2	194	4.4	140	132
3	Pinot gris	7.3	216	4	102	130
4	Selected Crâmpoșia	11.7	192	5.1	177	185
5	Cabernet S7 Dg	9.5	198	4.6	125	135
6	R. Muscat 104 Dg	11.0	206	4.5	130	160
7	Muscat Ottonel	9.1	210	4.4	121	155
	Mean	9,2	203	4.4	128	145

Figure 1 - Diagram regarding a medium production of grapes obtained to hectare (Drăgășani 2005-2007)

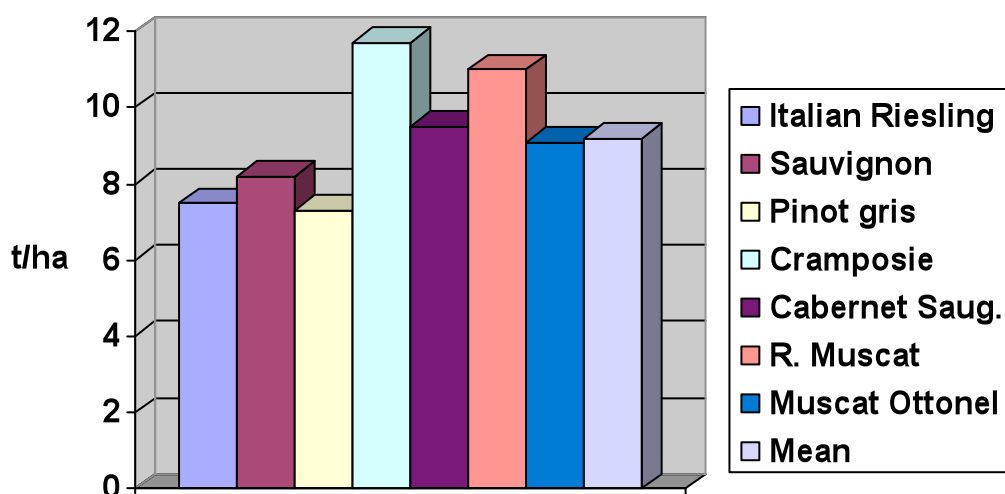




Figure 2. Riesling italian



Figure 3. Sauvignon petit 62 Dg



Figure 4. Pinot gris



Figure 5. Crâmpoșie
Selectionată



Figure 6. Cabernet Sauvignon 7 Dg



Figure 7. Muscat Ottonel



Figure 8. Tamâioasă românească
104 Dg



CONCLUSIONS

• Regarding the type of pruning

To Italian Riesling and Pinot Gris varieties, the application of speronate type of pruning had a very semnificative deficit comparative with a general mean. Unlike Selected Crâmpoșia and Romanian Muscat 104 Dg with Guyot on mid-stem type of pruning became very positive semnificative.

For another varieties and types of pruning are intermediate results.

Variants like Italian Riesling with Cazenave and Guyot type of pruning, Pinot Gris with Guyot type of pruning, Selected Crâmpoșia and Romanian Muscat 104Dg with speronate belt, type of pruning, Cabernet Sauvignon 7Dg, with speronate and Cazenave type of pruning and finally Muscat Ottonel with three types of pruning hadn't received no significance and by statistical-mathematical point of view are equal with experience mean.

The Sauvignon Petit 62Dg clone with speronate type of pruning and Pinot Gris with Cazenave type of pruning are in a semnificative, distinct, negative level comparative with a general mean.

Unlike, Selected Crâmpoșia and Romanian Muscat 104Dg with Cazenave type of pruning became a semnificative, distinct, positive.

• Regarding a load of settings

The Italian Riesling variety by applying a 10 eyes/m² load of setting has a very semnificative deficit comparative with a general mean. Unlike, Selected Crâmpoșia and Romanian Muscat 104Dg with 20eyes/m² load of setting became very semnificative, positive. For another varieties and load of settings are intermediate results.

Variants like Italian Riesling with load of settings by 15 and 20eyes/m² Sauvignon 62Dg, Pinot Gris, with load of settings by 20eyes/m², Selected Crâmpoșia, Romanian Muscat 104Dg with load of settings by 15 and 20eyes/m² and also Muscat Ottonel with 15 eyes/m², hadn't received no significance. Pinot Gris with 10eyes/m² load of settings becomes a semnificative, distinct, negative and variants like Muscat Ottonel with 10 eyes/m² load of setting and Pinot Gris with 15eyes/m² load of setting are in a simple way, a semnificative, negative.

• Regarding the years of research

In the year 2005 it had been obtained small productions of grapes to hectare and that had a very semnificative, negative qualifying for all varieties. Italian Riesling (years 2005, 2006), Sauvignon Petit 62Dg (2006), Pinot Gris and Muscat Ottonel (2006) registered very semnificative deficits of production.



The year 2007 excels with positive results ,thus: Sauvignon 62Dg, Selected Crâmpoșia, Cabernet Sauvignon 7Dg and Romanian Muscat 104 Dg, become a very semnificative positive. To another varieties results are intermediate.Variants like Italian Riesling and Pinot Gris (2007), Selected Crâmpoșia (2006), Cabernet Sauvignon 7Dg and Muscat Ottonel (2005), hadn't received no significance.

REFERENCES

1. Alexandrescu I.C. si colab., 1994 - Riesling italian. Mică Enciclopedie de Viticultură. Editura Glasul Bucovinei. Iasi (I): 529-530.
 2. Alexandrescu I.C. si colab., 1994 - Sauvignon 62Dg. Mică Enciclopedie de Viticultură. Editura Glasul Bucovinei. Iasi(I) : 546-547.
 3. Alexandrescu I.C. si colab., 1994 - Pinot gris. Mică Enciclopedie de Viticultură. Editura Glasul Bucovinei. Iasi(I) : 441-442.
 4. Alexandrescu I.C. si colab., 1994 - Crâmpoșia selectionată. Mică Enciclopedie de Viticultură. Editura Glasul Bucovinei. Iasi (I): 130.
 5. Alexandrescu I.C. si colab., 1994 - Tămâioasă românească 104Dg. Mică Enciclopedie de Viticultură. Editura Glasul Bucovinei. Iasi (I):618-619.
 6. Alexandrescu I.C. si colab., 1994 - Muscat Ottonel. Mică Enciclopedie de Viticultură. Editura Glasul Bucovinei. Iasi (I): 374-375.
 7. Alexandrescu I.C. si colab., 1986 - Sistem rationalizat de tăiere în uscat la soiurile pentru struguri de masă si vin, cu conducere pe cordoane, prin aplicarea tăierii în cepi roditori. Cercetarea în sprijinul productiei. Ministerul Agriculturii (I) : 22-27.
 8. Banita E., 1994 - Stabilirea principalelor măsuri fitotehnice în cultura soiului de struguri pentru vin, Crâmpoșie selecționată”.Recomandări ale cercetării stiintifice în domeniul viticulturii. Ministerul Agriculturii si Alimentatiei. Ministerul Cercetării si Tehnologiei. Institutul de Cercetare pentru Viticultură si Vinificatie, Valea Călugărească (I):130-132.
 9. Oprea A., Indreas A., 2000 - Tăierea și conducerea viței de vie. Viticultura. Editura Ceres.(I):224-237.
 10. Oslobeanu M. si colab., 1980 - Viticultura generala si speciala. Editura didactica si pedagogica. Bucuresti.: 299-315.
 11. Saulescu N.A., Saulescu N.N., 1967 - Câmpul de experiență. Editura Agrosilvică București : 213-220, 259-262, 286-289.
 12. Stoian V., 2001 - Marea carte a degustării vinurilor. Editura Artprint Bucuresti.(I): 284-290.
 13. Varga N., Ion M., Stoian M., 2005 - Soiuri noi de vită de vie roditoare realizate de cercetarea viticolă românească. Ministerul Agriculturii, Pădurilor si Dezvoltării Rurale (I): 60-66.
- * * * 1986 - Crâmpoșie selecționată. La 50 ani de activitate științifică în slujba viticulturii și vinificației.Statiunea de Cercetare-Dezvoltare pentru Viticultură si Vinificatie, Drăgășani: 112-113.
- * * * 1986 - Sauvignon 62Dg. La 50 ani de activitate științifică în slujba viticulturii și vinificației. Statiunea de Cercetare-Dezvoltare pentru Viticultură si Vinificatie, Drăgășani: 113.



