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*25<sup>th</sup> International Scientific- Experts Congress on Agriculture and Food Industry - Izmir 2014*

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**25<sup>th</sup> Scientific-Experts Congress on Agriculture and Food Industry**

*Organized by*

Faculty of Agriculture, Ege University, TURKEY  
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# Effect of Bud Loads on Mechanical Composition of Cluster and Chemical Content of Must in Victoria Table Grape Variety (*Vitis vinifera* L.)

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## Abstract

The two-year experiment (2008 and 2009) on new introduced table grape variety Victoria was carried out in the commercial vineyard in the conditions of Nerezi vine district, Čapljina Municipality. This study the influence of different bud load levels was investigate on grape quality of cv. Victoria under given environmental conditions. The experiment was conducted by random selection method in four variants with different bud load levels per grapevine (19, 24, 28 and 33 buds per grapevine), each variant being repeated four times with 6 vines repeating.

Variant II(24 buds per grapevine) had, in two-year experiment, the average value of the largest cluster weight (599.78 g), the cluster berry weight (573.25 g), and the mass of the cluster stems (12.5 g). The average content of sugar in the grape must was slightly higher in variants I and II (14 %) compared to other variants, while the highest average content of total acids had variant III (4,06 g/l).

Keywords: Cv. Victoria, bud load, mechanical composition of cluster, chemical content of must

## Introduction

Table grapes are grapes which by their appearance, organoleptic properties, time of ripening and market value are more suitable for consumption while they are fresh as opposed to grapes grown for wine production (Cosmo, as cited by Kamnečki, 1969). Table grape variety Victoria is a cross created by Leopodatu Victoria and Coridei Gheorghe at the Romanian Institute of Horticultural Research by crossing the varieties of Cardinal and Afus-Ali. Real yield is 1,2. With trellising (wire and rebar) it can easily reach a yield of 20 t/ha ([www.mih.hr/vino\\_product.asp](http://www.mih.hr/vino_product.asp), May 2010).

The subject of this study was to determine the influence of the load of fruiting nodes on yield and quality of grapes of Victoria variety. Victoria is an early table grape variety which ripens in mid-August. Clusters are large and provide high yields. Berries are very large with sweet and pleasant flavor and white or green to yellowish color ([www.sauron.md/en/victoria](http://www.sauron.md/en/victoria), May 2010).

## Material and Methods

The research was conducted in a production plantation located in Nerezi near Čapljina in 2008 and 2009. The trial vineyard is a part of the „Plantaze“ doo Čapljina, planted in 2002. Plantation area is 50 ha. Plant spacing is 3 x 1.5 m, and the training method is single cordon. The study was performed on the table variety Victoria grafted onto the vine stock Berlandieri x Riparia Kober 5 BB. The trial was set by the method of random selection in four variants with different loads of vine, where each variant had four iterations with 6 vines in each of them. In both research years, pruning was performed in mid-February and the pruning method combined short and mixed pruning depending on the variant of the load of fruiting nodes on the vine.

The experiment included the following variants of pruning:

Table 1. Type of pruning depending on the bud load level

Variant	Pruning	Short sprouts	Long sprouts	Bud load level
Variant I	Short	3(5)+ 2(2)	0	19
Variant II	Mixed	3 (2)	3 (6)	24
Variant III	Mixed	2 (2)	3 (8)	28
Variant IV	Mixed	3 (2)	3 (9)	33

With the occurrence of technological maturity of the grapes, harvesting was performed and samples were taken for the mechanical analysis of the bunch. Clusters were taken from different parts of the vine.

Analysis of the mechanical composition and structure of the clusters was performed using the test method of the ampelographic commission, i.e. modified Prostoserdov's method, to determine the following indicators:

Composition of the cluster: cluster mass, mass of rachis in the cluster and berry mass in the cluster.

Analysis of sugar content in must was performed using Oechsl's mustmeter, and the read number of Oechsl degrees was translated into sugar percentage by Salleron table. Determination of the content of total acids in must was performed by the method of titration with 0.1 M solution of NaOH. The moment of neutralization was determined by using phenolphthalein indicator.

### Environmental Conditions

Data of the Čapljina meteorological station were provided by the Federation hydro-meteorological institute for the analysis of the climate conditions.

Table 2. Basic meteorological factor in the Mostar vineyard

Parameter	1961 - 1990	2008	2009
Annual average air temperature (°C)	14.1	16.4	16.1
Average vegetation air temperature (°C)	18.83	21.54	21.63
Absolute minimum air temperature (°C)	-14.2	-5.8	-7.3
Absolute maximum air temperature (°C)	41	40.3	38.5
Temperature sum (°C)	4455	4615	4633
Rainfall during vegetation (mm)	518	448	332
Annual rainfall sum (mm)	1102	1030	1022
Duration of vegetation period (days)	239	240	245
Sunlight time (hours)	2287	2471	2412

Meteorological conditions in the studied years were above the multi-annual average values concerning air temperatures and quantity of rainfall. During both studied years, air temperature in the vegetation months were above the multi-annual average values, while the quantity of rainfall was far lower.

### Results and Discussion

#### Mechanical composition of the cluster

An important ampelographic indicator of a variety is the mechanical composition of cluster and berry. Mechanical structure of the cluster varies within the same variety depending on growing conditions and applied agro-technical measures (Avramov et al. 1968).

