

## YIELD PLANNING IN TABLE GRAPE PRODUCTION ON STRASHENSKI GRAPE VARIETY

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### Abstract

Table grape production takes considerable place in the total grape production in Republic of Macedonia. Central Povardarie wine regions, especially Tikvesh wine district has good conditions for producing table grape for consumption in fresh state. Obtaining optimal yield and quality table grape demands application of suitable ampelotechnical measures such as: yield planning per vine and hectare, pincage of grape cluster, partial defoliation, and use of biostimulators, use of modern packing centers and use of adequate packing for the table grape. The purpose of the research was yield planning with leaving specific numbers of grape clusters per vine to get high yield and high quality table grape. Three Variants were researched with 18, 23 and 27 grape clusters per vine and Standard with leaving of all grape clusters per vine. Measuring of the yield per vine and per hectare was conducted, percentage of packed grape and remnants, mechanical analysis of the grape cluster and berry, pressure resistance of the berry, resistance of cluster stem breakage and chemical analysis. The results and information received from the yield per vine and hectare, percentage of packed grapes and remnants, the chemical analysis of sugar content and total acid content are showing that the best results are achieved at the Variant with 27 grape clusters per vine.

**Keywords:** table grape, Strashinski, pincage, yield planning per vine and hectare.

### Introduction

Republic of Macedonia has long tradition in successful production of table grape along with its favorable agro ecological conditions. The area planted with table grape are 30-35% from the whole grape production. Successfully can be produce table grapes with very early, early, medium late and late ripening. For optimal yield and high quality table grape that will be used for fresh consumption the application of specific ampelotechnical measures such as: yield planning per vine, hectare and m<sup>2</sup>, pincage of grape cluster, partial defoliation, use of bioregulators for berry growing. Also agrotechnical measures should be used such as: leaving specific number of clusters on the vine per square meter, yield planning with mature pruning as well as the use of modern quality packages for the packing of the table grapes.

### Material and methods

The subject of this research was the table grape variety Strashenski in Tikves wine region. This variety originates from Moldova (Kisinev) and it is developed by crossing (Kata Kurgan x Dodreljai) x SV 20 - 473. This variety has large loose clusters with big dark blue round berries. The skin is thick, the flesh is juicy with acidic taste. It ripens in first epoch. Strashenski belong to the group of high yield grape varieties that is resistant to grapevine downy mildew, but not resistant to powder mildew and botrytis. It is also sensitive to winter temperatures. In Macedonia this variety is found in small areas in the Tikves wine district and also in Gevgelia - Valandovo wine region. (Bozinović, Ampelografija, 2010). The distance between rows is 2,5 m and between the vines is 1,8 m. This research was conducted on 4 test Variants from which one is taken as a main vine or standard.

- Standard (main vine) with leaving of all clusters per grape on each vine,
- Variant 1 with leaving of 18 clusters per grape on each vine,

- Variant 2 with leaving of 23 clusters per grape on each vine,
  - Variant 3 with leaving of 27 clusters per grape on each vine,
- All Variants and the Standard were equally treated in a matter of irrigation, fertilization, soil cultivation and phyto protection during the period the research was conducted. In the start of the flowering and pollination phase, 1/3 of the cluster length was removed to all vine variants except for the standard. During the technological ripeness of the grape: total yield, the percentage of packed grape and remnants are calculated for every variant and standard. The information about the mechanical contents of the grape cluster and berry, structure of the cluster, mechanical conditions of the grape cluster and berry, sugar content, total acids and pH value of the must are all conducted and received in laboratory conditions. Oechsle must meter was used to measure the total sugar content in must along with the Dijardin - Salleron table to all variants and standard Total acids are given in g/dm<sup>3</sup> calculated with potentiometric titration with the use of bromthymol blue. The neutralization was concluded with 0,1 m NaOH. Potentiometric method was used to measure the pH with the use of pH meter with calomel electrode.

### Results and discussion

One of the main indicators for the fertility of the grape is the yield as a parameter and it's shown in Table 1. The yield is an indicator calculated as a total grape mass for a specific grape variety or area. Also another parameters such as: total yield, percentage of packed grapes and remnant are given for each variant and standard in Table 1.

Table 1. Total yield for Strasenski table grape variety

Variants	Packed grape		Remnants		Total
	kg/ha	%	kg/ha	%	kg/ha
1	17.932	94,81	980	5,19	18.912
2	20.046	94,18	1.238	5,82	21.284
3	21.970	93,72	1.470	6,28	23.440
Standard	23.384	89,47	2.752	10,53	26.136

From the given results we can conclude that the lowest total yield from all variants has the Variant 1 with 18.912 kg/ha. The highest yield has the Standard with 26.136 kg/ha. Relatively high yield is measured in Variant 3 of 23.440 kg/ha. The percentage of remnants is the lowest in the Variant 1 with 5,19 %, and the highest in the Standard with 10,53%. In Variant 3 the percentage of remnant is 6,28% and the percentage of packed grape is 93,72 %. Other main characteristics of the table grapes are the dimensions of the cluster and berry shown in table 2.

Table 2. Dimensions of the cluster for Strasenski grape variety

Variant	Length in cm	Width in cm	Size
1	17,25	11,28	Medium
2	14,65	13,22	Medium
3	15,27	12,77	Medium
Standard	18,90	9,37	Large

The largest dimensions of the cluster is measured in the Standard because the cluster is whole and not pincaged. The dimensions of the berry for Strasenski grape variety for all the researched variants are given in Table 3.