THE IMPORTANCE OF THE INTEGRATED PEST CONTROL METHODS IN THE SUSTAINABLE SOIL MANAGEMENT

Nicole Livia ATUDOSIEI*, Maria MANIU*, Floarea NICOLAE*,
Camelia GAVRILESCU**, Ion NICOLAE*, Marian NICOLAE*

***Bioterra University of Bucharest**

****Institute of Agricultural Economics, Bucharest**

ABSTRACT

The integrated pest control is a concept which provides environment protection. The novelty of this concept is represented in the first place by the fact that it does not envisage to maintain at level 0 the pest and disease infestation; it rather accepts their presence in crops up to a certain accepted level, named *economic injury threshold*, which represents the limit from which the losses due to the infestation with pathogen organisms become important from the economic point of view. Another element is to use compatible control measures, with a synergic effect, i.e. with an enhanced effect when they are associated compared to their single use. *The methods* applied in the integrated control are the following: physical-mechanical, genetic, phyto-sanitary hygiene, crop management, biological and chemical therapy.

In the present paper we present a few preliminary results of the study on the integration of integrated pest control principles and actions with the environmental principles and actions in the case of twenty small and medium-sized farms from the county Ilfov.

Our studies were performed under the project CEEEX no. 56/2006 on the theme: "*Modeling the response of agricultural holdings to the integration of economic and environmental principles through the sustainable management of soil resources*", regarding the integration of economic and environmental principles and actions and the development of certain scenarios on the sustainable soil management.

* Bioterra University of Bucharest

** Institute of Agricultural Economics, Bucharest



The statistical data referring to production technology were investigated in order to achieve the best management system and to establish the measurements adopted for the integrated crop protection implementation.

Key words: integrated pest control, numerical density (ND), phyto-pathogens infestation level (IL), sustainable soil management.

INTRODUCTION

The *integrated control* concept was introduced in 1956 by B. Bartlett and in 1959 by Stern, considering it a new crop protection concept, which should take into consideration environment protection. The rational organization of the integrated crop control strategy needs to reveal the infestation level (IL) and the numerical density (ND) of the populations of harmful and useful organisms, in order to establish the treatments to be applied.

The methods applied in the integrated control are the following: physical-mechanical, genetic, phyto-sanitary hygiene, crop management, biological and chemical therapy.

The mechanical means are used for the removal of certain phyto-pathogenic agents from the crops, by simple mechanical means. Thus, the dry, diseased branches are cut off; the tree trunks are cleared of mosses and lichens; the diseased kernels are removed from seeds; the *Cuscuta* (dodders) is separated from the seeds (mainly in the case of alfalfa, clover, linseed).

The mostly frequently used *physical methods* are the following: heat treatment, preservation at cold temperatures, active airing, radiotherapy, electromagnetic techniques or electronic devices.

Heat has been used in the control of phyto-pathogenic agents for a long time. The low temperatures are used in order to preserve certain agricultural products for a long period of time (fruit, vegetables, potatoes, tubers) at 1-4 °C, which represents the lower limit for microorganism development. The active airing of storage rooms hinder the development of phyto-pathogenic micro-organisms, also contributing to their quality preservation.

The sunlight (heliotherapy) can be used in order to fight against certain pathogenic agents, for curative and preventive purposes. It is mostly used for the diseases that are transmitted through seeds or vegetative organs. The X-ray radiation (radiotherapy) proved to be efficient for disinfecting the seeds and the vegetative organs that are to be planted (*Agrobacterium tumefaciens* in the fruit-trees).



The electromagnetic means can be used, for example, for the removal of *Cuscuta* seeds from the alfalfa or clover seeds. The electric power is used for soil disinfection in certain countries, such as the United States. There is also electronic equipment in place for the chemical treatments. Their jet is electronically directed so as to avoid the great losses of active substance and to reduce soil pollution at minimum.

The genetic engineering methods are used in order to induce pest and disease resistance in certain crops. These genetically modified crops do no longer need specific phyto-sanitary treatments and contribute to the diminution of environment pollution.

The phyto-sanitary hygiene has the role to remove the contagion points, to prevent the spreading and multiplication of phyto-pathogens and to ensure optimum conditions for plant growth and development. Among these measures, the following should be mentioned: disinfection of working tools, of protection equipment; collection and removal of diseased crops, of the fallen leaves and fruit; destruction of weeds that can serve as host-plants for phyto-pathogens; destruction of the vegetal waste that remained after harvesting; removal of dried branches, etc.

The crop management measures, by their correct application, can maintain the infestation with phyto-pathogenic agents below the economic injury threshold (EIT), also contributing to chemical pollution prevention. The main crop management measures are the following: selection and preparation of soil for crops; soil structure improvement works; destruction of second growth plants; crop rotation; rational fertilization; selection of planting stock; plantation period and depth; plant density; maintenance works; irrigation scheme and harvesting period.

The effect of this set of measures is the modification of the ecologic conditions that favours the plants and is less favourable for phyto-pathogens development.

Biotherapy is the biological control that takes place by using the action of “living organisms upon the living organisms”, by means of live organisms and/or with products of their metabolic activity. The biological control can take place by the action of bacteriophages; on the basis of the antagonism between micro-organisms, by hyper-parasitism, by means of antibiotics and phytoncides, by means of insects, by plant pre-immunization.

The chemotherapy consists in stopping the evolution of pathogen infestation by chemical treatments.



The method has a fast and maximum effect, yet it also has a series of disadvantages, such as: pollution of agricultural products, soil and water pollution, harmful effects upon the useful flora and fauna, development of varieties that are resistant to the specific active substance that is used.

The decision on the application of a certain chemical treatment should be well considered, under all its aspects, while always having in view Hippocrate's statement: "primum non nocere" ("first of all, don't do any harm").

MATERIAL AND METHOD

In the present paper we present a few preliminary results of the study on the integration of integrated pest control principles and actions with the environmental principles and actions in the case of small and medium-sized farms from the county Ilfov.

The analysis of the implementation possibilities of the integrated pest control methods in the soil management was based upon the information resulted from the processing of the validated questionnaires applied to 20 agricultural units from the county Ilfov.

The necessary data for the characterization of the "agricultural holding" system, of the production technologies and soil management quality were centralized and investigated on the basis of several criteria: cultivated land area, production structure, land area under organic re-conversion, organically certified land area, cropping system (extensive, intensive), conventional agricultural practices, crop rotation, crop protection systems and methods, minimum soil conservation methods, use of chemical and organic fertilizers, waste storage facilities and treatment application techniques.

