AGROBIOLOGICAL AND TECHNOLOGICAL CHARACTERISATION OF SOME CLONAL ELITES FOR WINE GRAPES OBTAINED WITHIN S.C.D.V.V. IAŞI

CARACTERIZAREA AGROBIOLOGICĂ ŞI TEHNOLOGICĂ A UNOR ELITE CLONALE PENTRU STRUGURI DE VIN OBŢINUTE ÎN CADRUL S.C.D.V.V. IAŞI

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Abstract. *Autochthonous and cosmopolitan grapevines varieties represent a valuable source of germoplasm, which is particularly important for the breeding of the currently cultivated genotypes.Thestructural improvement of the national viticulturalassortment is supported by scientific research in the field of vine breeding, whose mission was and is to renew, diversify and increase the biological value of the vine assortment by creating new qualitative and productive genotypes with superior resistance to disease and stress factors, through both genetic engineering and clonal selection. The present paper contains the results obtained at the Research Development Station for Viticulture and Winemaking Iasi, referring to the agrobiological and technological characteristics of clonal elites selected from the populations of the varieties: Sauvignon blanc, Pinot gris and Cabernet Sauvignon. The clonal elites obtained, through the cultural and qualitative features for which they were selected, complementarily contribute to achievement of high quality grape productions.*
Key words: clonal elites, wine grapes, breeding schemes *Vitis vinifera* L.

Rezumat. *Soiurile de viță de vie autohtone şi cosmopolite reprezintă o sursă valoroasă de germoplasmă, deosebit de importantă pentru ameliorarea materialului genetic cultivat în prezent. Îmbunătățirea structurală a sortimentelor viticole naționale este sprijinită de cercetarea ştiințifică din domeniul ameliorării viței de vie, a cărei misiune a fost şi este, înnoirea, diversificarea şi creşterea valorii biologice a sortimentelor viticole prin crearea de noi genotipuri mai valoroase calitativ şi productiv, cu rezistență mai bună la boli şi factori de stres, atât prin inginerie genetică, cât şi prin selecție clonală. Prezenta lucrare cuprinde rezultatele obținute la Stațiunea de Cercetare Dezvoltare pentru Viticultură şi Vinificație Iaşi, cu referire la caracteristicile agrobiologice şi tehnologice ale unor elite clonale, selectate din populațiile soiurilor: Sauvignon blanc, Pinot gris şi Cabernet Sauvignon. Elitele clonale obținute, prin aptitudinile culturale şi calitative pentru care au fost selectate, contribuie în mod complementar la obținerea unor producții de calitate superioară.*
Cuvinte cheie: elite clonale, struguri pentru vin, scheme de ameliorare, *Vitis vinifera* L.

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INTRODUCTION

Maintaining and improving the biological potential of valuable vinevarieties by using the clonal selection as a fast and efficient means of quantitative and qualitative increase of grape production, is a major concern of scientific research in the field of vine breeding (Damian *et al*., 2006, 2010).

In this regard, by applying the clonal selection, at the Research Development Station for Viticulture and Winemaking (S.C.D.V.V.) Iasi, were obtained two clonal elites for white wines and one for red wine.The obtained clonal elites are well adapted to the ecological conditions specific to the vineyards from north-eastern Moldova, with high yield, superior qualities characteristics and genetic stability compared to population of the variety.

Presentwork refers to clonal elites Sauvignon blanc 12.9.5, Pinot gris 5.7.5 and Cabernet Sauvignon 16.6.9, obtainedat S.C.D.V.V. Iasi, and studied during several years of vegetation.

MATERIAL AND METHOD

The studies were carried out in experimental plantations located on cambic-chernozemsoil, practicing planting distances of 2.1/1.2m, semi-hightraining system, semi-protectedduring winter. Field technologies applied were those recommended by viticulturalagrotechnicsfor this area, specific to wine grape varieties. To highlight the agrobiological and technological characteristics, in the period 2012-2016, the researchwas focused on observations and determinations on the phenological spectrum, fertility and productivity of clonal elites, the quantity and quality of grape production, and also theirbehaviouron frost and cryptogamic diseases, in direct relation with the environmental factors.

RESULTS AND DISCUSSIONS

From the climatic point of view, a general analysis of the reference period (2012-2016) highlights the presence of moderate temperatures in the years 2013 and 2016, with temperatures below -14 °C (tab. 1). In 2012, 2014 and 2015, were recordedthe lowest temperatures, of -26.7 °C, -20.6 °C and -21.0 °C respectively, producing bud losses corrected by compensation pruning.

