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INFLUENCE OF CLIMATIC FACTORS ON THE QUALITY OF MERLOT GRAPEVINE VARIETY IN TREBINJE REGION VINEYARDS (BOSNIA AND HERZEGOVINA)

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ABSTRACT

The aim of this paper is to analyzed climatic influence on quality of yield of Merlot grapevine variety, in Trebinje region (Entity of Republic of Srpska, Bosnia and Herzegovina) vineyards, during the vegetation 2016 and 2017. We investigated the mechanical properties of bunch and berry (bunch weight, number of berries on the bunch, weight of 100 berries, weight of 100 berries flesh, weight of the berries skin, weight of seeds in 100 berries) and quality properties of grapes (sugar content and total acid content in the must). The highest bunch weight, as well as the number of berries on the bunch was achieved in 2017 (276.84 g, i.e. 183.03), while the lowest bunch weight (193.6 g) and number of berries on the bunch (158.53) were measured in 2016. Weight of 100 berries, weight of 100 berries flesh, weight of the berries skin, weight of seeds in 100 berries were larger in 2017. The highest sugar content was measured during 2017 and the highest level of acid in must was measured during 2016. During the years 2016 and 2017 a significant influence of climatic factors on the quality characteristics of the studied variety was observed. Although both considered years had above average temperature and less precipitation, further analysis of differences in monthly values of climatologically parameters could provide an explanation for differences in mechanical and quality properties of grapes.

Keywords: *climate, influence, Merlot, Trebinje vineyards*.

INTRODUCTION

The temperature characteristics of an area are primary to assess its suitability for growing vines. The area of Herzegovina is suitable for growing vines due to the high temperature sum of vegetation and mild winters whose absolute minimum rarely exceeds -10°C (*Kojić*, 2000). Trebinje is located in a zone of altered Mediterranean climate. It is characterized by a large number of sunny days (260), low relative humidity and cloudiness, rains in winters and warm summers. Autumn is significantly warmer than spring, the snow falls very rarely and when it falls, it

does not stay for too long. The relief of the municipality is dominated by the mountain Leotar, the river Trebišnjica, Trebinje field and Popovo field. It is located at an altitude of 273 m. The reconstruction of the vineyards in the area of Herzegovina started in the last decade and new varieties have been introduced since then, Merlot variety is one of them.

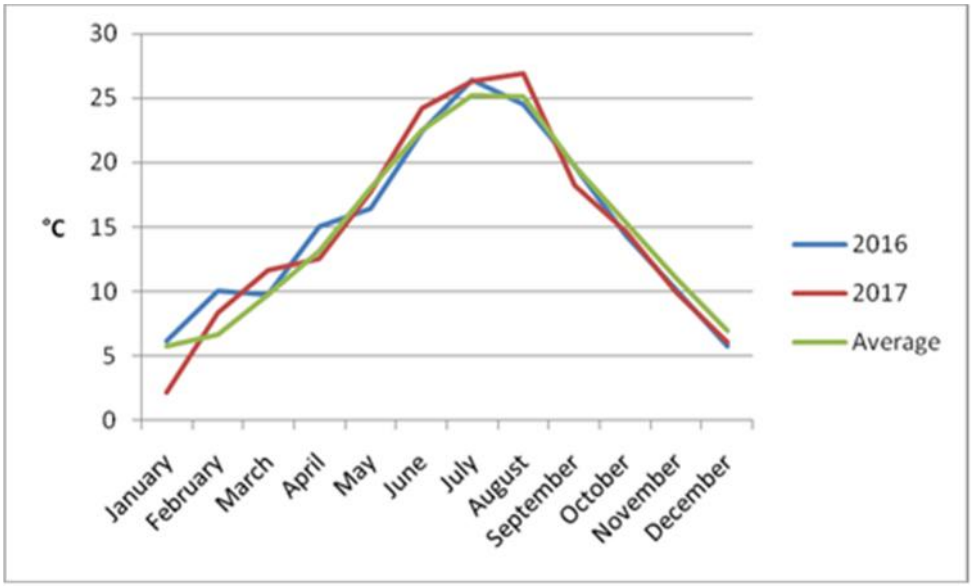
The aim of this paper is to analyzed climatic influence to quality of yield of Merlot grapevine variety and the possibility of its cultivation in climatic conditions of the Trebinje region and other wine regions of similar agro ecological conditions.