On the basis of these data, the management system will be characterized and a series of scenarios will be developed with regard to the farm response to the integration of economic and environmental principles in the sustainable soil management.

RESULTS AND DISCUSSIONS

According to the production structure, the investigated agricultural holdings were divided into three great categories: 11 crop farms, one animal farm and 8 mixed farms (Figure1). Out of total investigated farms, 12 farms belong to physical entities and 8 farms are legal entities.

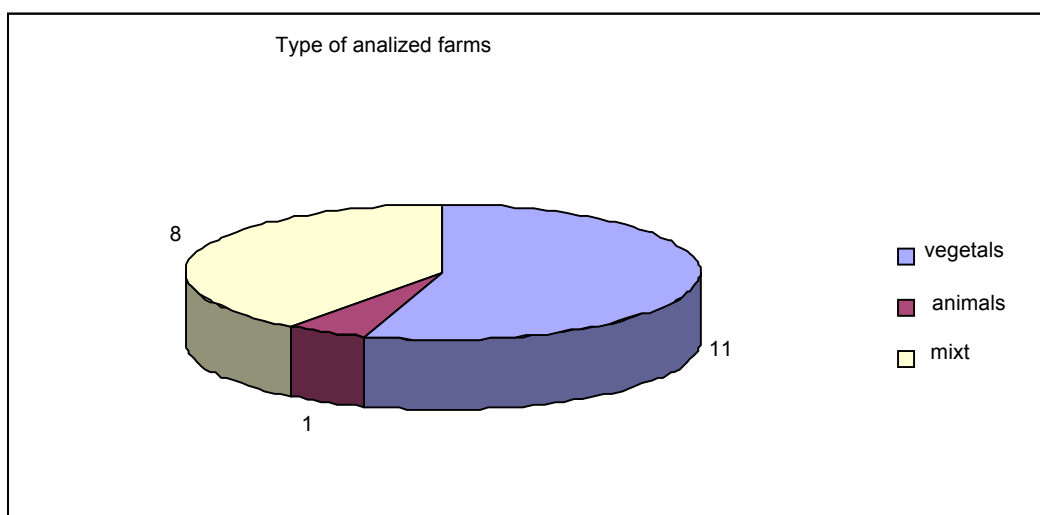


Figure1. Activity profile of the investigated farms

The arable area of these farms sums up 5739.23 ha. Out of this area, about 96.73%, i.e. 5552 ha, belong to the 8 legal entity farms, being represented by mixed (crop and animal) farms (Figure 2).

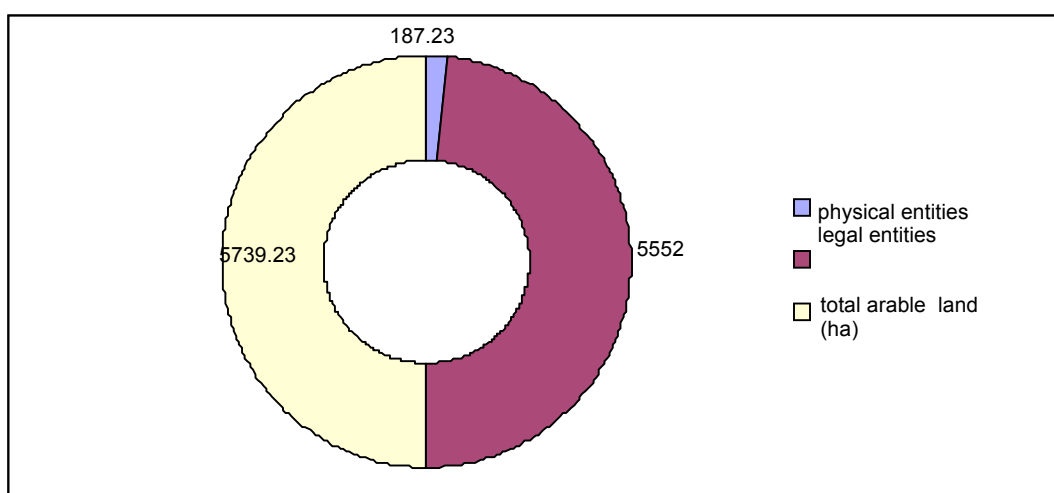


Figure 2. Distribution of arable area by the legal status of farms



With regard to the agricultural production methods that are used, out of the total number of investigated farms, only 4 farms were under organic reconversion (1 physical entity + 3 legal entities), the remaining 16 farms using conventional practices.

The analysis of data referring to the agricultural practices used on these farms reveals that 94.62% of the total area was tilled with plough or disk, while disk harrowing was applied on 81.73% of total land. For weed and pest control, mainly chemical and mechanical methods were used (Figure 3).

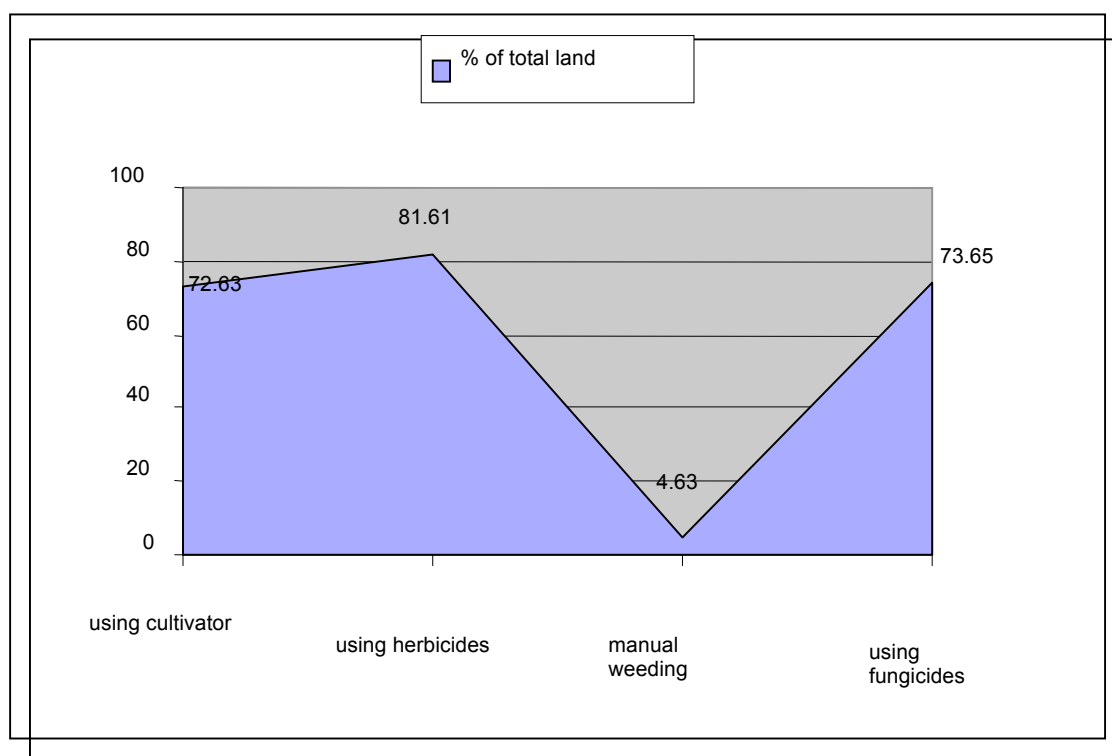


Figure 3. Different shares of weed and pest control methods

The high percentage of chemical control methods can be explained by the economic efficiency induced by the fast and maximum effect of the chemical substances applied.

