ABSTRACT

Key words: *new varieties, tables grapes, particularities agrobiological, tehnological*

The doctoral thesis: ***Research on the agrobiological and technological value of Gelu and Paula grapevine varieties grown in the North-East area of Moldova*** fits in the general context of researches on the agrobiological value of the vine varieties for table grapes, for an outline of the most valuable, potentially productive and top quality existing ones in the culture, adapted to climatic conditions which are constantly changing, with high commercial value to ensure profit to growers and satisfy consumer requirements.

The thesis´s purpose is to evaluate agrobiological and techonological qualities and to promote the cultivation of two new varieties for table grapes Paula and Gelu, created at Research Resort and Development for Viticulture and wine-making Iasi as compared with Aromat de Iasi variety.

The doctoral thesis summarizes a number of 211 pages being structured in ten chapters, in which are included a number of 70 tables, 36 figures and color photographs and 180 references. First part of the paper work, concerning the current state of knowledge of the issues covered, includes introduction and the first three chapters, and the second part, represents the results of personal researches, presented in seven chapters, final conclusions, recommendations and bibliographic references consulted.

In the **first chapter** entitled „*General considerations on the growth of table grapes varieties*" is presented a summary of the bibliographic data regarding to the importance of table grapes varieties, the main areas of cultivation and the situation of yields and the areas occupied in Romania, as well as the varietal and geographic conveyer, and in the **second chapter** reference is made to the main ecological, biological, technological characteristics and growing peculiarities of table grapes varieties.

The ecosystem characterisation from wine-growing center of Copou Iasi is detailed in **chapter III**, in both climatic aspect as well as in terms of geomorphological factors and geographic location. Synthesis of data for the 1972 -2011 period confirms us that conditions the habitat of vine are fulfilled, in terms of support factors (litho-morpho-pedological) and external

(bio-climatics) being provided conditions for ripening of the grapes up to age V and sometimes for the maturation of the grapes from eras VI and VII. Comparatively with the multiannual values is found an enhancement of the thermal regime and insolation, and a decrease of hydric regime which is distributed unevenly, represented through brief torrential rains alternating with long periods of drought.

The second part of the thesis, that includes personal researches, starts with **chapter IV** entitled: „*Research purpose and objectives*" in which are presented considerations concerning the purpose and objectives of the paper work diveded by activities. Studies were focussed on solving the following objectives:

- ✓ Present state of research concerning the table grapes varieties cultivated in Romania;
- ✓ Study on the biotope factors;
- ✓ Evaluation of resistance to negative temperatures from vegetative resting period;
- ✓ Behavior evaluation to biotic factors;
- ✓ Reaction to grafting and at the vine nursery;
- ✓ The study of fertility and productivity for table grapes varieties;
- ✓ Study of some physiological indexes;
- ✓ Study of physical properties of grapes;
- ✓ The study of chemical properties of grapes;
- ✓ The study of enzymes from oxidoreductase group.

In **chapter V** are presented the organizational and institutional framework of the research activities, material and methods of investigation. Experiments for the attainment of the objectives of the doctoral thesis were carried out at the Research and Development Station for Viticulture and Wine-making Iasi. Biological material which is the subject of my PhD thesis is represented by three new varieties Paula, Gelu, table grape varieties with early ripening and Aromat de Iași, with medium-aged and mixed functions, as a basis of comparison(control) for the other two varieties. Each variety is grown over an area of one hectare, and crop technology was the specific one for for table grapes varieties recommended in wine-growing zone in which the research station is located.

Experimental lots where the research has been conducted were established in 2001, on flat fields (in plateau) with exhibition predominantly southern, without being exposed to the risk climatic factors, being in full capacity of fruiting. The rootstock used for grafting was Kober 5BB. The cultivation system used was the half height strains (80 cm), hubs being led in the form of bilateral cordon with spurs safe at their base, for semiprotection of them during the winter, and the system of maintenance of soil is black field. The row number of hubs is 40 of each

variety and the distance between them is 1,2 m and row spacing is 2,2 m.

The last part of this chapter is the most complete and presents the research methods used in the evaluation of agrobiological peculiarities, of physiological indexes, the technological peculiarities and the enzymes from oxidoreductase group.

