CHARACTERISTICS OF SANGIOVESE GRAPE VARIETY (*Vitis vinifera* L.) GROWN IN TIKVEŠ VINEYARDS

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Scientific paper

Summary

Studies were carried out to the variety Sangiovese of manufacturing plants located in the site Lepovo-Tikveš vineyards and all of this in property of the Bovin Winery. During the period of study (2011-2012 year) the following items were included: realized yields (kg/vine), chemical composition of grape must (sugar content, total acids, pH) and chemical analysis of wine. The results show considerable variation in yield (coefficient of variation was18.45) which is due to the age of the crop or it is in the second (2011) and third (2012) year of birth. The must contains 224 g/L sugar and 6.75 g/l total acids average for the test period. The wine has a high content of extract (33 g/L) and alcohol from 12.90 vol% which is due to selective harvesting of grapes and the way of vinification.

Key words: *Sangiovese, yield, grape must, wine*

INTRODUCTION

In most of the vineyards in the Republic of Macedonia, particularly the Tikveš vineyards with continental and partially Mediterranean climates, the agro-ecological conditions are favourable for successful cultivation of wine grape varieties of all epochs of maturity. In the period of investigation, Lepovo site (micro location) is characterized by daily mean air temperatures of 13.7–14.5°C with annual temperature sum of 4302–4441°C and vegetation temperature sum ranging from 2289°C to 3381°C. Total annual precipitation ranges from 440–740 mm, and from 250–310 mm during the vegetative growth cycle. Lack of water, especially during the vegetation is gone, because the vineyards are irrigated with drip irrigation.

The vegetation period lasts on average from 206 to 209 days (Table 1), enough for the grapes to reach technological and full maturity.

Table 1 Climatic factors in Lepovo site (Tikves vineyards)

Vegetative period	in days	209
Period of active vegetation	in days	206-209
Average annual air temperature	in C⁰	13.7-14.5
Sum of annual temperature	in C⁰	4302-4441
Sum of temperature in the vegetative period	in C⁰	2289-3381
Annual precipitation	in mm	440-740
Precipitation in the vegetative period	in mm	250-310

Lately, the most spread biotypes are with small and medium-sized clusters. Clones differ in production characteristics, aromatic-organoleptic characteristics of wines and purpose. For young wines and wines for long aging, clones are characterized by highlighted fruit flavors, balanced tannins and good structure.

The *Sangiovese* grape comes from Italy, and most is grown in the Tuscany region. More clones are selected, but according to the quality characteristics, three of them can be separated i.e.: Sangioveto or Groso, Brunello and Prugnolo.

The vine is lush with thick tendrils and medium length internodis. It ripens in late September. The grape is medium to large with or without one or two wings. The grain is medium-sized with round shape. The skin is colored in dark gray, it is a dark berried vine, with thin skin. It is adapted to different environmental conditions. High yield variety, regular and stable yields. There is no need to maximize the weight, because the quality of the grapes decelerates. It looks for warm climate,according drought is highly resistant (Robinson, J. 1986). Wines

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produced from Sangiovese grape usually express red and black fruit color, especially black cherry, blueberry and plum, and have discreet aromas of flowers. Purple color is characteristic of wine with discreet pink shades (J. Robinson, 2012). Aromas of black currant, strawberry, red cherry, raspberry and blueberry are also characteristic of the wine. It is often kept in wooden barrels, and wine get aftertastes of coffee and chocolate.

MATERIALS AND METHODS

Studies were carried out on the Sangiovese grape production plants located in the Lepovo site-Tikveš vineyard. The plantations are owned by "Bovin" winary. The plantation was built in 2008 with certified planting material. The training system was a double Guyot cordon of pruning, distance of planting of 2.4m between the rows and 1.m between the grapevines in line with an optimal strain of 20 buds by grapevine. Regular agro-technical and ampelo-technical measures were applied. The vineyard is irrigated.

The yield per vine was determined as a representative parameter of the agro-biological and technological characteristics. During the vegetation, regular agro-technical and ampelo-technical measures were applied. 30 grapevines of each of the clones were included in the studies (three repetitions of 10 grapevines)..