With regard to the fertilization methods applied, on about 73% of total arable area chemical fertilizers were applied, 13% were fertilized with chemical and organic fertilizers, while only organic fertilizers were applied on only 1.8 ha, which represent 0.035 of total arable land under study (Figure 4). Half of the investigated farmers apply nitrogen fertilizers twice a year, the remaining farms only once a year. Only two agricultural holdings buy manure, about 50 tons each year. This is spread directly in the field under solid form.

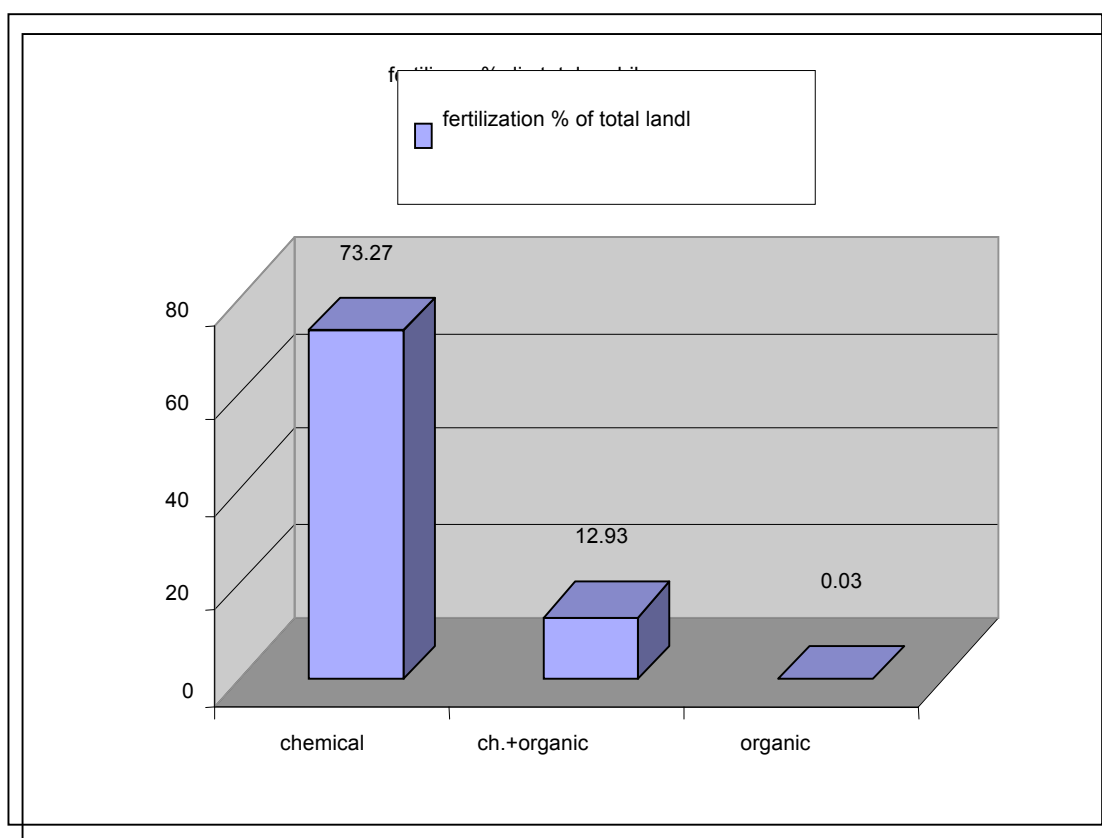


Figure 4. Situation on land where chemical and organic fertilizers are applied

It is worth noticing that when questioned on the decision on which the application of chemical or organic fertilizers was based, only 2 farms decide on the basis of soil analyses, 7 farms respect the farm fertilization plans, in 2 cases the information from the consultancy services is taken into consideration, one farm takes into consideration the information from the chemical plants, while in 17 cases the decision is made according to farmers' own experience.

In relation to the integrated pest control methods, the centralization of the data collected in the field reveal that out of the total arable land area, i.e. 5739.23 ha, the chemical control methods were applied on 2383.98 ha, which accounts for 41.54%. The pest resistant varieties were cultivated on 2331.8 ha, i.e. on about 40.63% of total arable land. The biotech methods were applied on 13.33% of the total arable area of farms. No data were reported for the biological and cultural control methods (Figure 5).

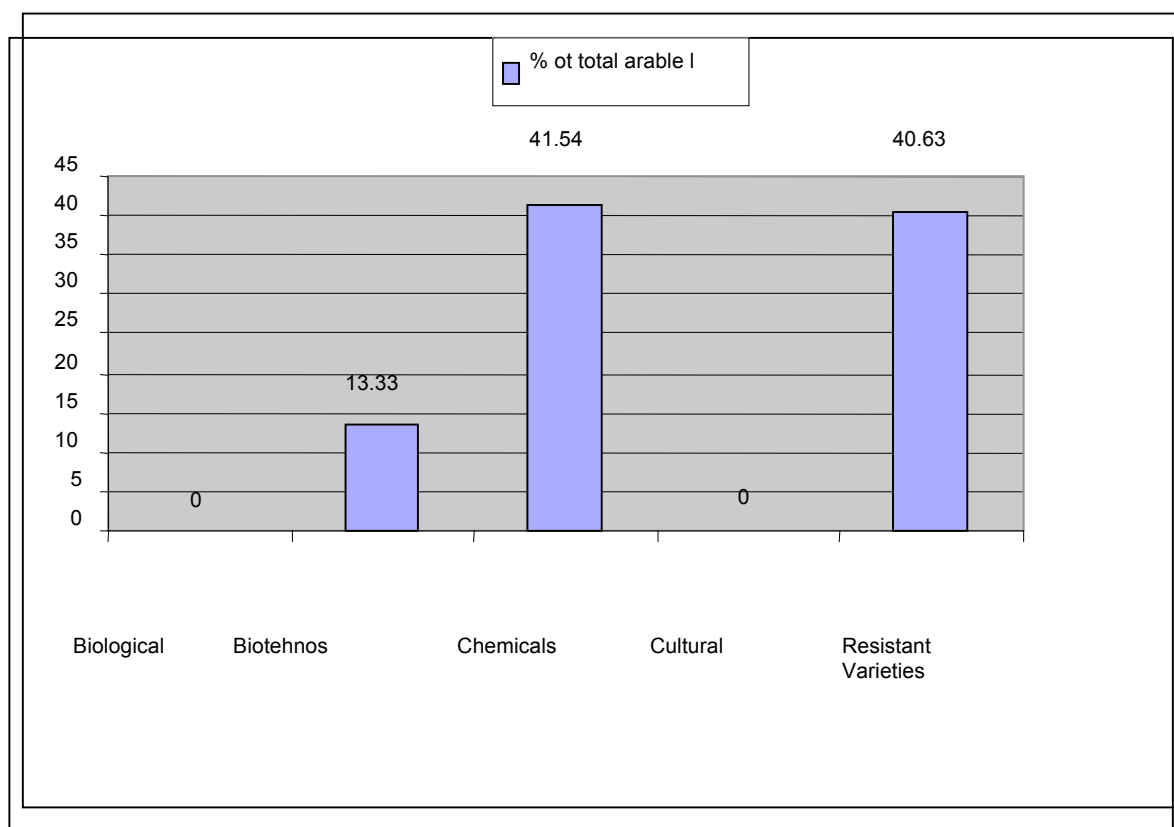


Figure 5. Share of integrated pest control methods

With regard to crop rotation, it can be noticed that on 19 farms from total investigated farms, this beneficial practice is used.

