

Influence of trellis system on productive and technological characteristics of variety Victoria in Strumica vine growing district

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Summary

The data on productive and technological characteristics of Victoria variety grown on two trellis systems, pergola and espalier are shown in this paper. Mechanical composition of a bunch and a berry as well as chemical composition of the must were analysed. The results of investigation show that this variety has good results on either of the trellis systems, pergola and espalier in the Strumica vine growing district, the Republic of Macedonia. The Victoria's bunches from pergola are heavier and longer whereas the bunch and berries are wider, with uniform characteristics of berries and skin colour in comparison with bunches from espalier trellis system.

Key words: table grape variety, Victoria, pergola, spalier, yield, quality of grapes.

Introduction

The Victoria variety was created in Romania by crossing Cardinal and Afus Ali varieties by the picker Victoria Lepadatu. The grapes are big, cylinder-conical in shape, winged with average mass of 600-800 grams. The grains are very big, oval-oblong and white or green-yellowish, with amber bronze. They have dense and fleshy pulp with sweet pleasant taste. They contain 2-3 seeds. Yield is around 30-40 tons per hectare making it a very perspective variety. This variety has high transportability and a very appealing look. Taking into account that it is a new variety, recently created, it has, however, become quite popular in the countries of the Southern Europe, being considered as one of the basic early ripening white

varieties which contain seeds. It is mostly cultivated in the north of Greece, near the capital Thessaloniki and Kavala. (*Dragoljub M.Zunic 2010*).

It was introduced in all significant vineyards for production of table grapes – Gevgelija, Valandovo, Tikvesh, Strumica, Veles, and Radovish vineyards in the Republic of Macedonia in 1988. It ripens in I epoch, or in Tikves vineyards in the first and second decade of August, 10-14 days after Cardinal cultivar. Harvesting takes 30 days. Pruning is mixed with arches of 8 buds with intensive use of agro-technical and ampelo-technological measures. Its further expansion is recommended in Macedonian vineyards. (*Zvonimir Bozinovic, 2011*).

In the Republic of Macedonia, table grapes are grown on both pergola and espalier. The aim of our study was to examine the differences in production and technological characteristics of the Victoria grape variety grown on pergolas and espaliers.

Materials and methods

The research was carried out in the Strumicko- Radovishki vineyard, on the field of Agrolozar, Strumica. Productivity, yield, texture of grapes and berries, and chemical composition of the must of Victoria variety grown on two supporting constructions, pergola tendone and espalier, were examined. Each variant was analysed in four varieties or repetitions. Young plants were newly introduced from Italy. The rootstock is Paulsen 1103.

The plantation was 7 years old. It was raised in 2003. The vines are spaced at 2.5 x 2.4 m with 1667 vines per hectare on pergolas and 2.5 x 1.2 m with 3333 vines per hectare on espalier trellis systems. The yield of grapes was obtained by harvesting and weighing of all the clusters on a vine. Average cluster weight was obtained by measuring the weight of each cluster on a vine. Clusters were grouped according to the weight of 0.2 kg, 0.2 to 0.4 kg, 0.4 to 0.7 kg, 0.7 to 1 kg and the last group of over 1 kg. The yield and the percentage share of the total yield were calculated for each group. Grape harvest of both treated and untreated vines was conducted at the same date, according to full grape maturity reached by any of the treatments.

Measurement of grape yield per vine, mechanical analysis of both clusters and berries, and analysis of the chemical composition of the grape must were done in terms of sugar and acid content. Methods of the OIV – International Organisation of Vine and Wine – were employed. Statistical analysis was based on a completely randomised design at the significance level of 0.05 and 0.01.

Results and discussion

Pergolas in comparison to espaliers have an equal distance between rows (2.5 m) and twice the distance between vines in a row 2.5 m and 1.2 m. The number of lines was half the size of pergola, i.e. 1667 compared with 3333 vine / ha on espalier.

The yield of grapes per vine was 24.2 kg in pergolas compared with 12.0 kg on espalier. Despite these differences, the yield of grapes per unit area was equal in both versions and amounted to 40.3 t/ha on a pergola compared with 40.0 t/ha on espalier.

As for pergolas, there were 53 clusters, only 12.2 less clusters compared with 40.7 clusters on espalier. Although the number of clusters on pergola was not significantly greater, the weight of the grape on pergola with 466.0 g was heavier by 171.2 g than that on espalier, 294.9 g.

