

Summary – Habilitation thesis
**The impact of newly created genotypes on the environment
protection due to the resistance and agro-biological
characteristics superior to the currently existing ones**

Field: Horticulture

Candidate: PhD. Assoc. Prof. Eng. Cezarina NECULA

The doctoral dissertation “Research on the phytosanitary protection of grapevine against the attack of phytopathogenic agents in the *tef ne ti* Arge Center for Viticulture, in the context of ecological viticulture” was completed under the supervision of PhD. Prof. Eng. Ion Olteanu. I was awarded the title “Doctor of Horticulture” by Order No.4450 of August 2nd, 2004 of the Ministry of Education and Research.

Environmental protection has imposed on finding solutions for the much needed economic development in harmony with nature.

Sustainable development – in the context of promoting the subsidence of man’s environmental imprint – needs a holistic and a global approach, but also a long-term worldview. Sustainable development in agriculture involves, among others, the practice of modern technologies, which would require the smallest amount of phytosanitary treatments, a constant goal in the practice of modern agriculture. In order to achieve this goal, several strategies can be addressed. One of these strategies starts from the fact that local varieties are the best adapted to local environmental conditions and can be used as the ideal genepool for obtaining new varieties and clonal elites, resistant to the phytopathogenic attack, but which would also meet the required agro-technical features, depending on the destination of the raw material.

The thesis is a summary of the research conducted over the years on three lines of research aimed at analyzing, identifying, selecting of the genotypes existing in the culture, which meet the most valuable ampelographic, agro-biological and technological features, with the purpose of obtaining new varieties and clonal elites. These can bring added value in agricultural practices both through their economic benefits but also by ensuring environmental protection.

The habilitation thesis “The impact of newly created genotypes on the environment protection due to the resistance and agro-biological characteristics superior to the currently existing ones” is divided into the following parts:

- A. The study of ampelographic, agro-biological and technological features of the most valuable genotypes in the area of Muntenia, with the purpose of using them in the selection work for creating new varieties of grapevine.

In the course of the proposed research in order to obtain new genotypes of grapevine, the main varieties of table grapes of *tef ne ti* Vineyard have been analysed: Perla de Csaba, Perlette, Canner, Augusta, Victoria, Chasselas doré, Mt. d Adda and Argessis.

The varieties of table grapes are appreciated for the features that determine the commercial aspect of grapes (the size and the shape of grape clusters and their grains), but also for those that determine the quality of the grapes (firm, crunchy, juicy grains, with only few, small seeds, with great taste and smooth, discreet aroma or the muscat type)

There are some well-known valuable varieties like: Victoria, Augusta, Transilvania, whose varietal features relate to precocity, production and quality. These varieties have been frequently used in the cross-breeding process, but not before being analysed and studied in different climatic conditions.

The Victoria variety, the premier Romanian table grape variety has been the subject of study in different ecopedoclimatic conditions, located at S.D.E. Banu M r cine and INCDBH tef ne ti. The study was conducted over a period of two years and consisted in ampelographic and technological measurements. The results were conclusive: the variety has proved to be more productive in tef ne ti, but of very high quality in both viticultural areas. Between 2007-2009 the research carried out on the current consumption variety of grapes included four local genotypes (Augusta, Victoria, Auriu de tef ne ti, Argessis) within different maturing ages, varieties with valuable agro-biological features which could satisfy the market requirements from July to October.

Within the study there have been made observations and measurements on the resistance to frost of the varieties during the winter, the strength of the logs, the triggering of the main phenological phases, the duration of the vegetation period, and also there have been made calculations on the absolute and relative rates of fertility, on the indices of productivity, on the quantity and the quality of the grapes and the grape production.

The ultimate goal of this objective was the selection of the most valuable varieties of table grapes as potential sires, and the activity of creating new genotypes adapted to various pedoclimatic conditions.

B. The obtainment of new varieties of table grapes and wine, which would complete and even compete with the local varietal conveyor through their quality.

An important objective of global research is the obtaining and promotion in viticultural practices of grapevine varieties which are resilient or tolerant to blight attack, mildew, rot, with a positive impact on production costs and pollution in general. Based on this goal, in 2002 at INCDBH tef ne ti the Argessis variety was approved, and was placed within the artisanal varieties because of its maternal sire – the Moldova variety, and because of its good tolerance to diseases, the variety is recommended as a basic element in practicing a sustainable ecological viticulture. The doctoral dissertation as well as the two research projects, the seven scientific papers and the three books make reference to this variety and I can say that (along with researcher author Camelia Popa) I have achieved a detailed study of this genotype.

Auriu de tef ne ti variety, obtained by controlled cross-breeding of the Frumoasa alb x Augustavarieties at INCDBH tef ne ti has received its approval certificate in 2007. The novelty of the variety consists in: the first period of ripening, the golden yellow grain, the perfectly round shape, and the good tolerance to cryptogamic diseases.

One finding of the study conducted on these new genotypes emphasizes the fact that each is valuable in its own way, especially as part of different eras of ripening. It is advisable to expand their growth in the crops by planting wide surfaces of land with these varieties and by

replacing the low quality varieties as soon as possible (the varieties with low resistance to phytopathogenic attacks, to pests and with inferior agro-biological qualities).