The yield of 30 grapevines per ha was mathematically calculated. The content of sugar in the must was determined using Oechsle Scale, and the composition of total acids was determined by titration method using solution of N/4 NaOH with factor 1.0000.The pH value on the must and wine, was determined by pH meter PB-11, Sartorius

For wine production, grapes were harvested at technological maturity transported to the Winery Bovin. The grape mash was sulphated with 80 mg/l liquid SO_2, and then selected wine yeast Fermol Premier Cru (*Saccharomices cerevisiae*) was added. During the maceration period of 6 days, the grape was pressed mechanically two times per day. After the maceration, wines were separated from the pomace, collected in glass balloons when the alcoholic fermentation is finished. The temperature during the alcoholic fermentation was 23-25 ^{0}C. The wine produced with these procedures were poured out 2 times, and during every pouring out, a correction of SO_2 was done, to not lower than 25 mg/l free SO_2 and not higher than 100 mg/l total SO_2. Chemical analysis of the wine were done after the second pouring out and recommended methods of O.I.V (International organization of vine and wine) were used. For determination of the wine specific weight, alcohol and dry extract, a pycnometer method was used. The colour intensity and hue was determined by spectrophotometric method. The intensity of the color (IC) depends on the content and structure of anthocyanins present in wine and is defined as the sum of apsorbanses of 420 nm, 520 nm and 620 nm, a relation between A420/A520 is used to calculate the hue (H) of wine. The organoleptic grade of wines was perfomred by application of Davis 20-point international wine scoring system.

RESULTS AND DISCUSSION

The fertility of grape varieties is determined by the level of growth and the number of eyelets. Beside the characteristics of the type and biological potential yield depends on agro-ekological conditions where the variety is grown (Violeta Dimovska at.al. 2010) of farming systems and the level of stretching the eyelets (S.Orlandini at al. 2008) etc .

Table 1 presents the results of obtained yields of grapes (kg) for the test period in years, the vine and per unit area (ha). The quantity (yield) of gathered grapes plays an important role in the quality of raw material (stuff) and wine. In the years of testing, the yield ranges from 5.130 kg/vine (2011) to 6.669 kg/vine (2012) or an average of 5.899 kg/vine (2011/2012). After few years, significant variation in ratio was found of 18.45, which is due to advancing in age of the vineyards, because it is in the second (2011) and third year of growth (2012). Although the Sangiovese variety isn't in the period of entirely growth, the received quantities of grapes indicate that it has high potential and challenge for the agricultural production in the Tikveš wineyards.

Table 1. Yield of grape (kg)

2011		2012		2011/2012		CV%	
kg/vine	kg/ha	kg/vine	kg/ha	kg/vine	kg/ha	kg/vine	kg/ha
5.130	20.520	6.669	26.676	5.899	23.598	18.45	

The content of sugar and total acids and their ratio are among the important parameters based on which the quality of one variety or clone is assessed. The results for the sugar and total acids content and pH value in the must are presented in table 2. Compared by years, the sugar content in the must in all clones was quite stable

with the coefficient of variation is from 2.53. During the period of study, the average sugar content ranged from 22 g/L (2011) to 22.8 g/L (2012), which enabled producing of medium strong wines. The freshness of the wines depends on the content of total acids in the must. The average content of total acids ranged from 6.7 g/L (2012) to 6.8 g/L (2011). No significant changes in the content of total acids in the must, were observed during the period of two years. The coefficient of variation is 1.05.

Table 2. Content of sugar, total acids in the must (g/L)

Element	2011	2012	2011/2012	CV%
Sugar (g/L)	22.0	22.8	22.40	2.53
Total acids (g/L)	6.8	6.7	6.75	1.05
pH	3.22	3.23	3.23	0.00

The chemical composition and colour components of wine are important parameters that contribute to the sensory characterstics (A.Versari at.al. 2007). The results of the chemical analysis of the wine made from the examined variety are presented in Table 3.

