

AGROBIOLOGICAL AND TECHNOLOGICAL EVALUATION OF CHASSELAS DORÉ ELITE CLONAL ACCESSIONS

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Abstract

Four elite clonal accessions of *Vitis vinifera* L., Chasselas doré variety were identified in a very old plantation, of 110 years, located in Valea Călugărească, on the St. Nicolas Monastery vineyard. The vines, grafted on the SO4 (Selection Oppenheim 4) rootstock, were planted in 2007 in the germplasm collection belonging to the Research and Development Institute for Viticulture and Enology, Valea Călugărească. The evaluation of elite clonal accessions focused on the duration of their phenological cycles, grape fertility and productivity, resistance to diseases, quantity and quality of the grapes production. The elite clonal accessions have been distinguished from Chasselas doré through the grape production which is double at one of elite and higher for the other elites as a results of the average weight of the grapes. The potential of sugar accumulations in the must was approximately twice at the elite clonal accessions, with balanced total acidity and pH values. The elites will be further studied for confirming the genetic stability and to propose the most competitive for homologation.

Keywords: ampelography, grape variety, fertility, productivity, quality

1. INTRODUCTION

Clonal selection is a common method of grapevine improvement in Romania (Popa et al., 2004; Tebeica and Popa, 2005; Stroe M. V. et al., 2008) and in all grape producing countries in the world (Audeguin et al., 2000; Munoz et al., 2001; Laureiro et al., 2011; Javier Ibáñez et al., 2015). The method is based on the genetic and phenotypic variation within cultivars due to the accumulation of the genetic mutations over time (Rives 1961; Lidiane et al., 2014).

Chasselas doré is one of the most important and widely planted white grape variety in the world, being used as a reference in setting the epochs of the maturation of grapes.

Even though in Romania this variety is cultivated in all vineyards, a single clonal selection has been achieved.

In this context, the present study aim to evaluate four Chasselas doré elite clonal accessions from agrobiological and technological point of view.

2. MATERIALS AND METHODS

Four elite clonal accessions of *Vitis vinifera* L., Chasselas doré variety were identified in a very old plantation, of 110 years, located in Valea Călugărească, on the St. Nicolas Monastery vineyard. The vines, grafted on the SO4 (Selection Oppenheim 4) rootstock, were planted in 2007 in the germplasm collection belonging to the Research and Development Institute for Viticulture and

Enology, Valea Călugărească. They have been coded 19-4.2 (E1); 24-5-1 (E2); 25-5-1 (E3); 4-3-2 (E4).

The evaluation of elite clonal accessions focused on the duration of their phenological cycles, grape fertility and productivity, resistance to diseases, quantity and quality of the grapes production.

The recording of the vegetation phenophases was carried out weekly, following the methodology defined by the OIV descriptor list for grape varieties and *Vitis* species (2009).

Time of bud burst was noticed when 50 % of the buds are in green shoot tip stage (stage C of Baggioini, stage 7 to 9 of BBCH scale). Time of full bloom was noticed when 50 % of flowers are open. When 50% of the red grape clusters show changes in color, or when about 50 % of the berries of the white cluster start softening was noticed the time of beginning of berry ripening (veraison). Time of physiological stage of full maturity of the berry is related to the maximum sugar content of the berry due to photosynthesis. Mean value of all bunches of 10 shoots was taken into account.

The behavior to biotic factors was assessed by using OIV ampelographic descriptor method, the notation being done through attribution of figures depending on the level of expression.

Production and the quality of grape harvest was calculated based on fertility coefficient and productivity index, the average length and weight of bunch grapes and berries, sugar content and the total acidity of must. The sugar concentration was determined by a hand held digital refractometer and the results were expressed as an absolute value and as a percentage by mass of sucrose (OIV-MA-AS2-02 method). Titratable acidity was determined by titration with 0.1M NaOH, with 1 % phenolphthalein and the results were expressed in g L⁻¹ tartaric acid (OIV-MA-AS313-01 method). For pH determination the OIV-MA-AS313-15 method was used. The method is based on the measurement of the difference in potential between two electrodes immersed in the liquid.

3. RESULTS AND DISCUSSIONS

The development of the vegetation phenophases

Related to the climatic conditions of 2016 year, in Valea Călugărească viticultural center, it has been noticed that all the genotypes enter in vegetation at the end of March.

The beginning of budburst occurs on 25th March at Chasselas doré variety, 19-4-1 (E1) and 4-3-2 (E4) elite clonal accessions and three days later in case of the other two elites. This phenophase ended in the first decade of the month of April, after twelve days at Chasselas doré, after fourteen days at 19-4-1 (E1) and 4-3-2 (E4) elites, and after eighteen days at 24-5-1 (E2) and 25-5-1 (E3) elites. The ripening of the grapes takes place starting from 2 August at Chasselas doré and three days later in case of clonal elites. In comparison with clonal elites, Chasselas doré variety reaches the maturation of the grapes 4 – 5 days early, in the first decade of September.

The fertility and productivity of the grapevine genotypes

The percentage of fertile shoots at the clonal elites taken into study was below the biological potential of Chasselas doré variety, with average values ranging between 29.7% (4-3-2 elite) and 47.6% (19-4-2 elite).

Under similar culture conditions and fruit loads, Chasselas doré registered 7.8% fertile twigs.

The number of infloresces formed on the vine was different from one genotype to another, at the selected clonal elites having the mean values ranging between 16.8 and 28.4.

