BEHAVIOR OF NEW TABLE GRAPE HYBRID ELITE IN THE CLIMATE CONDITIONS OF THE COPOU-IASI WINE CENTER

COMPORTAREA UNOR NOI ELITE HIBRIDE PENTRU STRUGURI DE MASĂ ÎN CONDIȚIILE CLIMATICE ALE CENTRULUI VITICOL COPOU - IAŞI

FILIMON Roxana[1*], DAMIAN Doina[1], NECHITA Ancuța [1], FILIMON V. R.[1]
*Corresponding author e-mail: roxanacotovanu@yahoo.com

Abstract. *Improving the table grape assortment is a permanent concern of hoticultural researchers. Through advanced breeding programs are favored the obtaining, introduction and promotion into the vineyards of new genotypes with superior yield and quality and increased biological resistance. The purpose of these approaches is to satisfy current consumer requirements and the growing demand for table grapes on the market. The current study aims to evaluate two valuable hybrid elite for table grapes obtained at Research and Development Station for Viticulture and Oenology Iasi (Copou-Iasi wine center). Adaptation to environmental conditions and grape quality were analyzed based on agrobiological and technological observations. The two hybrid elite showed high productions (up to 20 t/ha), with a marketed production of over 90%. Both genotypes showed significant accumulations of sugars in grapes (196-200 g/L) and high resistance to cryptogamic diseases, indicating a good adaptation to the environmental factors in the growing area.*
Key words: agrobiological features, grapevine breeding, hybrid elite, new genotypes, table grapes

Rezumat. *Amelioararea sortimentului viticol pentru struguri de masă reprezintă o preocupare permanentă a cercetătorilor din domeniul vegetal, favorizând obținerea, introducerea şi promovarea în cultură a unor genotipuri cu calități superioare atât productiv cât şi calitativ şi cu rezistențe biologice sporite, care pot fi cultivate cu costuri reduse şi care să satisfacă cerințele actuale ale consumatorilor şi acopere cu succes cererea tot mai mare de struguri de masă. Studiul a avut ca scop monitorizarea a două elite hibride valoroase pentru struguri de masă obținute în cadrul SCDVV Iaşi, în vederea omologării. Adaptarea la condițiile de mediu şi calitatea producției a fost analizată pe baza observațiilor agrobiologice şi tehnologice. Cele două elite hibride s-au remarcat prin producții ridicate, cu un procent de producție marfă de peste 90%. Strugurii au prezentat acumulări importante de zaharuri,*

[1]Research and Development Station for Viticulture and Oenology Iasi, Romania

între 196 şi 200 g/L, genotipurile studiate manifestând rezistenţă ridicată la bolile criptogamice şi o bună adaptare la condiţiile de mediu din zona de cultură.

Cuvinte cheie: amelioarea viţei de vie, elite hibride, genotipuri noi, însuşiri agrobiologice, struguri de masă

INTRODUCTION

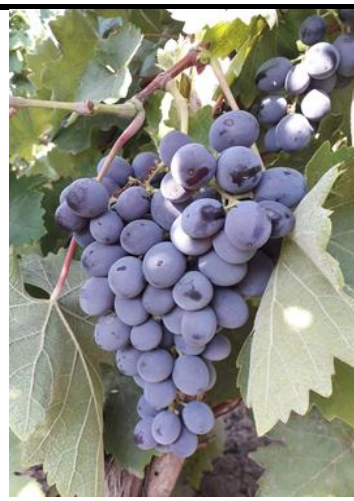
Grapevine is one of the most widely grown crops in the world, covering about 7,955 million hectares (Burger *et al.*, 2009). Great genetic diversity is found in grapevines and they are adapted to different soils and climates. The breeding of the grapevine appeared with its discovery, through the selection of plants with larger and tasty fruits that would satisfy the food need of the consumer (Oprea and Moldovan, 2007). Worldwide, targeted breeding activities started in the beginning of the 19th century, in North America, when the colonists tried to find solutions for the damage created by *Phylloxera* sp., fungal diseases and frost (Eibach and Topfer, 2015). In the same time, on the other continents, in many countries have been initiated grape breeding programs, in order to induce cold and disease resistance, some important wine grape cultivars were developed from these crosses, encountered even today in culture.

Improving the table grape assortment is a permanent concern of hoticultural researchers. Through advanced breeding programs are favored the obtaining, introduction and promotion into the vineyards of new genotypes with superior yield and quality and increased biological resistance. The current study aims to evaluate two valuable hybrid elite for table grapes obtained at Research and Development Station for Viticulture and Oenology Iasi (Copou-Iasi wine center).