The land areas under crop rotation totaled 5097.53 ha, which represents about 88.82% of total arable land. The average number of crops under crop rotation was 5-6 crops on the large-sized farms and 2-3 crops in the case of small-sized farms, with an average period of crop rotation ranging from 2 to 5 years.

With regard to the crop protection measures, out of the total arable land of 5739.23 ha / total farms, on 82.98 ha weed control was performed manually (weeding), while the mechanical method was applied on 1923.73 ha.

In order to reduce the number of predators or parasites, no biological methods were used, only chemical methods.

The preventive chemical methods against insects and weed development were used on 2849.5 ha, while the curative chemical methods were used on 2394 ha out of total arable land (Figure 6).

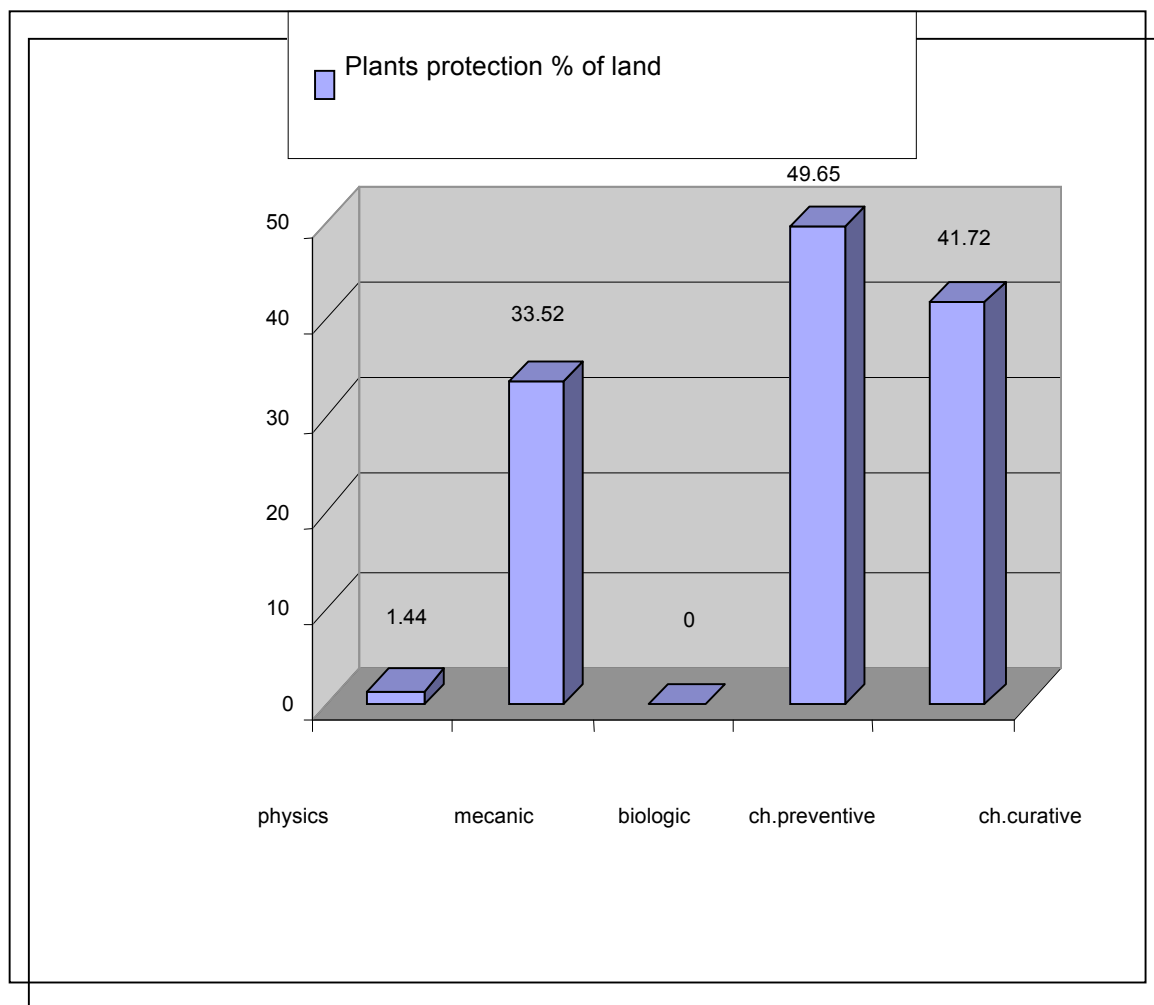


Figure 6. Situation of crop protection methods applied

The pesticides were applied by a sprayer on an area of 4046.88 ha and the treatments by air were applied on 1410 ha of the total arable land.

To the questions referring to the decision basis for the application of treatments, the answers were the following:

- 3 for the treatment schemes;
- 3 for consultancy services;
- 2 for mass-media forecasts;
- 7 for consultancy from the part of pesticide suppliers;
- 2 for decision-making only when the economic injury threshold was reached;
- 17 for farmers' own experience.



CONCLUSIONS

The overall analysis of the agricultural practices used on the investigated farms in the county Ilfov proves that in most cases, the management of soil resources on organic principles basis is rather deficient.

The organic fertilization and the mechanical weed control are applied on quite small areas compared to the chemical treatments, even in the case of the 4 farms that are under organic conversion.

The excessive application of the chemical fertilizers (2-3 times per year), in the absence of an evidence on soil treatments and analysis, may result in a series of future problems related to soil pollution, water pollution and even the pollution of agricultural products.

The use of large amounts of pesticides each year are harmful for the fauna and flora on the respective areas, generating great health risks both for people and for animals.

They may even induce cancer risk when their toxic, remanent and non-biodegradable effect is not taken into consideration.

In order to reduce the hazardous effects of the chemical treatments the following recommendations should be followed: use of low toxicity fungicides; application in the right doses; diminution of the number of treatments; application of treatments only on warning; use of selected products and of those with low remanence; use of complex products; handling of chemicals and application of treatments only by authorized staff.

Consequently, the integrated control strategy should take into consideration its intrinsic objectives, the main elements of the integrated control and the right choice of the most efficient and non-polluting methods.

The implementation measures of the integrated pest control methods in the sustainable soil management are the following:

1. permanent knowledge of the phyto-sanitary condition of crops and the establishment of the key-diseases specific for each crop;
2. establishment of the economic injury threshold (EIT–critical limit of infestation), i.e. of the level from which the value of losses exceeds the control treatment costs. EIT has different values according to: biology of pathogen agent (virulence, spread speed); biological value of crop; commercial value of crop;
3. protection and stimulation of useful flora and fauna;



4. use of non-chemical means for disease control (crop management techniques, biological means);
5. use of chemical control only when the case, i.e. only at warning – in this case it is recommended to use selected products that destroy specific pathogens and are not harmful to the useful flora and fauna;
6. avoiding the chemical substances with high remanence and use of minimum recommended doses;
7. implementation of modern techniques of chemicals application (eg. electrostatic application);
8. development and use of new pest and disease resistant hybrids.

