

RESEARCH ARTICLE

(Open Access)**Production and technological characteristics of table grape Muscat Italiya clones**SAMI KRYEZIU^{1*}, ZVONIMIR BOZINOVIC², KRUM BOSKOV³, ZLATKO PRCULOVSKI⁴¹ Phd Candidate at University of Skopje Ss. Cyril and Methodius Faculty of Agriculture and Food, Skopje, R. of Macedonia.²University of Skopje Ss. Cyril and Methodius Faculty of Agriculture and Food, Skopje, R. of Macedonia.³University of Skopje Ss. Cyril and Methodius Faculty of Agriculture and Food, Skopje, R. of Macedonia.⁴ Phd Candidate at University of Skopje Ss. Cyril and Methodius Faculty of Agriculture and Food, Skopje, R. of Macedonia.*Corresponding author; E-mail: Samikrmr@gmail.com**Abstract**

During the period from 2015 to 2016, we investigated some agro-biological and technological characteristics for three Muscat Italiya clones selections, including **VCR 10, cl. 307 cl. 318**, certificated seedling material was introduced from Raushedo VCR from Italy compared to standard material Muscat Italiya table grape. The research were held in the location Terstenik of Tikvesh vineyard region, in Republic of Macedonia. Technological characteristics were examined; mechanical composition of the bunch of grape and berries, mechanical properties of the bunch of grape and berries (transportability and reaction strength), chemical composition of grapes and organoleptic evaluation, using the standard ampelographic methods of OIV. The studied and analyzes were carry out in faculty of Agriculture sciences and food, department of Viticulture and Oenology, in Skopje and laboratory of Stone castle Rahovec in Kosovo. From the investigation we saw that there were some significant differences between clones and standard variants.

Keywords: variety Muscat Italiya, clones VCR 10, cl. 307 cl. 307, technological characteristics,

1. Introduction

Climate and agriculture condition represent a favorable aspect of table grape production in Macedonia and region.

Increasing the yield of grapes can be made in several ways, from the expand of the surfaces of the cultivation, good agricultural practices, application of irrigation and good protection programs, always in favor of increasing the yield and quality of grapes, but such a thing can be done through the application of variety s with high genetic potential, or by different respective clones. Recently, a lot of work is being done in various research institutes in order to find the clones with higher production.

For these reasons, the vineyards of the region of Kavadarci, were set up during the year 2002 with traditional varieties and also new clones in order to increase the yield but also the quality to be as good,

with the purpose of trading easier, faster and better prices.

In order the yields to be higher in the same production costs, it is imperative to apply clones that reach such a thing in different countries but also in our region.

This can be achieved gradually through the selection and application of suitable clones with positive features as: resistance to pests and diseases, higher yield, high production quality, but also aspects of marketing such as those of resistance on transport, grape appearance, size of grains, taste etc.

2. Material and method

The study was conducted in the period 2015 – 2016. Internationally recognized methods (O.I.V.) International Organisation of Vine and Wine were used. The yield was obtained by harvesting of the grapes of all the vines involved in the study, and the yield per vine and per unit area (ha) was calculated.

The dimension and shape of the cluster and berries were determined according to the CODE system issued by the International Organisation of Vine and Wine (O.I.V.). The mechanical properties of the berry were evaluated by 2 elements: breaking resistance and resistance of pressure measured in grams per unit area (g/cm²) and the pedicel-berry detachment resistance in grams (g). The chemical composition of the must is determined by measuring the content of sugar and total acids. The content of the sugar was determined using the Exlo's device, and the total amount of acids was determined by volumetric method, using 0.025 mol/l solution of NaOH.

3. Results and Discussions

Table 1 shows the results of mechanical structure of cluster of Muscat Italia's clones.