In chapter VI entitled *Study of the biotope factors concerning the suitability of the cultivation of table grapes varieties in the North East area of Moldova,* are presented the climatic conditions from the period stdied 2012-2014, characterized by prolonged drought (2012), the absolute minimum temperatures below freezing vineyards (-26.7 ° C in air and-33 ° C at the surface of the ground in 2012), heavy rainfall in a short period (2013), deposits of ice in thick layer (3-5 mm) that persisted for 15 days, as well as physico-chemical characterization of soils in the experimental plots.

The results concerning the peculiarities of tabel grapes varieties Paula and Gelu are reproduced in **Chapter VII**. The vigour of growth assessed in terms of the quantity of wood annually and multi-annual removed by cutting in the years 2013 and 2014 for vegetative growth from 2012 and 2013 shows a smaller vigor in 2013, the studied varieties being affected by frost in the winter of 2012 and prolonged drought and a normal vigor, specific to each variety, in year 2014. The same trend was apparent in the case of increases in length of shoots from the vegetation period, with lower values with 17-22 cm/shoot, toward 2014, considered climatically normal. The fertility of the varieties studied, assessed by the percentage of fertile shoots, the coefficient of fertlity absolute and relative, show that this is a worthy trait of genetic variety but also influenced by the climatic factors, the varieties concerned performing between 57.2 and 80,4 % fertile shoots, absolute over unity fertility coefficients (1,10 Paula variety and 1,24 Gelu variety) and relative 0.77-0.99 at Gelu variety and 0.93-0.96 Paula variety and the values under the biological potential (32.4 - 46.4% fertile shoots, 0,44-0,54 coefficient of relative fertility), lower in relation to the control variety.

Productivity expressed by the index in absolute and relative IPA, IPR presents different values from one variety to another but also from one year to the next, which includes the enhancement of values through the IPA, the variety Paula of 361.4 in 2013, and in 2014 variety Gelu 387,2 , upper then the control variety Aromat de Iași (202,0 and 212,3), less than in 2012, as a result of unfavourable weather conditions. The index of relative productivity (IPR provisions), indicator of average production of each shoot, highlights the two varieties as upper control variety, results supported by the statistics-mathematics analysis, as being very significant.

Regarding the development of vegetation phenophazes, this took place in a logical

progression, the beginning of vegetation and is marked by the budburst phenophaze, in the range from 21 to 25 of April, in the conditions of a good heat balance (BTU) between 14 and 63,2 °C the flowering between May 23 (2013) and 05 June (2014), in which the balance sheet useful heat (BTU) was between 264,4 °C and 344,1 °C, veraison occurred in the range from 07 - 28 July, aging of consumption of the grapes has been marked, each year of the study, for Paula variety, as from the date of August 09, was followed by Gelu variety, after August 15, both over the control variety, Aromat de Iasi with 15 to 20 days.

Behavior to frost of the varieties studied has been specific to species *vinifera*, losses of main shoots being higher in the year 2012, hovering between 68% (Paula) and 81% (Gelu), and in the year 2013, in which the proportion of main stems affected, especially the glazed frost deposited on vine chords, was of 13 to 55 %, value close to control variety.

Research conducted in 2012 regarding drought resistance revealed that all the range was affected in terms of vegetation increases, fertility and productivity, production quality, instilling fading phenomen and premature yellowing of the leaves.

Regarding the reaction to attack of the main diseases of the grapevine, it was noted that in the conditions for applying a different number, from year to year, of anticryptogamic treatments, the varieties studied were appreciated by the OIV scale resistance(according to the degree of attack), ranging from 8-9 for the onslaught of Mildew, Powdery Mildew on the leaves and grape and Gray Mold(Botrytis), with no differences compared to the control group.

Reaction to grafting and in the nursery, emphasized that the two varieties had a good behavior, between 73 and 88% of grafted and forced vines with circular callus and shoots start, lower values than control variety (92%), and the fruit yield STAS had values between 44-47% at Gelu, 46-55% at Paula, also , lower than control variety Aromat de Iași(49 - 54%).

In **Chapter VIII** entitled *The value of physiological indices of Gelu and Paula varieties* data are presented regarding the content in assimilatory pigments (chlorophyll contents a + b+ carotenoids), the intensity of photosynthesis and rate of transpiration. The results obtained reveal Paula variety as having the largest capacity to assimilate them (9.59mg/g leaf), followed by Gelu variety (got 7,43mg/g leaf), upper than the control. Also, it can be noted on upper values of photosynthetic activity of leaves and the transpiration rate at the end of flowering period at all the varieties concerned, the greatest amount of these processes registering at Gelu variety, followed by variety Paula, superior to control variety.

