

Technological characteristics of some clones of table grape to cardinal variety

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Abstract

During the period from 2015 to 2016, we investigated some agro-biological and technological characteristics for two Kardinal table grape clones selections, including **VCR 26, cl 80**, certificated seedlings material was introduced from Raushedo VCR from Italy compared to standard material Muscat Italija table grape.

The researches 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 outin 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 Kardinal; clones VCR 26; Cl 80; technological characteristics

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 Methods

The study was conducted in the period 2015-2016. Internationally recognized methods (O.I.V.)

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 Discussion

Table 1 shows the results of mechanical structure of cluster of Cardinal clones.

Table 1. Mechanical structure of cluster of Cardinal's clones

<i>Parameter</i>	<i>Year</i>	<i>Clones of Cardinal</i>		
		Standard	cl. VCR 26	cl. 80
Weight of cluster	2015	541.5	581.1	501.2
	2016	490.5	514.5	440.3
	Average	516	547.8	470.7
	CV%	6.99	8.6	9.15
Weight of stems	2015	20	21	16
	2016	18.5	20	18.4
	Average	19.25	20.5	17.2
	CV%	5.51	3.45	9.87
The weight of 100 berries (g)	2015	659	669	590
	2016	637.8	634	555.1
	Average	648.4	651.5	572.55
	CV%	2.31	3.8	4.31
Numbers of berries	2015	81.6	87.08	85.3
	2016	74	78	76
	Average	77.8	82.54	80.65
	CV%	6.91	7.78	8.15
Length (cm)	2015	23.08	26.79	22.56
	2016	21.7	23.3	19.4
	Average	22.39	25.04	20.98
	CV%	4.36	9.85	10.65
Width (cm)	2015	8.13	8.96	8.36
	2016	10	11.7	10.3
	Average	9.06	10.33	9.33
	CV%	14.59	18.76	14.7

The lowest weight of cluster has clone cl.80 with 501.2 g. The largest weight of cluster has clone cl. VCR 26 with 581.1 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 is in standard with 74.0 to standar variants in 2016, and the largest number of berries has clone cl.VCR 26 with 87.08. 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 to cl 80 with 19.4 cm in 2016 and the largest length of berries has clone cl.VCR 26 with 26.79 cm. the biggest CV% has a cl.318with 11,2 cm.

The width of cluster is lowest to standart variant with 8.13 cm during the year 2015, and the largest length of berries has clone cl.VCR 26 with 11.7 cm. The biggest CV% has a cl.318 with 16,4 cm.

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

<i>Parameter</i>	<i>Year</i>	<i>Clones of Cardinal</i>		
		Standard	cl. VCR 26	cl. 80
The length (mm)	2015	24.35	22.65	20.95
	2016	20.1	19.5	20
	Average	22.22	21	20.47
	CV%	13.52	10.57	3.28
Width (mm)	2015	24.2	22.26	20.75
	2016	19.7	20.3	19.5
	Average	21.95	21.28	20.12
	CV%	14.5	6.51	4.39
The shape of berries	2015	Elips	Elips	Elips
	2016	Elips	Elips	Elips
	Average	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 24.35 mm, during the year 2015 and smaller to cl. VCR 26 with 19.5 mm during the year 2016. The width of the berry is one of the most stable features that distinguishes the varieties, the bigger value resulted to cl. Standard variants with the value 24.2 mm, in 2015 and smaller value were to standard variants with the value of 19.7 mm during the year 2016.

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 1.3, 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 cardinal variety belongs to the group of varieties with large berries.

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 2900 g/cm² (2016) to 3350 g/cm² (2015) or the average of 3125 g/cm² for the test period. The mean test period value of the pedicel-berry detachment resistance is 396.5 g, ranging from 236 g/cm² (2016) to 557 g/cm² (2015). The results indicate that the cl. 80, by the average of 478 g.cm² have the features with high transportability.

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

<i>Parameter</i>	<i>Year</i>	<i>Clones of Cardinal</i>		
		Standard	cl. VCR 26	cl. 80
Resistance on pressing (g) cm ²	2015	3270	3350	3310
	2016	2900	3300	3000
	Average	3085	3325	3155
	CV%	8.48	1.06	6.95
	Resistance on picking (g/berry)	2015	449	471
	2016	236	487	399
	Average	342.5	479	478
	CV%	43.97	2.36	23.37

Table 4. Sensorial evaluation of cardinal's clones

<i>Parameter</i>	<i>Year</i>	<i>Clones of cardinals</i>		
		Standard	cl. VCR 26	cl. 80
External look	2015	2.7	3	2.8
	2016	2.43	3	2.16
	Average	2.56	3	2.48
Consistency	2015	3	3	3
	2016	2.43	2.16	2.66
	Average	2.715	2.58	2.83
Flavor	2015	2.9	3	2.9
	2016	2.5	3	2.4
	Average	2.7	3	2.65
Typicality and organoleptic	2015	1	1	1
	2016	0.72	0.75	0.83
	Average	0.86	0.875	0.915
Total	2015	9.6	10	9.7
	2016	8.08	8.91	8.05
	Average	8.84	9.455	8.875
	CV%	12.16	8.15	13.15
Classification	2015	Very good	Great	Great
	2016	Very good	Great	Great
	Average	Very good	Great	Great

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

<i>Parameter</i>	<i>Year</i>	<i>Clones of cardinal</i>		
		Standard	cl. VCR 26	cl. 80
Sugar (g/l)	2015	151	124	138
	2016	178	163	154
	Average	164.5	143.5	146
	CV%	11.6	19.2	7.7
Acids (g/l)	2015	6.52	6.97	6.75
	2016	5.3	5.0	5.4
	Average	5.91	5.98	6.07
	CV %	14.6	23.3	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 varitey 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 2.2. The must sugar content ranges from 151 g/l (2015) to 178 g/l (2016). Regarding the acids the lower values were to

cl. VCR 26 with 5.0 g/l in 2015, and higher value were to VCR 26 6.97g/l, in 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

There were significant differences in all variants between the standard and clones but also the clones to each other for all parameters.

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

5. Acknowledgements

Thank You for prof. Bozhinovic, University of Skopje, and wine company Stone Castle, in Rahovec which they give very good help and contribution regarding my date processing and laboratory work.

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