REFERENCES

1. Atudosiei Nicole Livia, Geamăn I., 2004 – *“Patologie vegetală”*, Editura Printech, Bucuresti, 178-186 ;
2. Ionescu Al., 2000 – *“Protecția mediului. Ecologie și Societate”*, Editura “Universitas” Bucuresti, 144-145 ;
3. Maniu Maria, 2007 – *“Ecologie și protecția mediului”*, Editura Bioterra, București, 23-25 ;
4. Proiect CEEEX nr. 56/2006-2008 – *“Modelarea răspunsului exploatațiilor agricole la integrarea principiilor economice cu cele de mediu prin managementul durabil al resurselor de sol.”*



VARIOUS ECOLOGICAL WAYS OF CAPITALIZING BLUEBERRIES FRUITS

(VACCINIUM MYRTILLUS L.)

*Authors: Nicole Livia ATUDOSIEI *, Floarea NICOLAE*,
Marian NICOLAE*, Constantin MANOLACHE*, Razvan COTIANU*, Paul STEFANESCU***

ABSTRACT

The phyto-therapeutic virtues of blueberries-as fruits or as natural juices – are due to the richness of their “vital principles” induced by photosynthesis as: glucides, lipids, proteins, enzymes, vitamins (A, B1, B2, C, E, P, PP), and mineralsn (K, Ca, Cl, Fe, P, Mg, S), pigments, organic acids, phyto - hormones, etc.

Knowing the chemical composition of blueberries fruits featured by a lot of phyto-therapeutic, bio-stimulating and nutritive qualities, we must capitalize them in large wide range of appreciated, natural products.

The imperative aim and the efforts for capitalization of blueberries are paid back by the following range of products:

- natural juices;
- half-preserved juices;
- concentrates from natural juices;
- natural colorants - ingredients for food industry.

Key words: blueberries (*Vaccinium myrtillus L.*), phyto-therapeutic features, raw blueberry juice blueberry leftover cake, anthocyanins.

* Bioterra University of Bucharest

** Academy of Agricultural Sciences and Forestry, Bucharest



INTRODUCTION

Blueberries are an ideal raw material - “noble fruits” - for making natural bio-stimulating juices, valorous and indispensable for the human body.

The well-known American doctor, D.C.Jarvis, great fan of phyto-therapy stated that blueberries fruits are “vegetal blood”.

The blueberries’ quality is due to their well-balanced complex composition on one hand, and to its small, very juicy fruits on the other hand; we all know that in the cells’ membranes there are lots of vitamins, minerals, pigments and flavours, so that there is a very high contents of “noble” elements per surface-unit, higher than larger fruits.

Blueberries are also rich in anti-oxidants, such as vitamins and anthocyanins, the latest are also very useful pigment with a synergic part.

Knowing the chemical composition of blueberries fruits featured by a lot of phyto-therapeutic, bio-stimulating and nutritive qualities, we must capitalize them in large wide range of appreciated, natural products.

Our paper presents a model of an integral technology for blueberries fruits processing: in the first stage we obtained a natural bio-stimulating juice very healthy for human consumption; the blueberry leftover cake is an ideal raw material with high uses and outputs.

Wastes deriving from processing are used fresh or dry or powder because of their nutritional and bio-stimulating functions due to vitamins and minerals.

Other advantages: the technology used is low energy consumer and no polluting.

MATERIAL AND METHODS

We used fresh blueberries fruits of Coville variety and we analyzed their bio-chemical content which is described in the following table:



Table no.1

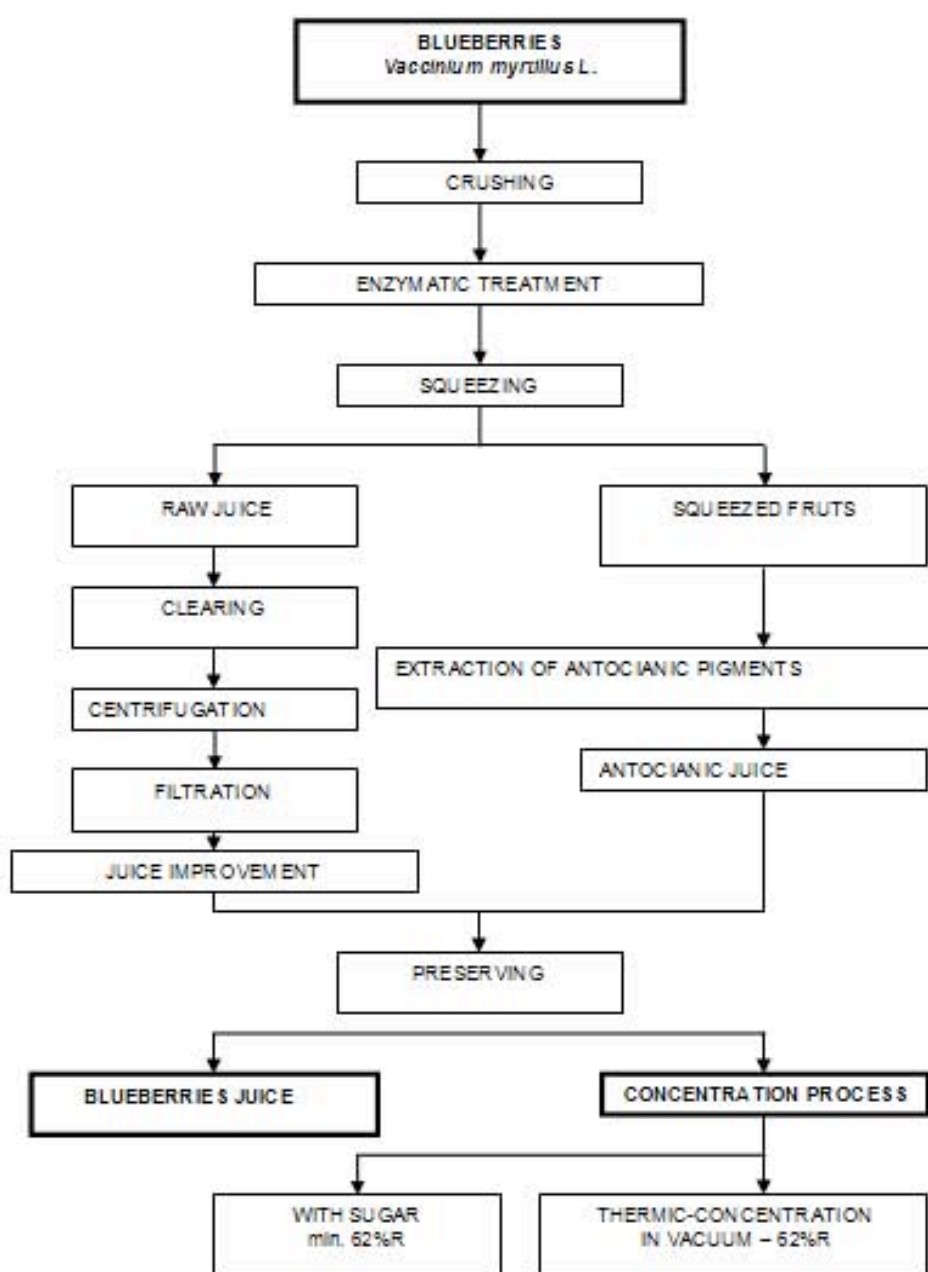
Blueberries' Bio-Chemical Composition:

Item No.	Composition	Content
1.	Dry matter %	13 – 15
2.	Total sugars %	5,5 – 7,0
3.	Total acidity (malic acid)	1,28 – 1,68
4.	$\frac{\text{Harmonic Ratio}}{\frac{\% \text{ Total sugars}}{\% \text{ Total acidity}}}$	$\frac{5,5}{1,28} \quad \frac{7,0}{1,68}$
5.	Pectins %	1,98 – 2,76
6.	Proteins %	1,94 – 2,70
7.	Tannins %	0,93 – 1,42
8.	Minerals %	2,92 – 3,56
9.	Potassium mg/100 g	187
10.	Calcium mg/100 g	20
11.	Magnesium mg/100 g	5
12.	Phosphorus mg/100 g	16
13.	Iron mg/100 g	1,38
14.	Copper mg/100 g	1,73
15.	Manganese mg/100 g	1,28
16.	Ascorbic acid mg/100 g	110 – 169
17.	B Carotene mg/100 g	1,2
18.	Anthocyanins %	0,736



In order to obtain more natural products with important therapeutic features, we included the following procedures into the blueberry processing technological scheme:

Fig. 1- Blueberry processing technological scheme





The following products and sub-products are gained thanks to the overall processing of blueberries:

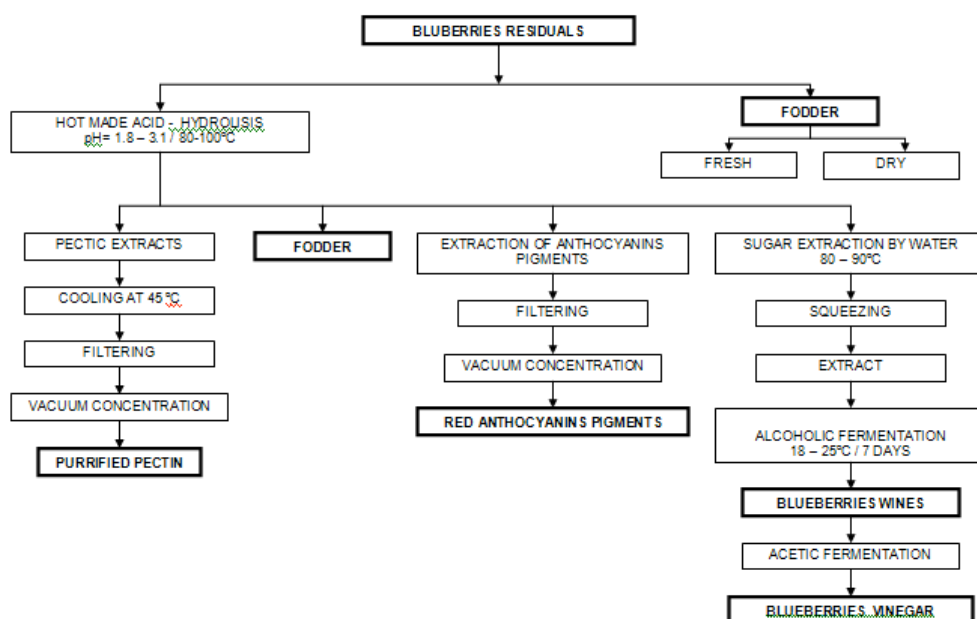
Table no.2

Item no	Products and sub-products	%
1	Fresh blueberry fruits	100,00
2	Selected fruits	93,07
3	Fruits pure'	22,82
4	Raw blueberry juice	67,63
5	"Blueberry cake" = blueberries leftovers	25,19
6	Structural wastes (seeds, peels)	10,25

As you can see in the above table, we deal with major sub-products quantities and qualities obtained after the blueberries processing, featured by anthocyanins high content.

Various ways of capitalizing blueberries after its processing are described in the following scheme:

Fig. 2 - Blueberries' residuals processing technological scheme





CONCLUSIONS

- This paper describes a pattern of better capitalizing blueberries, considering them a precious raw material from which we obtain – natural juice, in a first stage, and – after squeezing sub-products rich of anthocyanins, i.e. the “blueberry cake”.
- The achievement of natural pigments for food products obtained from natural sources is a major purpose as we must substitute the chemical dyeing products harmful for health.
- The quite high acidity of the vacuolar juice (in the blueberry pulp) is a strong lasting pigment for purple red stabilizer for colouring juice and hydro-alcoholic extracts.
- The blueberry leftover cake is an ideal raw material with high uses and outputs.
- Other advantages: the technology used is low energy consumer and no polluting.
- Wastes deriving from processing are used fresh or dry or powder because of their nutritional and bio-stimulating functions due to vitamins and minerals.

REFERENCES

1. - Atudosiei Nicole, Ștefănescu P., Ioniță Ciprian, 2004 – “Procesarea și valorificarea superioară a fructelor și legumelor”, curs pt. uzul studenților, Ed. Bioterra București, 149-157;
2. - Costain Lyndel, 2001 – “Super Nutrients: The hidden power in plant foods that benefit body and mind”, Ed. Dorling Kindersley, 62;
3. - Ștefănescu Elena, Ștefănescu P., – “Coloranți alimentari din materii prime indigene. Myrtiant - concentrat antocianic din affine”, Dosar de omologare al produsului.



BIOTERRA UNIVERSITY'S ECOLOGICAL FOOD RANGE WITH NUTRITIONAL AND THERAPEUTIC VIRTUES

Authors: Nicole Livia ATUDOSIEI¹, Ion NICOLAE¹,
Paul ȘTEFĂNESCU²

ABSTRACT

This paper presents briefly an important achievement of Bioterra University of Bucharest research focused on the obtaining of an ecological foods range with nutritional and therapeutic virtues for human's consumption.

For all the food products we used domestic raw material in order to underline better the valuable Romanian vegetal and herbs species.

The technologies used have low production price due to the new-found processing and preserving manners and due to the domestic raw materials also, they are no polluting and use low energy.

In this paper are described a part of these food products, that were already awarded with precious medals in international exhibitions for inventions and new products and technologies.

These food products are: „Ecological Vodka Bioterra”, „Carotina” Bio-stimulating Juice, Soy-beans for human consumption with different flavours, Natural Concentrate for soft drinks on basis of Chicory (*Chicorium intibus*).

Key words: bio-stimulating juice, Chicory (*Chicorium intibus*). ecological vodka, natural processing and preserving

INTRODUCTION

Modern society has finally realised that the so called new style of nourishment despite some directly advantages presents hidden risks for human health. During the past decades there was a great enthusiasm about the industrial processed food products, synthetic foods, with a perfect manner of its presentation (packaging in nice colours) and marketing in order to attract consumers.

¹ Bioterra University of Bucharest, Romania.

² Romanian Academy of Agriculture Sciences and Forestry



This represented an “alignment” to the modern life standards. Nowadays the consumer became more mature; he is not any more interested in shape, colour and aspect of the food product, but of its essence and of the consequences on long term of such alimentation on the human health and life quality.

We might say that we assist to a consumer higher interest for more natural, not very processed, without additives food products.

Taking into account these aspects, a group of professors and researchers of Bioterra University in Bucharest and Romanian Academy for Agricultural Sciences and Forestry has run a research activity regarding the obtaining of an ecologic food products range with nutritional and therapeutic values.

All these food products have the Romanian Patent of Invention and they have been already awarded at several important international exhibitions of inventions and new technologies.

We present you briefly a part of these products:

MATERIAL AND METHODS

Considering the rich spontaneous domestic flora and cultivated aromatic and medicine plants, we studied about 40 species, from which we selected 30 species, taking into account the nutritional and therapeutic values.