Table 1. Mechanical structure of cluster of Muscat italijsa's clones

<i>Parameter</i>	<i>Year</i>	<i>Clones of Muskat Italija</i>			
		Standard	cl. VCR 10	cl. 307	cl. 318
Weight of cluster	2015	537	511	536	585
	2016	481	506	487	574
	Average	509.0	508.5	511.5	579.5
	CV%	7.78	0.70	6.77	1.34
Weight of stems	2015	10.5	11.0	11.5	12.5
	2016	11.5	13.0	14.4	13.6
	Average	11.0	12.0	13.0	13.1
	CV%	6.43	11.79	15.83	5.96
The weight of 100 berries (g)	2015	800	740	704	726
	2016	662	624	550	629
	Average	731.0	682.0	627.0	677.5
	CV%	13.35	12.03	17.37	10.12
Numbers of berries	2015	72	76	74	72
	2016	71	79	86	95
	Average	71.5	77.5	80.0	83.5
	CV%	0.99	2.74	10.61	19.48
Length (cm)	2015	20.4	24	21.6	20.3
	21.7	21.3	25.1	22.3	23.8
	Average	20.9	24.6	22.0	22.1
	CV%	3.05	3.17	2.26	11.22
Width (cm)	2015	9	9.4	7.9	8.6
	2016	10.1	11.3	9.3	10.8
	Average	9.6	10.4	8.6	9.7
	CV%	8.14	12.98	11.51	16.04

The lowest weight of cluster has clone cl.VCR 10 with 508 g. The largest weight of cluster has clone cl. 318 with 579 g. The lowest CV% for weight of cluster has clone cl.VCR 10 with 0,6 g, and the biggest CV% has a standard with 7,7g. The number of berries in cluster is lowest in standard with 72 and the largest number of berries has clone cl.318 with 84. The lowest CV% for number of berries has standard with 1,2 and the biggest CV% has a cl.318 with 19,3. The length of cluster is lowest in standard with 20,8 cm and the largest length of berries has clone cl.VCR 10 with 24,6 cm. the biggest CV% has a cl.318with 11,2 cm.

The width of cluster is lowest incl.307 with 8,6 cm and the largest length of berries has clone cl.VCR 10 with 10,3 cm. The biggest CV% has a cl.318 with 16,4 cm.

Table 2. Mechanical structure of berries of Muscat Italija clones (mm/berry)

<i>Parameter</i>	<i>Year</i>	<i>Clones of Muscat Italy</i>			
		Standard	cl. VCR 10	cl. 307	cl. 318
The length (mm)	2015	26.8	25.9	25.8	26
	2016	22.8	23.2	23	23.3
	Average	24.80	24.55	24.40	24.65
	CV%	11.40	7.78	8.11	7.75
Width (mm)	2015	22.6	21.2	21.4	22.6
	2016	19.2	19.3	18.9	20.3
	Average	20.90	20.25	20.15	21.45
	CV%	11.50	6.63	8.77	7.58
The shape of berries	2015	Elips	Elips	Elips	Elips
	2016	Elips	Elips	Elips	Elips
	Average	Elips	Elips	Elips	Elips

The values for the weight, dimensions and shape of the grains are shown in Table 2. In the results shows that the length of the berries to standard variety were bigger with 22.85 mm, and and smaller to cl. 307 with the value of 24.4 mm. The width of the berry is one of the most stable features that distinguishes the varieties, the bigger value resulted to cl. 318 with the value of 21.5 mm and smaller value were to cl. VCR 10 with 20.25 mm.

The physical value of the grape is determined by the values of the length/width ratio. In our study, the length/width ratio has an average value of 22.64

for two years of research, according to which they belong to the group of varieties with elliptical shape (Bozinovic 2010). After two years of testing, the values of the berry shape have been with minor variations, suggesting that it is immutable biological trait of the varieties. The size of the berries of the table varieties is one of the characteristics that define the category of corresponding grape variety. According to the values of average diameter (length + width / 2), the Muscat italija variety belongs to the group of varieties with large berries. All these features increase the market value of the this variety.