MATERIAL AND METHODS

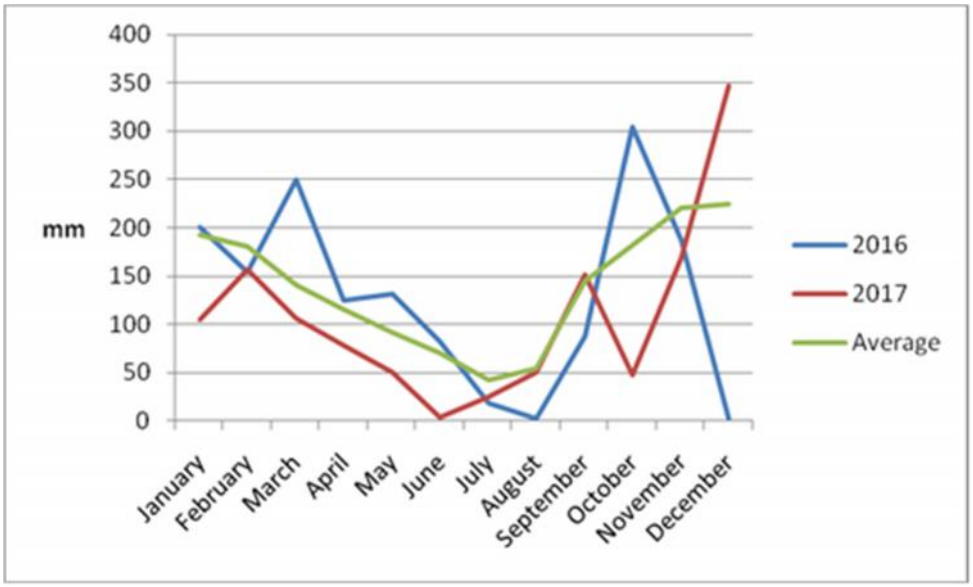
The research of yield quality of Merlot variety was carried out during the growing season in 2016 and 2017, in Trebinje area (Entity of Republic of Srpska, Bosnia and Herzegovina). The experiment was set up at the location of Petrovo field. This vineyard was founded in 2004. The distance between plantings was 2.8 x 0.9 m. 10 vines were selected for the research and each vine served as a separate experimental unit in the research. During the pruning, 14 buds were left on the vine. Basic measures of pruning were applied during the two years of research in experimental plantation, as well as basic measures for the protection of the most important causes of disease and pests. During the research, the "drop by drop" method of irrigation was used on the plantations. The investigations include the mechanical properties of bunch and berry (bunch weight, number of berries on the bunch, weight of 100 berries, weight of 100 berries flesh, weight of the berries skin, weight of seeds in 100 berries) and quality properties of grapes (sugar content and total acid content in the must). The data from Hydro meteorological Institute of the Republic of Srpska was used for the analysis of meteorological conditions observed during the two years.

RESULTS AND DISCUSSION

The amount and quality of grape yield depends largely on the climate and meteorological conditions that prevail in the regions of production. Therefore, in this paper the most important climatic elements were analyzed by comparing their values during studied years with the average values from the period of twenty years. Compared to long-term averages (1997-2017) both observed years were warmer and had less rainfalls (Graph 1. and Graph 2.). In January, March, April, May, June, October and November 2016, rainfall was considerably higher than in 2017, while in July, August and September rainfall was considerably higher in 2017.



