

EVALUATION OF THE AGROBIOLOGICAL AND TECHNOLOGICAL POTENTIAL OF SOME VALUABLE HYBRID ELITE OBTAINED AT R.D.S.V.O. ODOBEȘTI

I. Bosoi^{1*} and M. Pușcalău¹

1Research and Development Station for Viticulture and Oenology Odobești,
Ștefan cel Mare street, no. 61, Odobești, Vrancea, Romania

*Corresponding author email: oana_boss2002@yahoo.com

ABSTRACT

Over time at Research and Development Station for Viticulture and Oenology Odobești, numerous intra- and interspecific sexual hybridizations have been carried out, in order to obtain new cultivars, with high productive and qualitative potential, with disease tolerances, resistant to stress factors, very well adapted to the climatic conditions specific to Vrancea vineyards. Thus, valuable hybrid elites were obtained, which represent a permanent source for the selection, approval and promotion of new grape cultivars. In order to evaluate the agrobiological and technological potential of some valuable hybrid elites, in the period 2016 - 2018, two elites were studied: 'E.H. 10-1-6' and 'E.H. 6-1-1'. The results obtained from this study showed that these hybrid elites have a high productive and qualitative potential, show high biological resistance to the main diseases of the vine, and can be proposed for approval in order to improve the national assortment, in the context of sustainable viticulture.

Keywords: vines, breeding, resistance, cultivar

INTRODUCTION

The productivity, quality and adaptability of vine cultivars are very complex characteristics that depend on the genetic traits (inherited genotype or genetic dowry) of each cultivar, environmental conditions and the interaction between genotype and environment (Sestraș, 2004). Research conducted in recent decades in our country, has led to the production of valuable vine genotypes, with high tolerance to disease, drought and frost resistant. The scientific activity of vine improvement was and remains a strategic objective of tradition and continuity at Research and Development Station for Viticulture and Oenology Odobești (Bosoi et al., 2017, 2018; Pușcalău et al., 2018). In this context, in the last six years, four grape cultivars have been approved, with different production directions: a cultivar for table grapes 'Putna' (2014), a cultivar for superior white wines 'Vrancea' (2018), a cultivar for tinctorial red wines 'Măgura' (2014) and a cultivar for red and rose wines with genetic resistance 'Remus' (2016).

MATERIALS AND METHODS

The research was performed at the Research and Development Station for Viticulture and Oenology (RDSVO) Odobești, between 2016 and 2018. The biological material was represented by two valuable hybrid elites: the hybrid elite 10-1-6 obtained by crossing the

'Traminer roz' cultivar with the 'Isabella' interspecific hybrid and hybrid elite 6-1-1 obtained by crossing the hybrid combination 'Traminer x Armaş' with the 'Şarba' cultivar. The 'Fetească Regală' cultivar cultivated on large areas in the Odobesti, Coteşti and Panciu vineyards, was studied as a witness.

The hybrid elites were characterized ampelographic, the phenological spectrum was monitored, were made observation and determinations regarding the elements of fertility and productivity, behavior at the main diseases of the vine, established by assessing with grades from 1 to 9 according to the resistance scale developed by the O.I.V. (2009), quantitative and qualitative potential of grape production.

RESULTS AND DISCUSSIONS

Ampelographic characterization of the hybrid elite 10-1-6. At disbudding, the rosette is light green, slightly fluffy. The shoot is glabrous and has slightly intense anthocyanin coloration on the sunny side. The adult leaf is medium in size, pentalobate, slightly embossed, glabrous on the upper face and fluffy on the lower face, with the upper lateral sinuses open and the petiolar sinus open in the shape of a lyre. The flower is a normal hermaphrodite, type 5.

The grapes have a conical shape, rarely cylindrical, are medium to large in size and have medium compactness. The berries are medium-sized, spherical in shape, with pink skin, darker on the sunny side. The pulp does not have anthocyanin coloration, it is juicy, slightly firm, without specific taste (Fig. 1 and Fig. 2).