The sum of global temperatures oscillated during the years of study between 3755 °C in 2014 and 4222 °C in 2016. In 2014, thesum of active and useful temperatures was 1500.3 °C, and respectively 3460.3 °C, favouring the normal deployment of physical processes and grape maturation. The summers were warm, sometimes torrid, with a maximum of 40.1 °C in 2012 and 37.0 °C in 2016 respectively.Regarding the hydric regime, the year 2015 proved to be a dry year, accumulating during the vegetation period only 247.3 mm. The amount of rainfall accumulated in the other years of study was over 535.6 mm, providing the necessary conditions for obtaining large and high quality productions.

Table 1

Climatic characteristics of the years of study in the Copou Iaşi area

Year	2012	2013	2014	2015	2016
Average temperature(°C)	10.4	10.3	10.2	11.5	11.0
Absolute minimum in air (°C)	-26.7	-14.3	-20.6	-21.0	-8.4
Absolute maximum in air (°C)	40.1	33.7	34.2	37.0	35.5
Sum of active temperatures(°C)	4023.5	3550.0	3460.3	3615.4	3576.8
Sum of global temperatures(°C)	3838.1	3788.3	3755.0	4222.0	4019.0
Sum of useful temperatures(°C)	1963.5	1530.0	1500.3	1785.4	1686.8
Real insolation (hours)	4181.5	3999.7	3985.1	4169.6	4102.8
Rainfall (mm)	535.6	656.7	618.0	311.1	646.8

On the background of the specific climatic conditions of each year, the bud break ofstudied clonal elites occurred between 18th and 30thof April, being noted the early bud break of the clone Sauvignonblanc 12.9.5 (18.04.), followed by Pinot gris 5.7.5 (22.04.) and Cabernet Sauvignon 16.6.9 (25.04) (tab. 2).

Table 2

The main agrobiological characteristics of the clonal elites studied

Analysed elements	Sauvignon blanc 12.9.5	Pinot gris 5.7.5	Cabernet Sauvignon 16.6.9
Bud break	18 IV - 25 IV	22 IV - 27 IV	25 IV - 30 IV
Flowering	29 V - 08 VI	28 V - 07 VI	28 V - 07 VI
Veraison	29 VII - 13 VIII	3 VIII -06 VIII	31 VII - 13 VIII
Grape maturation	9 IX - 29 IX	9 IX - 30 IX	18 IX - 10 X
Duration of vegetation period	166- 206	166- 206	164 - 210
Fertile shoots (%)	70 - 81	70 - 81	82 - 85
Absolute fertility coefficient	1.18 - 1.56	1.18 -1.56	1.56 -1.90
Relative fertility coefficient	0.91 -1.28	0.91 -1.28	1.32 -1.56
Absolute productivity index	109 - 113	109 - 113	124 - 187
Relative productivity index	64 - 105	64 - 105	120 - 156
Growth vigour	average	average	average
Frost resistance (% viable buds)	90 - 93	90 - 93	85 - 92
Resistance to downy mildew (OIV notes)	9	8 - 9	7 - 9
Resistance to powdery mildew (OIV notes)	9	8 - 9	7 - 9
Resistance togrey mould (OIV notes)	7 - 8	7 - 8	6 - 8

Blooming occurred between 28.05 and 08.06, being conditioned by a useful thermal balance, with values ranging from 256.0 °C to 276.0 °C, while grape veraison took place between 29.07 and 13.08. Grape maturity of consumption coincided with the harvest date and took place in September. The first grapes that reached technological maturity were those of the clonal elites for white wines (Sauvignon blanc 12.9.5 and Pinot gris 5.7.5).

Regarding the elements defining the fertility of the studied clonal elites,

was found that the percentage of fertile shoots was high, ranging between 70 and 85%, particularly pointing out the clonal elite Cabernet Sauvignon 16.6.9.

Under the terms of an almost equal bud load attributed by pruning, the average number of inflorescences varied according to the hereditary specificity of the elites. The values of the absolute fertility coefficient were supraunitaryat all three elitesstudied, while the relative fertility coefficient rangedbetween 0.91 and 1.56. Elite Cabernet Sauvignon 16.6.9 showed the highest values of the absolute (> 124) and relative (> 120) productivity indices.

By comparing the results inrespect to the fructification capacity of the studied clones, it can be concluded that they have reached the known biological potential of population of the variety, with small differences between the repetitions of the same genotype, demonstrating that they have acquired genetic stability and have a good adaptability to the conditions of the ecosystem in which they were studied.