Tab. 1. Yield of Victoria variety on pergola tendona and shpalier trellis system
Prinos sorte Viktorija na pergola i špalir sistemu

Date of harvest 30 August 2011			
Parameter	Pergola	Shpalier	Perg.–Shpa.
Distance between rows – m	2,5	2,5	0,0
Distance between vines in row – m	2,4	1,2	1,2
Number of vine per hectare	1667	3333	-1666,7
Number of cluster per vine	53	40,7	12,3
Yield - kg/vine	24,2	12,0	12,2
Yield - t/ha	40,3	40,0	0,3
Weight of cluster – gramme	466,0	294,9	171,2

Grapes grown on espaliers ripen faster compared to those on pergolas. Sugar content in pergolas is 148 g/dm³, 40 grams less than 188 g/dm³ on espaliers. The content of the total acids is 4 g/dm³ on pergolas and 3.0 g/dm³ on espaliers.

Tab. 2. Chemical content of must
Hemijski sastav šire

	Pergola	Shpalier	Perg.–Shpa.
Sugar g/dm ³	148	188	-40
Total acids g/dm ³	4,1	3,0	1,1
pH	3,51	3,82	-0,31
Index of sweetness	37	63	-26,1

This proportion of sugar and acid content is reflected in the perception of taste. Index sweetness of 37 points is ideal for pergolas unlike the sweetness index of 63 in espalier. Grapes harvested from a pergola are light green in colour, with a slight yellow hue and evenly coloured. The taste is pleasant, harmonious and refreshing. Grapes harvested from espalier are yellow, evenly coloured with brown shades on the sunny side. The taste is pleasant but with pronounced sweetness.

Victoria variety on both espaliers and pergolas had equal grape yields with weight from 0.4 to 0.7 kg. On pergolas, the yield was 43.7%, and 40.0% on espalier, with a difference of only 3%. Major differences occurred in the yield of grapes weighing above 0.7 kg.

The yield of grapes weighing from 0.7 to 1 kg on pergolas was 9.1 t/ha and 6.3 t/ha of clusters weighed over 1 kg, with a total yield of 15.4 t/ha of clusters weighing over 0.7 kg. The yield of clusters weighed from 0.7 to 1 kg on espaliers was 2.7 t/ha and 1.1 t/ha of clusters weighing over 1 kg for a total yield of 3.8 t/ha of clusters weighing above 0.7 kg. The yield of clusters weighing over 0.7 kg was by 11.6 t/ha higher on pergolas in comparison to espaliers.

The yield of clusters weighing between 0.2 and 0.4 kg was for 9.2 t/ha higher on espaliers in comparison to pergolas. Likewise, the yield of clusters weighing under 0.2 kg was for 3.5 t/ha higher on pergolas in comparison to espaliers. All groups of grapes from pergolas are useful for packaging.

Tab. 3. Yield of cluster with different mass in t/ha and %
Prinos grozdova različite mase u t/ha i %

Mass of cluster	Pergola		Shpalier		Perg.–Shpa.	
	t/ha	%	t/ha	%	t/ha	%
Up of 1 kg	6,3	16,2	1,1	3,1	5,2	13,1
Between 0,7-1 kg	9,1	22,6	2,7	6,8	6,4	15,7
Between 0,4-0,7 kg	17,7	43,7	16,4	40	1,3	3,7
Between 0,2-0,4 kg	4,5	11,1	13,7	34,5	-9,2	-23,4
Under 0.2 kg	2,6	3,9	6,2	4,7	-3,5	-0,8
Above 0,7 kg	15,4	38,8	3,8	9,9	11,6	28,8
Between 0,4-0,7 kg	17,7	43,7	16,4	40	1,3	3,7
Under 0.4 kg	7,1	15	19,9	39,2	-12,7	-24,2

The pergola cluster weight was 850.0 g, 90 grams higher compared to 760.0 g on espalier. The number of berries of normal size was almost equal in both pergolas (103.0) and espaliers (100.0). However, the number of atypical, very small berries was 41 in clusters of espalier compared to 9 in the clusters of pergola.