Starting from their qualities, we created new original food products recipes and we patented new manufacturing technologies and, in some cases, also new original natural preservation methods, excluding all chemical additives.

The manufacturing technologies were created in order to be low-energy consumer, non –polluting and easy to put into practice also in medium and small - size units.

The nutritional and clinical analyses were performed within the National Institute for Food Research, safety tests included. The Institute release the “free to go” documents.

As we deal with inventions, they were patented and registered by the Romanian National Institute for Inventions and Innovation (OSIM).

The National Agency for Science, Technology and Innovation within the Romanian Ministry of Education and Research – which participated on the behalf of the Romanian State to the International Inventions and Inventors Fairs, selected some of these products and exhibited them.



RESULTS AND DISCUSSIONS

Hereunder we present briefly a part of this range of food products which were awarded important medals within these international fairs.

ECOLOGICAL VODKA „BIOTERRA”

It is an alcoholic drink made of refined alcohol from fermentation tinctures and natural extracts from 30 domestic medicinal and aromatic plants.

It has features between Vodka and Swedish bitter. Due to these medicinal plants it is a liver protector, an energiser, rich in minerals.

It has a nice colour and a basil flavour taste. So, even you drink alcohol, it will bring you good humour, but will not anymore damage so badly your liver. It happily combines the taste pleasure with plants active principles.

Its obtaining implies low production price due to the processing and preserving technology and raw materials. The technology used is non-polluting and low energy cost. No special stocking conditions are required.

This product was awarded with:

- Genius Platinum medal at the International Inventions Olympiad in Budapest, 2000;
- Golden Medal in Brussels 2000, at the World Inventions Fair, EUREKA;
- Golden Medal in Geneva 2002, at the International Inventions Fair.

„CAROTINA” BIO-STIMULATING NATURAL JUICE

It represents a 100% naturally processed and preserved bio stimulating juice, called Carotina, obtained from a mixture of white underbrush (*Hyppophae rhamnoides*), carrot (*Daucus carota*) and several domestic aromatic medicinal plants.

It is bio-stimulating, antioxidant, full of vitamins and minerals; it happily combines the taste pleasure with plants active principles.

Due to therapeutic qualities it is a health and youth elixir for all ages. Other advantages:

- protection against radiations;
- anti-tumour features due to its antioxidant effect;



- it contains vitamins A, E, F, C, Phytosterols, fatty acids and over 24 minerals (P, Fe, B, Cu, Ca, Se, I, etc);
- natural preserved;
- low production price due to the processing and preserving technology and raw materials;
- no special stocking conditions are required.

It was awarded with:

- the Silver medal At The World Inventions Fair in Brussels, Belgium, EUREKA, 2000;
- the Silver Medal at the International Inventions Exhibition, Geneva, Swiss, 2002.

“SOY-BEANS FOR HUMAN CONSUMPTION WITH DIFFERENT FLAVOURS”

The soy-beans seeds so important for the high level of proteins (40% proteins) are adequately processed under the shape of berries, respecting the natural way and the result is a natural delicious, nutritive product with different tastes and flavours of pizza, sausages, vanilla, etc.

This food product based on soy-beans seeds was awarded with the Bronze medal at The International Inventions Fair, Geneva 2000.

“NATURAL CONCENTRATE FOR SOFT DRINKS ON BASIS OF CHICORY (*Chicorium intibus*)”

This concentrate is obtained from the soluble roasted chicory with sugar, citric acid, ether oils from citrus fruits, menta piperita, etc.

It is a liver protector, carminative and anti-oxidant product thanks to its polyphenolic compounds.

It was awarded with the Silver Medal at The International Inventions Fair of Geneva, 2000.



CONCLUSIONS

These products were targeted in order to put into practice the new modern scientific concept about safe, healthy and natural nourishment as applied into the so called food industry, and they happily join together the natural genuine qualities of the traditional way of manufacturing updated to the high production request, and they proved also, in some cases, real therapeutic values.

This is why they were highly appreciated by the International Committee which evaluates the inventions presented to the fairs and awarded medals.

Therefore, they were successfully introduced in the manufacturing line of a Romanian food producer micro enterprise. Starting from these good results, the research team has developed further improvements and technological settings during 2004-2007 in order to adapt the manufacturing procedures to the technologies requested by the big chain series industrial producers, so that they can be used also in big factories.

- Would they be introduced easily on market by the big companies?
- Could we find them in the supermarkets as an alternative to the conventional food and beverages products?

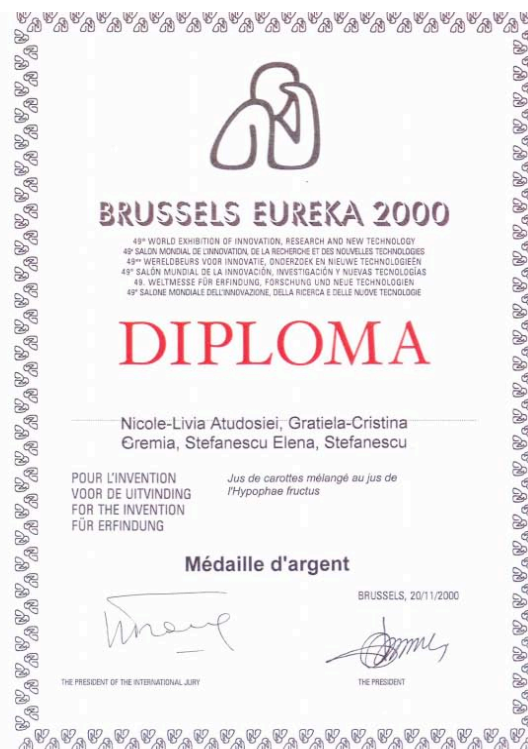
We do not know yet – maybe the future will give us the right answer, if the food companies will be available to accept this challenge.

REFERENCES

1. - Atudosiei Nicole Livia, Eremia I., Grațîela Cristina, Ștefănescu Elena, Ștefănescu P., *“Carotina Bio-stimulating Ecological Juice - and the natural preservation method”* – 2003, Romanian Patent registered in OSIM.
2. - Nicolae I., Ștefănescu Elena, Ștefănescu P. - *“Ecological Vodka Bioterra”* - 2002, Romanian Patent registered in OSIM.
3. - Ștefănescu P., Ștefănescu Elena – *“Natural Concentrate Based on Chicory for Soft Drinks”* – 2000, Romanian Patent registered in OSIM.
4. - Ștefănescu P., Ștefănescu Elena – *“Food Product obtained from Soy Beans and the obtaining technology”* – 2000, Romanian Patent registered in OSIM.



BULLETIN OF SCIENTIFIC INFORMATION - NR.15 / 2008





Bioterra University of Bucharest is a private higher education institution for ROMANIA; a component of Bioterra University Foundation, which was set up in 1990, as an initiative of several famous personalities from the scientific and academic fields. Since 1990, Bioterra University of Bucharest was proposed for the official acknowledgement by the National Academic Evaluation and Acknowledgement Council and Ministry of Education of Romania. In 2002 (M.O. no. 518), Bioterra University of Bucharest was officially acknowledged by the Romanian Government and Senate of Romanian Parliament. Therefore Bioterra University of Bucharest now is a part of the public education system in ROMANIA, having the same duties and rights as the State Universities.

Bioterra University of Bucharest has several international partnerships in order to assure a modern and efficient education for its students.

Rector, prof. univ. dr. Floarea NICOLAE