Figure 1. Elite hybrid 10-1-6 (shoot, leaf - lower side, inflorescence)



Figure 2. Elite hybrid 10-1-6 (shoot tip, leaf - upper side, grape)

Ampelographic characterization of the hybrid elite 6-1-1. At disbudding, the rosette is light green, slightly fluffy. The shoot is glabrous, with entirely green internodes with longitudinal striations. The adult leaf is small, pentalobate, slightly embossed, glabrous on the upper face. The superior lateral sinuses are deep, with the lobes slightly open, the lower ones open, and the petiolar sinus is semi-open. The flower is hermaphroditic, type 5. The grapes are small, have a cylindrical shape, very rarely conical, with dense berries. The berries are small, spherical in shape, with golden-yellow skin, with more intense golden hues on the sunny side. The pulp does not have anthocyanin coloration, it is juicy, with a balanced taste, slightly aromatic (Fig. 3 and Fig. 4).



Figure 3. Elite hybrid 6-1-1 (shoot, leaf - lower side, inflorescence)



Figure 4. Elite hybrid 6-1-1 (shoot tip, leaf - upper side, grape)

Climatic conditions. The research period (years 2016 - 2018) was characterized by high heliothermal availability, the thermal regime expressed by the average annual temperatures ($^{\circ}\text{C}$) and the sum of the useful temperature degrees ($\sum^{\circ}\text{tu}$) registering values much higher than the multiannual ones (Table 1). Compared to the multiannual values (10.5°C , respectively 1604.1°C), the average annual temperature varied between 12.0°C and 13.2°C , and the sum of the useful temperature degrees ($\sum^{\circ}\text{tu}$), between $1933,6^{\circ}\text{C}$ and 2072.8°C . The rainfall regime was a surplus during the vegetation period in all three years of study (between 613.2 mm and 910.6 mm), compared to the multiannual value (431.2 mm).

Table 1. The main climatic parameters from the study period (Odobesti, 2016-2018)*

Climate parameter / Month	Average temperature (°C)				The sum of the useful temperature degrees (°C)				Rainfall (mm)			
	Multi annual	2015 / 2016	2016 / 2017	2017 / 2018	Multi annual	2015 / 2016	2016 / 2017	2017 / 2018	Multi annual	2015 / 2016	2016 / 2017	2017 / 2018
XI	5.1	9.2	5.3	6.5	9.5	45.7	5.7	1.4	45.8	108.0	68.2	70.2
XII	0.2	4.2	2.1	3.7	0.4	1.9	3.5	0.2	41.6	4.2	0.6	37.2
I	-1.6	-0.9	-2.8	0.2	0.1	0.0	0.0	0.0	34.3	6.4	10.2	16.6
II	-0.1	6.4	1.0	0.3	0.7	12.7	3.1	0.0	32.4	11.6	30.8	52.8
III	4.4	8.2	9.5	2.9	12.2	18.4	28.8	3.8	32.0	52.8	24.4	29.0
IV	10.9	14.2	10.9	16.3	66.9	144.2	61.3	189.2	48.4	131.2	71.8	1.8
V	16.4	16.7	18.2	20.4	212.8	206.3	250.3	323.6	74.3	151.8	31.6	20.4
VI	20.0	22.7	22.4	22.5	308.9	382.6	403.0	375.5	84.1	138.4	111.4	138.6
VII	22.0	24.6	22.6	22.1	371.7	452.3	391.5	374.0	78.2	13.0	93.4	181.8
VIII	21.2	23.3	23.9	23.9	351.1	411.2	431.5	429.4	59.1	188.8	47.6	42.2
IX	16.7	19.6	18.9	18.2	205.4	281.4	267.7	247.8	45.0	71.4	51.8	21.0
X	10.8	9.6	12.3	14.1	64.4	34.5	87.2	127.9	42.1	216.0	84.8	1.6
Annual average/ amount	10.5	13.2	12.0	12.6	1604.1	1991.2	33.6	2072.8	617.3	1093.6	626.6	613.2
during the vegetation period	16.9	18.7	18.5	19.6	1581.2	1912.5	1892.5	2067.4	431.2	910.6	492.4	407.4

*Data provided by the weather station AgroExpert of R.D.S.V.O. Odobesti

The phenological spectrum. The phenology of the hybrid elites studied is presented in Table 2. In the climatic conditions specific to the study period (2016 - 2018) the growth and development processes of the vine evolved normally.