MATERIAL AND METHOD

The study was conducted between 2019-2020, in the experimental plots of SCDVV Iasi, the plant material being represented by two hybrid elites for table grapes: hybrid elite 3.5.5. (H.E. 3.5.5) resulting from the crossing between the Coarnă Neagră × Muscat of Hamburg and the hybrid elite 2.7. (H.E. 2.7) obtained by interspecific crossing of the varieties Coarnă Neagră × Varousset, compared to the control variety Coarnă neagră (fig. 1). The soil where the plantations are located is of the chernozem type, the planting distances are 2.2/1.2 m in the semi-high crop system.

The research was focused on observations and determinations regarding the dynamics of vegetation phenophases, productivity, yield and quality, in direct relation with ecological factors. Total acidity (g/L tartaric acid) and sugars (g/L), concentration of anthocyanins and accumulated polyphenols were determined according to the OIV protocols (OIV, 2019). The biological resistance of the varieties to the main diseases was assessed by the method of ampelographic descriptors proposed by OIV, the notation being made by assigning grades according to the level of expression.



Hybrid elite 3.5.5

Hybrid elite 2.7

Fig. 1. The studied hybrid elites

RESULTS AND DISCUSSIONS

Under the influence of the climatic conditions specific to the study years 2019 - 2020, at the studied hybrid elites, the bud burst emerged between 14 and 23 april, noting an early bud burst of the hybrid elite 2.7. (14.04 - 16.04), both studied elites having an advance of about one week compared to the control variant (tab. 1).

Table1

Phenological spectrum of hybrid elites studied in the conditions of the Copou Iaşi wine center

Genotype		Bud burst		Full bloom		Veraison		Grape maturity	
		Date	BTU (ºC)	Date	BTU (ºC)	Date	BTU (ºC)	Date	BTU (ºC)
Coarnă neagră	2019	29.04	48.7	15.06	368.5	30.08	925.3	02.10	251.3
	2020	23.04	35.2	08.06	226.5	24.08	979.8	27.09	364.6
H.E. 3.5.5	2019	23.04	16.7	09.06	313.2	07.08	706.9	16.09	477.1
	2020	16.04	28.3	09.06	260.6	11.08	778.9	16.09	444.4
H.E. 2.7	2019	14.04	12.9	04.06	262.1	10.08	801.0	23.09	503.5
	2020	16.04	22.1	07.06	226.2	16.08	880.3	30.09	439.2

Note: BTU - useful thermal balance.

Flowering started in first decade of june, being conditioned by a useful thermal balance with values between 226.2˚C and 313.2˚C, and the grape veraison started in first half of august (7 -16).

The grapes compsumption maturity coincided with the date of harvest and was noted in the second decade of September. First grapes that reach technological maturity were of the hybrid elite 3.5.5, followed after about a week

by the hybrid elite 2.7. The useful thermal balance that conditioned the maturation phenophase had values between 444.4 and 503.5°C.

The agrobiological caracteristics were exprimated by analyzing the fertility of the studied hybrid elites. The fertility of both genotypes, represented in table 2, by the average of the two years of study, was between 60.53 and 61.18%, being superior to the control variety (Coarnă neagră). The values of the absolute fertility coefficient were higher than the control variant at both studied elites, while the relative coefficient value was between 0.69 and 0.71.

Table 2

Evaluation of the fertility characteristics of the studied hybrid elites

Genotype	Number of shoots/ vine stock	Fertile shoots/ vine stock	Coefficient of fertile shoots (%)	Number of inflorescences	Coefficients of fertility	
					RFR	AFR
Coarnă neagră	35.0	18	51.42	19	0.54	1.05
H.E. 3.5.5	38.0	23.0	60.53	26.2	0.69	1.14
H.E. 2.7	30.4	18.6	61.18	21.6	0.71	1.16

Note: RFR - relative fertility rate; AFR - absolute fertility rate.

In the climatic conditions of the years 2019-2020, the evaluation of the biological potential of the analyzed genotypes was performed according to the list of OIV descriptors for table grapes (OIV, 2009), the hybrid elites studied being noted with marks of 9 both in terms of resistence to frost (winter buds viability), as well as drought resistance (tab. 3).

Table 3

Evaluation of the biological potential of the studied hybrid elites in the Copou Iaşi wine center (2019 - 2020) - frost resistance

Genotype	Viabil buds (%)	Degree of resistance
Coarnă neagră	100	9
H.E. 3.5.5	100	9
H.E. 2.7	100	9

Even if during the vegetation period the precipitations were few and unevenly distributed, the studied hybrid elites had a very high resistance to drought (tab. 4), without presenting specific manifestations of water stress.

