

THE INFLUENCE OF THE DURATION OF MACERATION ON THE CHEMICAL COMPOSITION AND QUALITY ON THE WINES OF THE VRANEC BRAND IN TIKVESH WINE REGION

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ABSTRACT

This paper shows the results obtained from the study of the duration of maceration to the chemical composition of wine and the sensor characteristics. Analyses were made during 2019 in the Tikvesh Wine Region on the vineyards in the area of the village Shivec. Analyses were made from the grape of three vineyards of variety Vranec, including variants 1, 3 and 5 with the maceration of 7 days, and variants 2, 4 and 6 with the maceration of 15 days. Wines produced from variations 1,4,5, and 6 are wines with a pure smell, a pleasant and discrete varietal aroma, and with a simple and fruity taste which does not leave a lasting aftertaste. Wines produced from variation 3 have dark ruby red colour and the most complex and accentuated fruity aroma, with a sour cherry and red fruits aroma being especially present. Wines produced from variation 2 have a complex and accentuated black fruits aroma, harmonious and full taste and they can be aged for a long time, stored and processed further. Maceration of 15 days gave wines with complex and accentuated aromas and more polyphenols compounds and anthocyanins, which are better for a long time store and processed further, while the maceration of 7 days gave wines with simple and fruity taste which does not leave a lasting aftertaste, nice for quickly consummation.

Key words: Vranec, wine, maceration, chemical compounds, sensory characteristic

INTRODUCTION

The total area under vineyards in the Republic of Macedonia is approximately 24,000 ha (State Statistical Office, 2017), while the total amount of grapes produced is 330 million kilograms (FAOSTAT, 2019). Most of the grapes produced are from wine varieties that are used for the production of wine. The most common wine varieties in our country are: Vranec, smederevka, žilavka, traminec, temjanica, merlot, cabernet sauvignon, prokupec, stanusina, etc. Among the varieties for red wine production, the Vranec variety is the most common, occupying about 70% of the areas with red wine varieties, which makes our country the largest producer of grapes and wine of this variety in the region.

Today, it is produced in almost all vineyards in our country, with the application of different pruning systems and different specific ampelotechnical measures and technological procedures in wine production. In our research, we studied the Vranec variety in the conditions of the Tikvesh vineyard, grown with three different methods of pruning on the one hand, and we used two different maceration times, thus determining their impact on the yield and quality of the grapes, as well as on the obtained wine.

MATERIALS AND METHODS

The research was conducted during 2019 on a plantation of the Vranec variety in the vicinity of the village of Shivec, Tikvesh vineyard. The plantation was erected in 2003, it is of full fertility and is located at an altitude of 230 m. It is grown on a line system with a height of 2 meters. The distance between the vines in the row is 0.9 m, and between the rows is 2.25 m. During the vegetation, standard agrotechnical and ampelotechnical measures were applied for the production of wine grapes.

The following variants were used in the experiment:

- Variant 1: Vranec produced with the Guyot - Poussard pruning method (with a load of a total of 11 buds, namely: 2 short spurs (2 buds each) and one bow cut to 7 buds), maceration of 7 days;
- Variant 2: Vranec produced with the Guyot - Poussard pruning method (with a load of a total of 11 buds, namely: 2 short spurs (2 buds each) and one bow cut to 7 buds), maceration of 15 days;
- Variant 3: Vranec produced by cordon pruning with spurs (with a total burden on the vine of 12 buds, that is, 6 spurs per 2 buds), maceration of 7 days;
- Variant 4: Vranec produced by cordon pruning with spurs (with a total burden on the vine of 12 buds, that is, 6 spurs per 2 buds), maceration of 15 days;
- Variant 5: Vranec produced in a double Guyot - Poussard pruning method (with a total burden on the vine of 18 buds, that is, 2 short spurs on 2 buds and 2 arcs on 7 buds), maceration of 7 days;
- Variant 5: Vranec produced in a double Guyot - Poussard pruning method (with a total burden on the vine of 18 buds, that is, 2 short spurs on 2 buds and 2 arcs on 7 buds), maceration of 7 and 15 days;
- In all variants of pruning, two variants of maceration of 7 and 15 days each were applied, while all other operations (room temperature, temperature of maceration, including pumping over the cap four times per day during the maceration period, etc. were identical for all variants). Also, the same concentrations of $K_2S_2O_5$ (6 g/100 kg), FCE enzyme (3 g/100 kg), D-80 yeast (30 g/100 kg), Go Ferm Protect (45 g/100 kg), Opti Red (45 g/100 kg) and Fermaid E 10 g/100 kg were used for all variants.