Applying a number of seven anticryptogamic treatments, the studied clonal elites showed a good resistance to the attack of the main grapevine diseases, specific to the *V. vinifera* varieties, appreciated with grades from 7 to 9 in the O.I.V. scale.

During the observation period (five years), the production and quality of grapes was influenced by environmental factors, thus, the yieldon vine stock ranged between 2.8 (Cabernet Sauvignon 16.6.9) and 5.4 kg (Pinot gris 5.7.5). Yield per hectare ranged between 13 and 20 t/ha forelite Pinot gris5.7.5 and between 10 and 15 t/ha for the other two studied elites (tab. 3).

Table 3

The main technological characteristics of the clonal elites studied

Analysed elements	Sauvignon blanc 12.9.5	Pinot gris 5.7.5	Cabernet Sauvignon 16.6.9
Average grape weight (g)	68 - 75	80 - 100	95 - 120
Weight of 100 berries (g)	177 - 186	136 - 151	120 - 129
Sugars in must (g/L)	185 - 230	205 - 230	185 - 216
Acidity of must (g/L H_2SO_4)	5.1 -5.9	4.2 - 4.6	3.9 - 4.3
Glucoacidimetric index	36 - 39	49 - 50	47 - 50
Colour of berry skin	yellow - green	red - grey	black - azure
Pulp consistency	succulent	succulent	succulent
Effective yield on vinestock (kg)	3.4 - 4.0	3.6 - 5.4	2.8 - 3.4
Calculated yield on ha (t/ha)	12.5 - 15.1	13.6 - 20.0	10.6 - 12.5

The size of the grapes, as mean weight, was superior to the control (population of the variety), with aweight of 100 berriesof over 120 g for all three elites.

The quality of the harvest, measured as the meanweight of a grape, the weight and volume of 100 berries, the sugar content and total acidity of the must, reflects both the genetic character of the variety and the influence of the climatic factors on these elements.

The studied genotypes showed high sugar concentrations, ranging between 185 g/L to 230 g/L at the technological maturity. Pinot gris 5.7.5 clonal elite was noted for its high potential ofsugars accumulation, which exceeded220 g/L at grape harvesting. The acidity of the must was situated within normal limits, being inverselycorrelated with the sugar concentration of grapes.The highest total acidity was recorded in clonal elite Sauvignon blanc 12.9.5 (5.1-5.9 g/L H_2SO_4).

Regarding the polyphenolic potential of the studied genotypes, the total polyphenolic index ranged from 8 to 25, the maximum value being obtained for the Cabernet Sauvignon 16.6.9 clonal elite (tab. 4).

Table 4

The polyphenolic potential of grapes at harvest

Clonal elites	DO 280	Polyphenolic index	Anthocyanins (mg/L)	Total anthocyanin potential (mg/kg)
Sauvignon blanc 12.9.5	0.028	8	0	0
Pinot gris 5.7.5	0.056	17	15	45
Cabernet Sauvignon 16.6.9	0.084	25	32	96

Clonal elite Cabernet Sauvignon 16.6.9, showed a total anthocyanin potential of 96 mg/kg, in accordance with its hereditary character and the climatic conditions of the harvest year.

CONCLUSIONS

1. The climatic conditions recorded during the study period allowed to the clonal elites obtained within S.C.D.V.V.Iaşi to complete the annual biological cycle and to ensure productions of superior quality comparing to the population of the variety.

2. Pinot gris 5.7.5 clonal elite was highlighted by constant quantitative and qualitative productions and a high potential for sugar accumulation (225 g/L) in the context of a balanced acidity, being suitable for obtaining quality white wines.

3. Clonal elite Sauvignon blanc12.9.5 ensures the obtaining of quality white wines, with typicity specific to the variety, accumulating over 200 g/L sugars. It is characterised by constant quantitative and qualitative productions, showing good resistance to low temperatures.

4. Clonal elite Cabernet Sauvignon 16.6.9 is a valuable creation that is distinguishedby an average yield of 4.8 kg/stock, providing anincreasein production of over26% compared to the variety. Cabernet Sauvignon 16.6.9 ensure the obtaining of high quality, extractive and balanced red wines, with a total acidity of 4.0 g/L of H_2SO_4.

5. The obtained clonal elites are well adaptedto the ecological conditions specific to vineyards from the north-eastern Moldova, with higher fertility and productivity, superior quality characteristics and genetic stability compared tothe population of the variety.

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