Table 4

Evaluation of the biological potential of the studied hybrid elites in the Copou Iaşi wine center (2019 - 2020) - drought resistance

Genotype	Degree of resistance (OIV 403)	Expression code
Coarnă neagră	9	Very good
H.E. 3.5.5	9	Very good
H.E. 2.7	9	Very good

In the climatic conditions of the study period, after applying of 8 anticryptogamic treatments, the studied elites showed a good resistance specific to *Vinifera* varieties (tab. 5). The powdery mildew and gray mould did not affect the

studied genotypes, and the pathogen *Plasmopara viticola* (downy mildew) was slightly present on the grapes of the hybrid elites, the degree of attack being below 0.33, without causing significant losses.

Table 5

The behavior of the studied hybrid elites at the main diseases of the grapevine

Genotipul	Downy mildew (*Plasmopara viticola*)		Powdery mildew *(Uncinula necator)*		Gray mould *(Botritis cinerea)*	
	Leaf OIV 452	Grape OIV 453	Leaf OIV 455	Grape OIV 456	Leaf OIV 458	Grape OIV 459
Coarnă neagră	9	9	9	9	9	9
H.E. 3.5.5	9	9	9	9	9	9
H.E. 2.7	9	9	9	9	9	9

The average production per vinestock varied between 5.30 and 6.46 kg, and the average production calculated per hectare was 20.48 t/ha for the hybrid elite 2.7, respectively 24.46 t/ha for the hybrid elite 3.5.5 (tab. 6).

Table 6

The main quantitative characteristics of the studied hybrid elites

Genotype	Number of cluster/vine stock	Actual yield (kg/ vine stock)	Calculated yield (t/ha)	Marketed production (%)
Coarnă neagră	19	5.32	20.14	90
H.E. 3.5.5	26.2	6.46	24.46	90
H.E. 2.7	21.6	5.41	20.48	90

The quality of the grapes, indicated by the average weight of the cluster, the sugar content and total acidity of the must, reflects both the genetic character specific to the variety and the influence of climatic factors on these elements (tab. 7). Hybrid elite 3.5.5 is characterised by large grapes with an average weight of 310.8 g. The weight of 100 berries, was specific to each genotype, ranging from 263.0 g for the control variety, to 343.9 g at hybrid elite 3.5.5.

Table 7

Quantitative and qualitative production of the studied hybrid elites

Genotype	Weight of cluster (g)	Weight of 100 berries (g)	Sugars (g/L)	Total acidity (g/L tartaric acid)
Coarnă neagră	280.0	263.0	176.0	6.50
H. E. 3.5.5.	310.8	343.9	193.0	5.17
H. E. 2.7.	280.5	278.5	210.0	6.30

In the ecopedoclimatic conditions of the studied years, due to the low amounts of precipitation and the high temperatures during the grape ripening, the studied elites showed high sugar concentrations (210 g/L at H.E. 2.7). Total acidity of the must was within normal limits, between 5.17 and 6.30 g/L as

tartaric acid. Total polyphenolic index showed values between 15.99 and 20.85, the maximum value being obtained at the hybrid elite for table grapes 3.5.5. The anthocyanin potential was high, being in accordance with their hereditary character and climatic conditions of the harvest year (tab. 8).

Table 8

Polyphenolic content of grapes at harvest

Genotype	DO280	Polyphenolic index	DO520	Anthocyanins (mg/L)	Total anthocyanin potential (mg/kg)
Coarnă neagră	0.0629	18.87	0.9599	436.75	1310.26
H. E. 3.5.5.	0.0695	20.85	1.4548	661.93	1985.80
H. E. 2.7.	0.0533	15.99	0.9484	431.52	1294.56

CONCLUSIONS

1. The climatic conditions of the reference years positively influenced the development of the plants, favouring grape ripening and the accumulation of sugars in grapes of hybrid elite analysed.

2. Hybrid elite 3.5.5 was characterised by large grapes (310.8 g), with specific flavor and good grape yield (24.46 t/ha), with over 20% more productive compared to the control (Coarnă neagră), with a marketed production of 90%.

3. Hybrid elite 2.7 was noted by a good sugar accumulation in berries (210 g/L), an average grape weight of 280 g and good yield (20.46 t/ha).

4. The two studied elites showed high ecological plasticity, high quality productions, good resistance to frost, drought and cryptogamic diseases, being able to be successfully introduce in the assortment of table grapes for temperate climate.

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