In all variants, the following parameters were examined: yield, mechanical analysis of the cluster, chemical analysis of the grapes, chemical composition of the obtained wine and sensory evaluation.

The content of sugars was measured with an Exlov must hydrometer, to determine the content of total acids, potentiometric titration was used, by application of the bromothymol indicator, while the pH of the must was determined with a pH meter. The chemical analysis of the wine included the following: alcohol content, total extract, dry extract, reducing sugar, total acids, volatile acids, free SO_2 and total SO_2 . All analyzes were performed according to the methods of the provisions of the law on wine, recommended by the OIV. Used method of sensory evaluation was the total of 20 positive points.

RESULTS AND DISCUSSION

For a better overview, we have divided the obtained results into the following chapters: chemical composition of the must, chemical composition of the wine and sensory properties of the wine.

Chemical composition of the must

From the chemical composition of must, the content of sugars, the content of total acids and pH were tested.

Table 1. Chemical composition in the tested varieties

Version		V1/2 - Guyot - Poussard	V3/4 - Cordon pruning	V5/6 - Guyot – Poussard
Elements	Indicator			
Sugars	%	22.2	22.4	22.4
Total acids	g/l	6.9	5.23	5.58
pH	/	3.54	3.56	3.59

From the obtained results (Table 1) it can be concluded that the type of pruning does not affect the content of sugars in the must, but a significant difference in the content of total acids was found in variant 1/2 (6.9 g/l) in relation to the other two variants where they were measured 5.23 g/l (V3/4), ie 5.58 g/l (V5/6) acids.

Chemical composition of the wine

For each of the three pruning variants, two types of maceration were carried out, namely 7 days and 15 days. The following parameters were examined in all variants: alcohol, specific mass, extract, total and free SO₂, pH, glucose/fructose, volatile acids, malic acid and lactic acid. The results of the tests obtained are presented in Table 2.

Table 2. Chemical composition of the wine in the tested variants

Variant	Alcohol (vol %)	Specific Mass (g/cm ³)	Extract (g/l)	Free SO ₂ (mg/l)	Total SO ₂ (mg/l)	pH
V1 /7	13.55	0.9939	30.07	18	37	3,42
V2 1/15	13.83	0.9934	29.59	17	32	3,5
V3 2/7	13.65	0.993	30.1	15	27	3,41
V4 2/15	13.29	0.994	29.57	17	36	3,42
V5 3/7	13.86	0.994	31.24	21	46	3,3
V6 3/15	13.77	0.9927	31.03	22	36	3,44
Variant	Glucose/Fructose (g/l)		Total Acids	Volatile Acids	Malic Acids	Lactic Acids
V1 /7	0.13		5.79	0.21	0.91	0.08
V2 1/15	0.1		5.5	0.26	1.09	0.06
V3 2/7	0.15		5.95	0.21	0.96	0.18
V4 2/15	0.07		5.77	0.26	0.98	0.24
V5 3/7	0.16		6.45	0.22	0.8	0.03
V6 3/15	0.09		5.64	0.35	0.69	0.18

The data in Table 2 show that the variant V5 gives wine with the lowest amount of alcohol of 13.29 vol % and the highest amount of extract of 31.24 g/l, while the wine of the V4 variant gives the lowest alcohol content (13.29 vol%) and the lowest amount of extract (29.57 g/l). The total acids in the wine range from 5.5 g/l in the variant V2, to 6.45 g/l in the variant V5.