Table 2. The dynamic of the main phenological stages (Odobesti, 2016 -2018)

The hybrid elite	Year	The phenological stages								Active vegetation period (days)
		Disbudding		Flowering		Veraison		Full ripening		
		Date	$\sum tu$ (°C)	Date	$\sum tu$ (°C)	Date	$\sum tu$ (°C)	Date	$\sum tu$ (°C)	
E.H. 10-1-6	2016	06.IV	56.0	30.V	369.8	06.VIII	1309.1	25.IX	1879.6	166
	2017	15.IV	65.8	03.VI	367.9	10.VIII	1306.4	18.IX	1777.4	157
	2018	17.IV	84.9	23.V	410.0	03.VIII	1307.2	10.IX	1807.9	147
Average		13.IV	68.9	29.V	382.6	06.VIII	1307.6	18.IX	1821.6	157
E.H. 6-1-1	2016	06.IV	56.0	30.V	369.8	01.VIII	1234.4	03.IX	1662.2	151
	2017	13.IV	57.9	01.VI	360.6	03.VIII	1193.1	08.IX	1655.1	148
	2018	15.IV	71.8	21.V	389.2	21.VII	1143.7	01.IX	1709.7	140
Average		11.IV	61.9	27.V	373.2	28.VII	1190.4	04.IX	1675.7	146
Fetească Regală (Control)	2016	09.IV	76.2	30.V	369.8	04.VIII	1277.3	06.IX	1699.9	151
	2017	14.IV	61.3	01.VI	360.6	03.VIII	1193.1	14.IX	1725.7	154
	2018	16.IV	75.3	20.V	379.5	22.VII	1155.6	04.IX	1752.6	142
Average		13.IV	70.9	27.V	370.0	30.VIII	1208.7	08.IX	1726.1	149

The full ripening of the grapes took place at the hybrid elite 10-1-6 between September 18 and 25, with four to 10 days later compared to the control cultivar, and in the first decade of the September at the hybrid elite 6-1-1, about a week earlier than the 'Fetească Regală' cultivar (Control).

Fertility and productivity characteristics. The fertility and productivity characteristics of the hybrid elites studied, assessed by the percentage of fertile shoots, fertility coefficients

(absolute and relative) and productivity indices (absolute and relative) show lower values compared to the control. In contrast, due to the higher average weight of the grapes, the hybrid elite 10-1-6 showed values of productivity indices higher than the control cultivar (Table 3).

Table 3. The fertility and productivity characteristics (Odobesti, average data 2016-2018)

The hybrid elite	Fertile shoots (%)	Fertility coefficients		Average weight grapes (g)	Productivity indices	
		Relative	Absolute		Relative	Absolute
E.H. 6-1-1	64	0,68	1,08	134	95	151
E.H. 10-1-6	62	0,78	1,20	267	208	320
Fetească Regală (Control)	75	1,02	1,31	138	141	181

Behavior at the main diseases of the vine. The biological resistance to the main cryptogamic diseases of the vine appreciated according to the descriptors OIV 452, 453, 455, 456, 458 și 459 is presented in the table 4.