The improvement of Romania's wine varieties by creating new ones, especially seedless ones, with a wide range of applications (jam, compote, raisins), with varying degrees of seedlessness, with staggered ripening represents an actual necessity for national viticulture and economy. In the past years in Romania, the table varieties destined for fresh consumption and processing have been deficient due to the lack of newly created varieties for this segment and it was not applied within the cultures.

To complement this ailing segment within the local assortment, a comparative study has been made over a period of 3 years regarding the main seedless existing varieties. Attention was particularly drawn by the Canner variety, a seedless one with medium ripening, whose seedlings have been imported from France. The two research papers which studied this topic, recommend the extending of this variety within Romanian plantations, but they also recommend using it for the breeding of new varieties or clonal selections.

Within the comparative and attempt fields are planted over twenty cross-bred perspective hybrids which, after having gone through all the technology-specific stages, may be proposed at ISTIS for the inclusion within the Official catalogue of culture varieties in Romania.

Some of these elites have high value in the practice of improvement by fulfilling the following parameters:

Capitalization of environmental conditions with high adaptive plasticity;

Achieving of large, high quality production, corresponding to a grain weight exceeding 5g and cluster weight of 400 g.

Being resilient to environmental factors, diseases and pests, at least equally to the sires with the best resilience or superior to it;

There have been studies conducted on three elite hybrids, H16A-2 Elite, H17-4 Elite and H23/88/9 Elite, with the prospect of being approved. The three elites, in all the years of being studied, proved to be distinguished by appearance and quality, good adaptation to the climatic conditions in recent years, as well as phytopatogen attacks.

Regarding these perspective elites, we can mention a few conclusions:

Future varieties, with their many intrinsic, genetically transmitted features represent the most important factors in defining the biological, productive and qualitative potential, work in close correlation with the ecological offer;

It is recommended that they be included in the Official catalogue of culture varieties in Romania and that they replace the genetically eroded varieties of table grapes.

Also in the comparative field in 2010 have been planted hybrid elites for table grapes obtained by the cross-breeding of the Victoria x Black Pearl (BP) varieties. After a rigorous selection over a period of three years, it was considered that six of them meet the status variety, that they sum traits and features which highlight these.

Four elites (BP8, BP9, BP11, BP13) and the parental varieties have shown an average tolerance to disease. The BP2 elite, in the years favorable to vine blight has shown good resistance, and the BP7 elite was similar to a variety with increased resistance to the pathogen agents representative to blight and mildew. I would like to mention that BP2 and BP7 elites, even though seedless, have shown good resistance to disease, given that the varieties designed for the obtaining of raisins are generally more sensitive.

The assessment of agro-biological and technological values of a variety is directly influenced by the tolerance to the main cryptogamic diseases, for which reason the study of new varieties cannot be reached without these determinations.

C. The selection, the procurement and the approval of new elite clonal, adapted to the different resilient pedoclimatic conditions, which would in time replace the existing population

Clonal selection – it is a method of individual choice, applied to plants which normally multiply in a vegetative manner, like the grapevine, contributes to the improvement of existing varieties. In 2008 a new cloned selection has been approved, from the flavoured varieties group Muscat Ottonel, the second clone of Mt. Ottonel obtained within the country after Mt. Ottonel 12BL. The clone was brought out by its high fertility and higher productivity indices.

The clonal elite Mt. d'Adda 22 is superior to its reference variety from a qualitative and quantitative point of view was approved in 2009.

Conclusions:

Clonal selection is required in old, genetically eroded plantations

The obtained clonal selections have shown that old varieties are still valuable if subjected to a rigorous selection

In order to maintain the genetic variability of varieties where the selection has already been made, the multiplication and approval of several clones of the same variety is recommended.

Progress and professional career development plan

The obtaining of the habilitation certificate will give me the opportunity to get actively involved through the research studies that I will propose for the elaboration of doctoral papers. This aspect involves continuous training and informing of the latest findings in the field. I will pursue to increase the awareness both within as well as outside the country by developing and publishing interdisciplinary research papers on topics within the field of interest, but also by using biochemical and physiochemical analyses in accordance with international methods. I will continue to be concerned with those systems of sustainable agriculture with reduced effect on the quality of the environment. This can be achieved by embracing some strategies:

The identification and the use of the traditional resources of the genepool in order to ensure the ampelographic diversity and protection of the environment. This offers the possibility of obtaining new varieties and clones from the traditional varieties that are resilient to biotic and abiotic factors. Thus, by increasing the resilience, new effective technologies insuring the protection of the environment will be developed. Sustainable agricultural systems with low pollution effect on the environment ensure the health of the consumers.

Thus, the research can exceed the limits of fundamental and applied research, reaching the status of research - development and innovation when the results are implemented in the socio-economic environment.

All this aims at the increase in competitiveness, sustainability and stability of agricultural production, a healthy diet with quality food, but also the protection of the environment.

The viticultural agro-ecosystem can ensure maximizing the potential of natural resources by improving the potential of the already present, adapted varieties, and it can ensure productivity and quality as well as maintaining an important genepool for the future.