Sensory characteristics of the wine

The sensory profile of the wine gives us a real picture of the quality of the wine. This is achieved with the help of the descriptive method for the analysis of the wine, which also enables the quantification of the examined characteristics of the variety. Descriptive methods of wine serve to standardize terminology, to describe the aroma of wine, for better communication between oenologists. There are several methods of descriptive analysis, that is, description of the sensory profile of the wine. Used method of sensory evaluation was the total of 20 positive points.

Table 3 shows the results of the sensory characteristics of the Vranec wine. Based on the obtained results, it can be concluded that the type of pruning and the duration of maceration have a significant influence on the sensory characteristics of the Vranec wine in the Tikvesh vineyard.

Table 3. Sensory characteristics of the Vranec wine in variants

Characteristics	Variant					
	V1	V2	V3	V4	V5	V6
Color - 2 points	2.0	2.0	2.0	2.0	2.0	2.0
Clarity - 2 points	2.0	2.0	2.0	2.0	2.0	2.0
Bouquet - 4 points	3.2	3.6	3.5	3.2	2.9	3.1
Taste - 12 points	10.6	11.0	11.0	10.4	10.4	10.5
Total - 20 points	17.8	18.6	18.5	17.6	17.3	17.6

It can be seen from the table that all the examined variants are well clarified and without visible signs of turbidity or sediment, thus all variants received a maximum of 2 points for color and clarity. Tasting determination of the aroma showed significant differences between the varieties in the aromatic profile. The wine samples obtained by these trials have significant differences regarding aromatic profile and tasting grades.

The grade for “Bouquet” varies from the lowest 2.9 for V5, up to 3.6 for V2. The wine marked as V2 has a complex and pronounced varietal bouquet that includes black fruit notes, harmonious and full body, strong tannins and a very long aftertaste. This wine has a potential for gaining in oak barrels, barriques.

The wine marked as V3 has intensive ruby color and the most complex and accentuated fruit aromas from all of them. Most prominent aromas are cherries and red forest fruits. This wine would be ideal as wine for early drinking mostly because of its soft tannins and harmonious and balanced taste.

The rest of the wines had clean bouquet with pleasant, although discreet aromas and a simple, fruity taste that doesn't last for a long time. The total tasting grade for tasted wines ranges from 17.3, for sample V 5, to 18.6 for V2.

CONCLUSIONS

Based on the results obtained from this study we can conclude that the type of pruning and the duration of the maceration period have significantly influenced the sensory profiles of the wines produced from Vranec variety from Tikvesh region.

Obtained results showed that it is possible to obtain from the Vranec variety raw material adapted for the production of high-quality wines by monitoring the ripening dynamics and

applying Guyot-Poussard type of pruning. The wines would be suitable for further aging and finishing processes. Applying Cordon pruning also provides raw materials adapted for quality red wines. Both types of pruning provided grapes that had specific varietal aromatic characteristics and taste qualities. The control variant, using double Guyot pruning method, gave the already expected wine quality, which was not much behind the two newly tested pruning methods.

The best match for Guyot-Poussard pruning was maceration period of 15 days. This combined technique provided wines with higher quality, more complex and more intensive aromas and containing higher concentrations of total polyphenols and anthocyanins, giving higher potential for aging. However, the best match for Cordon pruning was 7-day maceration – giving wines that have complex pronounced fruit aromas.

The sensory tasting showed significant differences between wines regarding their aromatic profile and taste characteristics. Wine sample 2 had the most complex and pronounced fruit aromas, especially those reminiscent of black fruits. This wine was harmonious, full-bodied that left a great impression and is well adapted for further finalization and aging. Wine sample 3 had complex and strong fruit aromas, especially cherry aroma, discreet mineral notes, harmonious and full taste, making it a great wine for early consummation. The wines from all other samples had lower aroma intensity, medium varietal aromas (red fruits) and soft tannins, with medium body but well-balanced taste.

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