Table 3. Chemical analysis on wine

| Element	2011	2012	2011/2012	CV%
Alcohol vol %	12.90	13.0	12.95	0.55
Dry extract (g/L)	32.90	35.2	34.05	4.78
pH	3.25	3.25	0.00	0.00
Total acids (g/L)	6.3	6.8	6.55	0.35
Residual sugar (g/L)	4.8	3.35	4.08	25.16
Colour intensity	0,768	0,776	0.772	0.73
Hue	0.012	0.015	0.014	15.71

There were very small changes of the alcohol content in the wines with coefficient of variation 0.55. That's a result from the almost same content of sugar in the must and the completed alcoholic fermentation. In addition, the sugar-free extract (dry extract) in wine is a characteristic parameter for each variety. In the period of study, values for the dry extract ranged from 32.9 g/l (2011) to 35.2 g/l (2012).The wine has a value of pH (3,25) which is very stable, which means that the wine has a high level of natural acidity.

Furthermore, another very important parameters which determine the quality of red wines are color of the wine and anthocyanins. The colour intensity is affected by number of factors, including vintage, grape, composition, fermentation and storage condition (A.Versari at.al. 2007, Egger E. at.al. 1996). In the years of examination, average color intensity was 0.772 and it's very stable (coefficient of variation 0.73).

Beside chemical analysis, organoleptic evaluation (tasting) is an important indicator for determining the quality of the wine. When tasting the wine Sangiovese the following elements are evaluated: appearance, color, aroma, total acid, sugar, flavour and astringency. The sum of the calculated values gives the total evaluation of wine. Wine-tasting points of the examined wine are given in Graph. 1.

After years, the received grades (points) for all elements show high stability, except the aroma which is in slight, insignificant variation (12.35).

Wine-tasting points of the examined wine are given in Graph. 1. Average wine-tasting grades range is 18.5 point. In the years of testing, wines from this variety, were characterized by high stability assessment, i.e. the coefficient of variation ranges is 3.85. Based on the results of chemical analysis and tasting evaluation, the Sangiovese wine belongs to the group of wines of high quality.
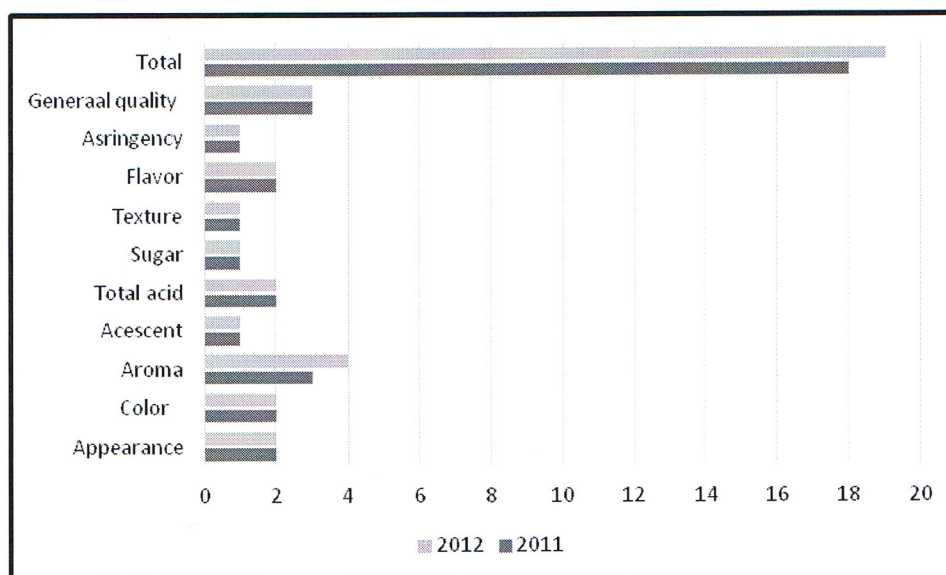
Graph. 1 Degustation rating of wine (points)

CONCLUSIONS

The results of this study give us knowledge of production and technological characteristics of the Sangiovese grape variety, grown in agro-ecological conditions in Lepovo - micro locality, Tikveš wine region.

As a newly introduced variety (2008), in the years of testing showed high stability of the quality of grape must and wine. Greater variation was found in yield, and it is a result of the declining age of the vineyards. It is in the second (2011) and third (2012) year of birth when the vine is not yet in full maturity. This gives us the right to say that variety Sangiovese interests the Vine and Wine sector in the Tikveš vineyard.

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