Table 4. The behavior at the main diseases of the vine

The hybrid elite	Downy mildew (<i>Plasmopara viticola</i>)		Powdery mildew (<i>Uncinula necator</i>)		Gray rot (<i>Botrytis cinerea</i>)	
	Leaf OIV 452	Grape OIV 453	Leaf OIV 455	Grape OIV 456	Leaf OIV 458	Grape OIV 459
E.H. 6-1-1	7	7-9	7	7-9	7-9	5
E.H. 10-1-6	7	9	7	7-9	7-9	5-7
Fetească Regală (Control)	7	7	7	7	7	5

The obtained data show that during the study period (2016-2018), years that registered during the vegetation period favorable climatic conditions for the attack of cryptogamic diseases, under the application of the scheme of anticryptogamic treatments, the hybrid elites studied showed high resistance, superior to the control cultivar - Fetească Regală. The elite hybrid 6/1/10 stood out by high biological resistance to the three main diseases of the vine.

Technological characteristics of grape production. The study of the technological characteristics of grape production complemented the knowledge elements for the hybrid elites studied (Table 5). The number of grapes per vine and the obtained production confirm the fertility data for the two hybrid elites compared to the control. The hybrid elite 10-1-6 was noted with a production of 5.87 kg/vine, superior to the control cultivar (4.14 kg/vine).

Table 5. The quantitative and qualitative characteristics of grapes and juice (average data, Odobesti, 2016-2018)

The hybrid elite	No. bunch/vine	Weight grapes (g)	Weight 100 berry (g)	Production grape		The juice	
				kg/vine	kg/ha	Sugars g/l	Total acidity g/l H ₂ SO ₄
E.H. 6-1-1	24	135	136	3.22	12.197	236	3.12
E.H. 10-1-6	22	267	202	5.87	22.235	217	4.74
Fetească Regală (Control)	30	138	139	4.14	15.682	191	4.16

From a qualitative point of view, the hybrid elites studied were above the control cultivar, with higher values of sugar content in must (236 g/l for 'E.H. 10-1-6' and 217 g/l for 'EH 6-1-

1', respectively 191 g/l for the 'Fetească Regală' cultivar). A good value of the total acidity relative to the sugar content was achieved by the hybrid elite 10-1-6 (4.74 g/l H₂SO₄). Lower total acidity was recorded by the hybrid elite 6-1-1 (3.12 g/l H₂SO₄), under conditions of high sugar accumulation.

CONCLUSIONS

- The two hybrid elites studied at R.D.S.V.O. Odobești during the years 2016 - 2018, presented valuable agrobiological and agro-productive characteristics which recommends their proposal for homologation and promotion in culture for the diversification of the local assortment of cultivars with high ecological plasticity.
- The hybrid elite 10-1-6 was distinguished by a high productive and qualitative potential, as well as a good genetic resistance to the main diseases of the vine (downy mildew, powdery mildew and gray rot).
- The hybrid elite 6-1-1 stood out with good results regarding the qualitative and productive potential, as well as by a high tolerance to the main cryptogamic diseases.

ACKNOWLEDGEMENTS

This study was carried out in 2015-2018 within the ADER project 3.2.5./2015 - Diversification of the wine cultivar for table grapes and wine, ADER 2020 Sector Plan, funded by the Ministry of Agriculture and Rural Development (MARD).

REFERENCES

1. Bosoi Marioara, Miha Ghică, Bosoi Ionica, (2017) - Măgura - new cultivar of vine for red wines created at S.C.D.V.V. Odobești, Lucrări științifice USAMV Iași, Seria Horticultură, Anul LIX - vol 60(1), , 57-63.
2. Bosoi Ionica, Pușcalău Marioara, (2018) - Vrancea - soi nou pentru obținerea vinurilor albe de calitate superioară creat la S.C.D.V.V. Odobești, Revista HORTUS, nr.,16/2018, 281 -286.;
3. OIV descriptor list for grape cultivars and *Vitis species*, 2nd edition - 2009
4. Pușcalău Marioara, (2018) - Remus - new cultivar of vine for rose and red wines with high biological resistance, Lucrări științifice UȘAMV Iași, Seria Horticultură, 61(1), 129-135..
5. Sestraș R. (2004). - Improvement of horticultural species, Cluj-Napoca, RO: Ed.