The technological peculiarities of Paula and Gelu varieties are shown in **Chapter IX.** The results concerning the elements of production highlights their ability to form and produce on average 19.7 - 20.1grapes/hub, to the loads of fruit approximately equal. Average mass of a

grape, the determining element of production of grapes, recorded average value greater at Paula variety (304,5 g) followed by Gelu with 280,29 g/grape variety upper Aromat de Iasi (148.5 g/grape), the differences being secured mathematical - statistics. Average yields of grapes actually determined ranking at first place Paula variety with performing kg/hub, respectively 23,36 t/ha, high production at Gelu variety 5.41 kg/hub, respectively 20,48 t/ha, worry about bonuses of the crop from the control being secured statistico maths. The proportion of production merchandise had superior value at Gelu variety, 85% of the total production and 80% Paula variety, while variety of comparison, with mixed functions, has been carried out only 61 %. Differences very significant asle this item reveal trade-in value of the varieties concerned.

Physico-mechanical analysis of grapes by which it has been shown quantitative relationships between structural parts of grapes and berries analyzed, highlights Paula and Gelu varieties which have made an average number of berries/kg grape of 260 and 302 with a total mass of 956 g, respectively 975 g, superior to Aromat de Iasi variety. The mechanical analysis of 100 berries highlights that the varieties concerned have achieved large berries of more than 4 g/berry, with 1.3 to 2.1 seeds in the berries, thin skin (5 - 7 %), and the quantity of fruit pulp represents 77 - 88% of berry weight.

Technological indices expressing technological economic and commercial value of the varieties concerned shall complete quality traits of superiority, indicating variety Gelu with suffix of grape accent of 40.4 , upper than Paula variety (22.7) as well as the control. The index of 21.5 from berry variety Gelu and 25.3 to Paula, in conjunction with the drawing up of grape accent submits that the two grape varieties performed well organised as with a high percentage of berries normally developed, satisfying superior quality which they located in the group of valuable table grape varieties. Tests carried out on the strength to not be captured on berry pedicel and resistance to crack of a berry, indicates average values superior at variety Gelu 3.22 (N), respectively 16,23 (N), variety with large berry, crispy pulp and thicker skin, according to transport and storage.

Chemical composition analysis of musts of varieties studied highlights a potential of accumulation of sugars in grape must between 170 - 184 g/L to Paula variety and of 160 - 164 g/L to Gelu, accompanied by a normal acidity of 5.6 - 6.0 G/L tatric acid, respectively 4.1 - 4.4 G/L tatric acid, specific to table varieties. Balance harmonious and pleasant taste of grapes has been highlighted and value of glucoacidimetric index, in the 1960s with favorable climatic conditions had values 37 3 9 to variety Gelu and between 29 to 31 from Paula, variety upper control.

Tests carried out on the amount of natural organic compounds, respectively anthocyanins

and polyphenols reveal that the variety Gelu, epidermis violet blue color the recorded values between 180,6 - 211,4 g/L, with a anthocyanic potential between 508,3 and 608,4 . The content of total polyphenols as well as total polyphenolic index had the same distribution as a function of the vintage year being superior to variety Gelu 0,260 - 0,301 g/L Gallic acid, i.e. 5.1 - 5.9 IPT, upper values than Paula and Aromat de Iasi varieties.

The results of the following calculations on the performance of certain enzymes of oxidation of the grapes varieties surveyed revealed an high activity of polyphenoloxidase to variety Gelu, between 6.30 - 6.81 U/g/min, dual variety bud by Paula and triple from the control, so that there is an inverse relationship between polyphenoloxidase and the content of total polyphenols, especially in the varieties with white grapes. An inverse relationship existed between polyphenoloxidase and values with those of Peroxidase-of catalase, in the sense that their high values correspond to a reduced activity of catalase.

Top rated visual, olfactory and tactile, the varieties studied were listed with notes for descriptors specified in the data sheets, the highest score being received by Gelu variety (108), followed by Paula variety (103), and Aromat de Iași variety(79).

The results of the observations and calculations carried out in the years of study, establishing ampelographic descriptors are being visible in **Chapter X** „*The ampelographycal descriptors of the vine varieties studied*", being used for the purpose of supplementing and the preparation of new descriptive sheets of the varieties concerned, which led to the conclusion that these varieties correspond to extent of accomplishments submitted for their approval and licensing.

All of these data gives a complete picture of agrobiological and technological value of the Gelu and Paula varieties, which allows recommendation and extend successfully in cultivation.