All the genotypes registered supraunit values of Absolute fertility coefficient, this being high at Chasselas doré and medium at the elites. Relative fertility coefficients had subunit values at elites (small relative fertility) and supraunit values at Chasselas doré (medium relative fertility) (Table 1).

Table 1. The fertility elements (mean values)

Genotype	Total shoots/vine (no.)	Fertile shoots/vine (no.)	Inflorescences/vine (no.)	Relative fertility coefficient	Absolute fertility coefficient
Chasselas dore	34.8	27.3	58.8	1.66	2.14
EC 19-4-2 (E1)	46.0	22.4	28.4	0.60	1.32
EC 24-5-1 (E2)	43.3	19.0	22.3	0.53	1.19
EC 25-5-1 (E3)	54.4	20.8	24.5	0.45	1.20
EC 4-3-2 (E4)	48.5	14.8	16.8	0.33	1.10

The Relative productivity index (IPR), representing the grape production (expressed in grams) on each shoots formed on the vine, revealed a medium production at Chasselas doré and 19-4-2 elite (E1), and a small one at the other elites.

The Absolute productivity index (IPA), representing the grape production (expressed in grams) on each fertile shoots formed on the vine, put into evidence a medium production in case of all the genotypes. Compared to Chasselas doré, the values are double at 25-5-1 elite (E3) and higher for the other elites as a result of the average weight of the grapes, bigger at elites (table 2).

Table 2. The productivity elements (mean values)

Genotip	Fertile shoots (%)	Relative fertility coefficient	Absolute fertility coefficient	Relative productivity coefficient	Absolute productivity coefficient
Chasselas dore	77.8	1.66	2.14	127.54	120.10
EC 19-4-2 (E1)	47.6	0.60	1.32	103.06	224.91
EC 24-5-1 (E2)	44.6	0.53	1.19	80.50	179.14
EC 25-5-1 (E3)	38.4	0.45	1.20	94.08	249.91
EC 4-3-2 (E4)	29.7	0.33	1.10	52.80	175.19

Evaluation of behavior to biotic factors

Chasselas doré presents a good level of tolerance to manna, mildew and to the grey rot of the grapes (level of expression 7 - 8), both on the leaves and on the grapes.

The clonal elites exhibit good and very good tolerance.

Table 3. Behavior to biotic factors (mean values)

Genotype	Level of tolerance (percent of attack degree) to				
	Manna		Mildew		Grey rot
	Leaves	Grapes	Leaves	Grapes	Grapes
Chasselas dore	1,34	1,18	1,22	1,00	1,20
EC 19-4-2 (E1)	0,72	1,15	1,05	0,85	1,07
EC 24-5-1 (E2)	1,04	1,59	0,67	0,47	1,37
EC 25-5-1 (E3)	0,54	1,64	1,00	0,72	1,16
EC 4-3-2 (E4)	0,87	1,61	0,64	1,15	1,10

Regarding clonal elites, the bunches have a smaller length (peduncle excluded) with 1.27% (E3) – 19.11% (E2) while the weight is higher with 14.43% (E2) – 66.15% (E3), due to the berries structure. They are bigger with a higher weight that exceeds the control with 27.18% (E1) – 46.15% (E4) (table 4).

Table 4. Certain characteristics of grapes and berries
(mean \pm standard deviation)

Genotype	Bunch			Berry		
	Length (mm)	Length of peduncle (mm)	Weight (g)	Length (mm)	Width (mm)	Weight (g)
Chasselas dore	126.0 \pm 11.47	36.9 \pm 11.32	122.20 \pm 21.05	14.04 \pm 0.68	14.14 \pm 0.72	1.95 \pm 0.27
EC 19-4-2 (E1)	112.3 \pm 17.46	42.0 \pm 11.29	175.05 \pm 32.79	16.00 \pm 0.94	14.14 \pm 0.97	2.48 \pm 0.42
EC 24-5-1 (E2)	101.6 \pm 12.04	42.8 \pm 7.32	139.83 \pm 39.75	15.60 \pm 1.17	15.10 \pm 0.57	2.57 \pm 0.33
EC 25-5-1 (E3)	124.0 \pm 19.83	38.3 \pm 6.48	203.03 \pm 44.81	16.60 \pm 0.97	15.20 \pm 0.92	2.70 \pm 0.41
EC 4-3-2 (E4)	110.9 \pm 18.31	43.0 \pm 9.09	185.82 \pm 55.08	16.70 \pm 0.48	15.20 \pm 0.42	2.85 \pm 0.23

Chemical composition of must

The potential of sugar accumulations in the must, a representative characteristic for each variety, influenced for the climatic factors of the year, was approximately twice at the elite clonal accessions, with balanced total acidity and pH values (table 5).

Table 5. Chemical composition of must

Genotype	Weight of 100 berries	Volume of 100 berries	Sugar accumulation (g/l; %)	Total acidity (g/l acid tartaric)	pH
Chasselas Doré	154.28	142	149.3; 18%	3.20	2.54
Elita 19-4-2	204.38	190	283; 30%	4.00	3.58
Elita 24-5-1	234.97	220	293; 32%	4.20	3.54
Elita 25-5-1	206.72	195	273; 30%	4.00	3.61
Elita 4-3-2	221.24	210	270; 30%	4.10	3.53

4. CONCLUSIONS

The elite clonal accessions have been distinguished from Chasselas doré through the grape production which is double at E3 25-5-1 elite and higher for the other elites as a results of the average weight of the grapes, bigger at elites. The potential of sugar accumulations in the must was approximately twice at the elite clonal accessions, with balanced total acidity and pH values. The elites will be further studied for confirming the genetic stability and to propose the most competitive for homologation.

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