#### Cluster mass

Statistical tests have shown that for each pruning variant observed by the year of experiment there is a statistically significant difference in the average mass of cluster between 2008 and

2009, i.e. in each variant of pruning, the experimental year factor had a significant impact on the increase of the value of parameter of average cluster mass in 2009.

The obtained results on the average cluster mass where there was a statistically significant difference between the experimental years, can be attributed to a considerably smaller number of clusters per vine in 2009 compared to 2008. Climatic conditions in relation to the formation and differentiation of nodes were substantially more favorable for the nodes that were developing in 2009 than for those in 2008.

Table 3. Average values of mechanical composition of the cluster and chemical composition of the must

		2008	2009
Cluster weight (g)	I	423,51 <sup>de</sup>	663,63 <sup>ab</sup>
	II	484,91 <sup>cd</sup>	714,65 <sup>a</sup>
	III	331,93 <sup>ef</sup>	582,40 <sup>bc</sup>
	IV	316,75 <sup>f</sup>	663,63 <sup>ab</sup>
Weight of berries in the cluster (g)	I	414,07 <sup>cd</sup>	647,90 <sup>a</sup>
	II	474,83 <sup>bc</sup>	671,73 <sup>a</sup>
	III	323,80 <sup>de</sup>	571,95 <sup>ab</sup>
	IV	308,74 <sup>e</sup>	650,05 <sup>a</sup>
Weight of rachis in the cluster(g)	I	9,44 <sup>c</sup>	10,48 <sup>bc</sup>
	II	10,09 <sup>c</sup>	14,90 <sup>a</sup>
	III	8,13 <sup>c</sup>	10,45 <sup>bc</sup>
	IV	8,00 <sup>c</sup>	13,58 <sup>ab</sup>
Sugar content in must (%)	I	14,00	14,00
	II	14,13	13,88
	III	14,00	13,88
	IV	13,75	13,50
Content of total acids in must (g/l)	I	3,38 <sup>b</sup>	4,33 <sup>a</sup>
	II	3,38 <sup>b</sup>	4,45 <sup>a</sup>
	III	3,93 <sup>ab</sup>	4,20 <sup>ab</sup>
	IV	3,40 <sup>b</sup>	4,08 <sup>ab</sup>

#### ***Mass of berries in the cluster***

Berry is the vine fruit and it consists of skin, pulp and seeds. The average mass of berries is an indicator which is generally consistent with the regularities set by the average cluster mass.

Observed by the years of research, in all pruning variants, there was a statistically significant increase in the average mass of berries in a cluster in 2009 compared to 2008, which confirms the significance of the year factor for the scope of indicator of the mass of berries in a cluster.

The results of this research are consistent with the literature data referring to the participation of berry mass in the cluster structure. They are also consistent with the studies carried out on the variety Victoria in northern Greece, where the participation of berry mass in the cluster structure amounted to 96.7 % (Mattheou et al., 1995).

#### ***The mass of rachis in a cluster***

The results of testing the significance of differences indicate that there were no statistically significant differences in the average mass of rachis in a cluster by pruning variants in the years in which this study was carried out, with the exception of variant I in 2008, which had clusters with a statistically significantly lower mass of rachis (10.48 g) compared to variant II (14.90 g). However, a statistically significant increase in the mass of rachis was observed in the clusters in all pruning variants in 2009 relative to 2008.

The study results obtained for the table grapes varieties in northern Greece indicate that the share of rachis in the overall cluster structure reached 3.3 % in variety Victoria, 2.8% in Italia, 2.8 % in Afus-ali and 2.9 % in Muscat of Alexandria, which is consistent with the results of this study (Mattheou et al., 1995). The results of this study are also consistent with the literature data relating to the participation of rachis in the cluster structure.

## Chemical content of must

### *Sugar content in grape must*

According to data on the content of sugar in must shown in Table 3., the results of the analysis of variance indicate that there is no significant influence of either of the two observed experimental factors (pruning variant and year) on the specified indicator, nor is there a significant interaction between the factors.

### *Content of total acids in grape must*

Observed by the years of research, some statistically significant differences were established in the average content of total acids in grape must in variant I (3.38 g/l in 2008 and 4.33 g/l in 2009) and variant II (3.38 g/l in 2008 and 4.45 g/l in 2009). The only factor which had a statistically significant impact on this indicator was the year factor.

## Conclusions

1. Meteorological conditions in the years of the study differ from the multi-year averages both in terms of recorded air temperatures and precipitation. During both experimental years, air temperatures in the vegetation months were higher than the multi-year averages, while the amount of precipitation was considerably lower.
2. Average cluster mass was under a statistically significant influence of both the year conditions and the applied pruning variants.
3. Berry mass and rachis mass as indicators were consistent with the relations established in the analysis of the average cluster mass. The mass of berries in a cluster was statistically significantly influenced by both experimental factors (pruning and year), while the mass of rachis in a cluster was statistically significantly influenced only by the conditions of the year.
4. The sugar content in grape must was not influenced by either of the two observed experimental factors.
5. The content of total acids in grape must was under a statistically significant influence of the conditions of the year.

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