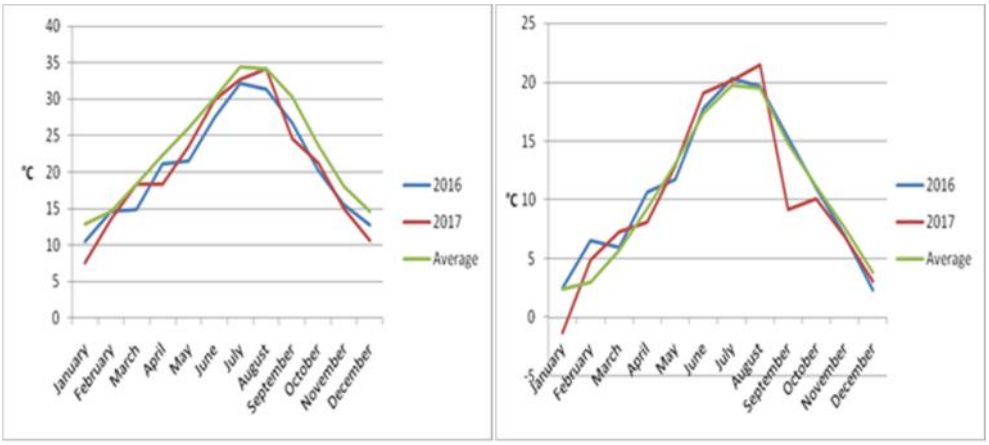
Graph 1. Average monthly temperature for the period of 1997-2017 as well as for 2016 and 2017 years.



Graph 2. Average monthly rainfall for the period of 1997-2017 as well as for 2016 and 2017 years.

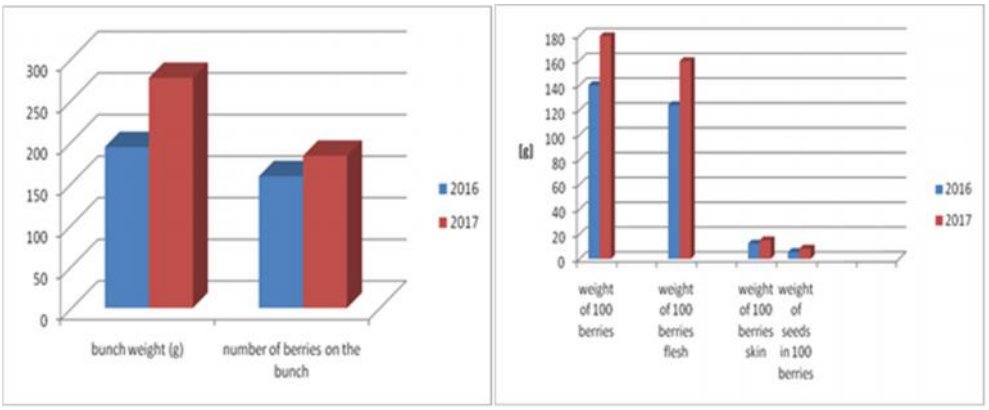
In Trebinje vineyards the warmest summer months are July and August, which is shown in Graph 3. The high temperatures during July and August were not adversely affecting the growth of the wine grape. The average maximum monthly

temperature in May, June, July and August 2017 was higher than in 2016, but the average maximum monthly temperature in both studied years were lower compared to the perennial average (1997-2017).



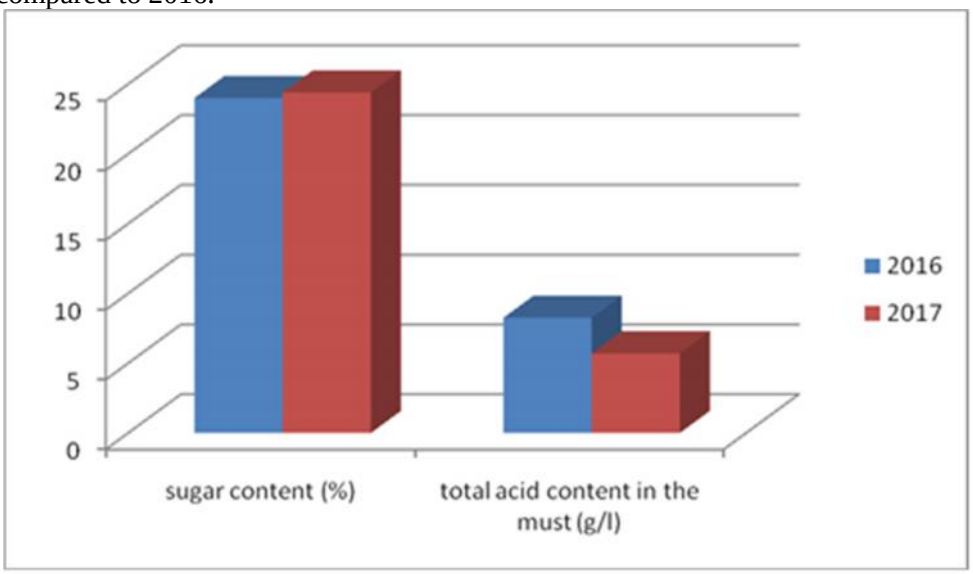
Graph 3. Average monthly maximum and minimum temperatures for the period of 1997-2012 as well as for 2013 and 2014 years.