Table 3. Transportability of Muscat Italija's clones (g/cm²)

<i>Parameter</i>	<i>Year</i>	<i>Clones of Muscat Italy</i>			
		Standard	cl. VCR 10	cl. 307	cl. 318
Resistance on pressing (g) cm ²	2015	2331	2299	2348	2310
	2016	1990	2140	2570	2290
	Average	2161	2220	2459	2300
	CV%	11.16	5.07	6.38	0.61
Resistance on picking (g/berry)	2015	358	348	354	326
	2016	453	570	516	650
	Average	406	459	435	488
	CV%	16.57	34.20	26.33	46.95

One of the very important properties of table varieties is the transportability which is determined by the pressure resistance of the berry and the pedicel-berry detachment resistance. The results of these surveys are given in Table 3. The berry pressure resistance ranges from 1990g/cm² (2016) to 2570

g/cm² (2016) or the average of 2280 g/cm² for the test period. The mean test period value of the pedicel-berry detachment resistance is 326 g, ranging from 326 g/cm² (2015) to 650 g/cm² (2016). The results indicate that the cl. 318, by the average of 488 g.cm² have the features with high transportability.

Table 4. Sensorial evaluation of Muscat Italija's clones

<i>Parameter</i>	<i>Year</i>	<i>Clones of Muscat Italija</i>			
		Standard	cl. VCR 10	cl. 307	cl. 318
External look	2015	2.70	3.00	2.80	2,25
	2016	2.43	3.00	2.16	2,70
	Average	2.57	3.00	2.48	2,48
Consistency	2015	3.00	3.00	3.00	2,45
	2016	2.43	2.16	2.66	2,46
	Average	2.72	2.58	2.83	2,46
Flavor	2015	2.90	3.00	2.90	2,45
	2016	2.50	3.00	2.40	2,60
	Average	2.70	3.00	2.65	2,53
Typicality and organoleptic	2015	1.00	1.00	1.00	0,68
	2016	0.72	0.75	0.83	0,80
	Average	0.86	0.88	0.92	0,74
Total	2015	9.60	10.00	9.70	7.83
	2016	8.08	8.91	8.05	8.56
	Average	8.84	9.46	8.88	8.20
Classification	CV%	12.16	8.15	13.15	6.30
	2015	Very good	Great	Great	Great
	2016	Very good	Great	Great	Great
Average	Very good	Great	Great	Great	

Table 5. Content of sugar in must of Muscat Italija's clones (g/l)

<i>Parameter</i>	<i>Year</i>	<i>Clones of Muscat Italy</i>			
		Standard	cl. VCR 10	cl. 307	cl. 318
Sugar (g/l)	2015	151	124	138	218
	2016	178	163	154	186
	Average	164.5	143.5	146.0	202.0
	CV%	11.6	19.2	7.7	11.2
Acids (g/l)	2015	6.5	7.0	6.8	4
	2016	5.3	5.0	5.4	5
	Average	5.9	6.0	6.1	4.5
	CV%	14.6	23.3	15.7	15.7

As shown in Table no. 4 of the evaluation of taste and other organoleptic parameters results that the respective clones were characterized with higher flavor, appearance, hardness and typicality for a better nuance compared with traditional varieties, and based on these parameters is done classification of grape, where the clones resulted to have “great” results compared with the traditional variety which results with “good quality” during the two years research.

The results for the content of sugar and total acids in the must are shown in Table. The average sugar content of the test period is 164.5 g/l to standard variety, and after years of testing it has been quite

stable with a coefficient of variation of 11.6. The must sugar content ranges from 178 g/l (2015) to 194 g/l (2016). Regarding the acids the lower values were to cl. 318 with 4.0 g/l, and higher value were to standard variants with 4.8 g/l during the year (2015). The content of sugar and total acid ratio determines the index of the maturity of the berries which primarily depends on the variety and also of the conditions of cultivation and application of agrotechnical and ampelotechnical measures during vegetation. Because of the balanced proportion between the sugar content and total acids, the grapes has pleasant and refreshing taste.

4. Conclusions

Based on two years research we can conclude that there were significant differences in all variants between the standard and clones but also the clones to each other for all parameters, for appearance of cluster and berries, sugar, acids content, thickness of the epidermis etc.

The Muscat Italiya variety belongs to the group of high-yielding varieties. Its cluster is large and beautiful and it ripens early .

The balanced proportion between the sugar and total acid content gives the grapes a pleasant and refreshing taste which in our research date shows there are significances between years and clones, as well the standard.

More research needs to be done in order to come more findings.

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