Tab. 4. Technological properties of clusters under 400 g
Tehnološke karakteristike grozdova ispod 400 g

Indicators – average	Pergola	Shpalier	Perg.–Shpa.
Cluster weight g	850,0	760,0	90,0
Weight of normal berries in cluster g	818,9	725,0	93,9
Weight of very small berries in cluster g	16,0	25,0	-9,0
Number of normal berries in cluster g	103,0	100,0	3,0
Number of very small berries in cluster g	9,0	41,0	-32,0
Weight of one normal berry g	8,0	7,3	0,7
Weight of one very small berry g	1,8	0,6	1,2

Normal berries weighed 8.0 grams on pergolas compared to 7 g of berries from espalier clusters. The espalier clusters of normally developed berries weighed less in comparison with espalier clusters. Many poorly developed unfertilised berries could be noticed on the espalier clusters, atypical for the variety, thus reducing the quality class and posed a problem for arranging during packing process.

On the other hand, big berries are present on pergola clusters, weighing 17.1 g and being 3.8 cm long and 2.8 cm wide compared with the largest clusters of espalier berries weighing approximately 13.2 g and being 3.1 cm long and 2.7 cm wide.

Tab. 5. Technological properties of berries
Tehnološke karakteristike bobica

Indicators	Pergola	Shpalier	Perg.-Shpa.
Weight of the largest berry g	17,1	13,2	3,9
Length of the largest berry cm	3,8	3,1	0,8
Width of the largest berry cm	2,8	2,7	0,1
Weight of 100 average berries	103,3	86,0	17,3
Skin %	6,0	4,1	1,9
Seeds %	1,2	1,6	-0,4
Flesh %	92,8	94,3	-1,6

The increase in the length of berries influences the weight gain, which seems very attractive. In clusters of pergola berries, the skin participates with 6% which is more compared to 4.1% on espaliers.

Conclusion

1. Victoria variety grown on both pergola (tendona) and espalier systems gives very fine grape quality in the conditions of Strumica vineyards, the Republic of Macedonia. The quality of grapes on the pergola is significantly better than the espalier in regards with all characteristics.

2. Growing vines on the pergola trellis system, with 1667 vines/ ha, three canes or 26.5 buds/ vine, we get 53 clusters/ vine with average mass of 466 g. The yield is 24.2 kg/ vine or 40.3 t/ ha, out of which the yield of clusters weighing over 0.7 kg is 15.4 t/ ha, the yield of clusters weighing from 0.4 to 0.7 kg is 17.7 t/ ha, and the yield of clusters weighing below 0.4 kg is 7.1 t/ ha.

3. Growing vines on the espalier trellis system, with 3333 vines/ ha and two canes or 15.75 buds/ vine, we get 40.7 clusters/ vine with average mass of 294.9 g. The yield is 12.0 kg/ vine or 40.0 t/ ha, out of which the yield of clusters weighing over 0.7 kg is 3.8 t/ ha, the yield of clusters weighing from 0.4 to 0.7 kg is 16.4 t/ ha, and the yield of clusters weighing below 0.4 kg is 19.9 t/ ha.

4. The Victoria variety grown on both cultivation systems gives a similar yield of 40 t/ha, though the grape from pergolas has a greater mass of grapes, larger berries and greater number of large berries. It can be used for decoration more easily due to the small number of atypical berries. Further, it has a greenish skin colour and very pleasant refreshing flavour. Grapes grown on espaliers have a strikingly large number of atypical berries, yellow skin colour with shades of brown on the sunny side, weakly developed rachises and overly sweet flavour due to the inharmoniously high sugar content and very low content of total acids.

5. All groups of grapes on pergolas are useful for packing.

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Uticaj potporne konstrukcije na proizvodno tehnološkim karakteristikama sorte Viktorija u uslovima Strumičkog vinogorja

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Sažetak

U radu se prikazuju podaci o proizvodno tehnološkim karakteristikama sorte Viktorija gajene na dva tipa potpornih konstrukcija, pergola i špalir. Ispitivani su prinos, mehanički sastav grozda i bobice i hemijski sastav šire. Rezultati istraživanja su pokazali da se ova sorta može sa uspjehom gajiti na oba sistema, pergola tendone i špalir u uslovima strumičkog vinogorja, Republika Makedonija. Sorta Viktorija gajena na pergoli daje grozd sa većom težinom, dužinom i širinom grozda i bobica, gde bobice imaju ujednačenu veličinu i boju u odnosu na grožđe dobijeno na špalir.

Ključne reči: stone sorte, Viktoria, pergola, špalir, prinos, kvalitet grožđa.

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