The absolute and relative values of the mechanical composition are different for different varieties of grapevine and for different conditions of cultivation. Knowing the mechanical composition of clusters and berries has a special practical significance in assessing grapes as a raw material for processing and consumption in a fresh state. The mechanical composition of the bunches and berries is crucial for the grape must in wine ratio (*Blesić*, 2006). The values of certain parameters of the mechanical composition of the bunch of the Merlot variety are presented in Graph 4.



Graph 4. Mechanical composition of bunch of Merlot variety

In 2016, the average bunch weight (193.6 g) was less than the year 2017, when the average weight of 276.84 g was measured. A larger weight of 100 berries (179.42 g) and weight of 100 berries flesh (156.4 g) was in 2017, while in 2016 were measured weight of 100 berries (139.92 g) and weight of 100 berries flesh (122.24 g). Average weight of 100 berries skin were 14.88 g and weight of seeds in 100 berries were 8.14 g in 2017, while in 2016 weight of 100 berries skin were 12.23 g and weight of seeds in 100 berries were 5.45 g. The obtained values are higher compared to the results of *Pajović et al* (2009). Higher average monthly temperatures and precipitation in July, August and September 2017 contributed to higher values of parameters of the mechanical composition of bunch in 2017 compared to 2016.



Graph 5. Chemical composition of the must of Merlot variety

Influencing the physiological processes, the ecological potential of the production region significantly affect the quality of the grapes which is primarly reflected in the change of the sugar content, acid content, coloured and aromatic compounds, etc. The quantity of sugar in the grapes, depending on variety, degree of ripeness and health significantly depends on the climatic conditions in the ripening stage of grapes (*Ranković-Vasić et al.*, 2011). Based on the results given in Graph 5 it can be noticed that higher sugar content in grapes was measured in 2017 (24.4 %) and that particular year had higher average temperature during the May, June, July and August. Lower sugar content was obtained in 2016 (24 %). Total acid content in the must is an important indicator of the quality of grapes and it is linked to the taste and a harmony of grape and later wine (*Popović et al*.,2013). The total acid content in 2017 (5.7 g/l) was lower compared to 2016 (8.25 g/l) as a result of higher precipitation in July, August and September. These results are in accordance with the results of *Vukosavljević et al* (2011), *Garić et al* (2010) and *Avramov et al* (2003).

CONCLUSIONS

Based on the presented results the following conclusions on the influence of climatic factors on Merlot variety cultivated in agro ecological conditions of Trebinje can be formed:

- In Trebinje vineyards there are favorable agroecological conditions for growing Merlot variety.
- The results showed a significant influence of climatic factors on the quality of the yield of Merlot variety.
- Bunch weight and number of berries were lower in 2016, which was assigned to the lack of precipitation during the July, August and September. Weight of 100 berries, weight of 100 berries flesh, weight of the berries skin, weight of seeds in 100 berries also were lower in 2016.
- Higher sugar content had been measured in 2017 which was the result of higher average monthly temperature in May, June, July and August. The total acid content in 2017 was lower compared to 2016 as a result of higher precipitation in July, August and September.

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