There are specific differences in length and width of the berries between the variants and the standard. The standard has the smallest dimensions of the berry in comparison with the other researched variants. The results of the mechanical contents are given in Table 4.

The conclusion from the given results is that highest cluster mass was measured in Variant 1 with 487,70 g and the lowest cluster mass in the standard. According to the cluster size classification the whole variants including the standard have weight more than 400 grams and belong to a group of

very large clusters. The mechanical content of the berries for the Strasenski table grape variety is given in the Table 5.

Table 3. Dimensions of the berry for Strasenski grape variety

Variants	Length in mm	Width in mm	Median value	Length - width ratio in mm
1	25,34	23,16	24,25	1,09
2	24,54	22,45	23,49	1,09
3	25,05	23,41	24,23	1,07
Standard	24,29	22,67	23,48	1,07

Table 4. Mechanical content of the cluster for Strasenski grape variety

No:	Elements	Variants			
		Standard	1	2	3
1	Cluster weight in g	410,10	487,70	462,50	438,60
2	Cluster remnant in grape bunch g	8,14	8,45	8,60	8,18
3	Berry weight in g	401,96	479,25	453,90	430,42
4	Cluster content indicator	49,38	56,71	52,77	52,61
5	Cluster remnant percentage according to weight	1,98	1,73	1,86	1,86
6	Berry percentage according to weight	98,02	98,27	98,14	98,14
7	Numbers of berries in cluster	72,16	74,55	70,37	68,52
8	Berry indicator	17,59	15,28	15,21	15,62

Table 5. Mechanical content of the berries for the Strasenski grape variety

No	Elements	Variants			
		Standard	1	2	3
1	Weight of 100 berries in g	770,42	910,02	880,68	860,94
2	Weight of seed in 100 berries in g	15,14	16,12	15,64	15,70
3	Weight of skin in 100 berries in g	37,18	40,04	38,56	39,10
4	Weight of flesh in 100 berries in g	718,10	853,86	826,48	806,14
5	Content indicator in berries	19,31	21,32	21,43	20,61
6	Number of seeds in 100 berries	276	282	286	290
7	Number in seeds in cluster	113,18	137,53	132,27	127,19
8	Weight in 100 seeds in g	5,48	5,71	5,46	5,41
9	Weight in seeds in cluster	10,92	12,01	11,00	10,75
10	Weight in skin in cluster g	26,82	29,84	27,13	26,79
11	Weight in flesh in cluster g	364,22	437,40	415,77	392,88

Table 6. Structure of cluster for the Strasenski grape variety

No	Elements	Variants			
		Standard	1	2	3
1	Percentage of cluster remnant	1,98	1,73	1,86	1,86
2	Percentage od skin	6,54	6,11	5,86	6,10
3	Percentage od seeds	2,66	2,46	2,37	2,45
4	Percentage of flesh	88,82	89,70	89,91	89,59
5	Skeleton	8,52	7,84	7,72	7,96
6	Hard remnant	11,18	10,30	10,09	10,41
7	Structural indicator	7,94	8,70	8,91	8,60
8	Theoretical randman	87,06	88,14	88,23	87,92

There are differences in values between the variants and the standard. Above 700 grams measured values are found in all the variants and the standard in the elements of weight of 100 berries in g.

The structure of the cluster that shows the contents of the cluster is measured in %. For the Strasenski table grape variety it is shown in Table 6.

We can conclude that all of the variants and the standard have high percentage of flesh.

The mechanical characteristics of the berries are presented through their pressure resistance in Table 7.

Table 7. Pressure resistance of the berry in g/cm<sup>2</sup> for the Strasenski grape variety

Variant	X - min	X - max	X
1	900	1800	1420
2	1000	1900	1400
3	900	1900	1360
Standard	700	1800	1230

The lowest average value for the pressure resistance of the berry is measured in the standard. It can be concluded that all variants have relatively high values for pressure resistance. The chemical content of the cluster for the Strasenski grape is presented through the sugar content, total acids and pH value of the must shown in Table 8.

Table 8. Chemical content of the cluster for Strasenski grape variety

Variants	Sugar g/l	Total acids g/dm <sup>3</sup>	pH
1	190	5,68	3,62
2	194	5,82	3,40
3	186	5,14	3,46
Standard	188	5,73	3,32

The lowest sugar content in g/l is measured in the Variant 3 with 186 g/l but with very close value with the Standard with 188 g/l. The highest sugar content of all with 194 g/l is in Variant 2. The contents of total acids are highest in the Variant 2 with 5,82 g/dm<sup>3</sup> and lowest in Variant 3 with 5,14 g/dm<sup>3</sup>.

### Conclusions

Variant 3 has the highest measured yield of 23.440 kg/ha with 93,72% of packed grape compared with the Standard which has 26.136 kg/ha but with much lower percentage of packed grape of 89,47%. The pressure resistance of the berry for the Strasenski grape variety is with high values in all variants and the standard. This is a good sign because it also increases the transportability of the grape. The cluster reduction increases the sugar concentration in the grape. Summarizing the overall results for total yield, percentage of packed grape, the sugar content, the total acids, the pressure resistance of the berry we can conclude that the best variant is the Variant 3 with leaving of 27 clusters per grape.

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