

THE INFLUENCE OF TECHNOLOGICAL FACTORS ON QUALITY INDICATORS FOR THREE *VITIS VINIFERA* VARIETIES CULTIVATED IN THE JIDVEI VINEYARD

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Abstract: The article presents partial results of the study regarding the influence of some technological factors on the evolution of quality indicators for three *Vitis vinifera* L. varieties, namely Fetească Regală, Muscat Ottonel and Sauvignon Blanc. The experiments underlying the research were conducted in Jidvei's experimental field, located in the eastern part of Alba County, on the lower course of the river Târnava Mică. The three varieties were tested under different irrigation and fertilization conditions to determine grapes's levels of sugar, acidity and pH, which are responsible for the quality of wine production.

Keywords: grapevines, wine, irrigation regime, fertilization, *Vitis vinifera*, vineyard

INTRODUCTION

Nowadays, due to the fact wine has a high percentage in the population's diet, "organic viticulture", free of chemical fertilizers and pesticides, is important to produce "healthy" wine.

In 2014, the five largest producers of wine in the world were Spain, Italy, France, the United States and China. The total worldwide production was 31 million tonnes (1,000 kg) of wine (which roughly corresponds to 1,000 l), while the top 15 countries produced over 90% of the total (FAO, 2014).

Romania has one of the oldest wines making traditions in the world, its viticulture dating back more than 5,000 years (Merlin, 2003). Due to suitable climate, landscape and soils, viticulture became a current activity of the local inhabitants mainly in the hilly areas. Romania has about 177,000 hectares of grapevine plantations (FAO, 2014), that ranks it on sixth place between the European wine-producing countries. With a wine production of about 5.1 mil hl/year Romania is the 13th largest wine producing country in the world (OIV, 2016).

MATERIAL AND METHODS

The biological material used in this paper is represented by 3 varieties of *Vitis vinifera* L.: Fetească Regală, Muscat Ottonel, Sauvignon Blanc.

Fetească Regală was the result of natural hybridization between Fetească alba x Grasă de Cotnari. The accumulated sugars range from 170-180 g / l to 200-210g / l, and the total acidity may be between 4.5-7.0g / l H₂SO₄. The wines obtained are of good quality, but can also be used for the raw materials for the preparation of obsolete distillates of wine or sparkling wines. The variety is also cultivated in less favourable areas due to ecological plasticity and large grape crops, but in the Transylvania Plateau and Moldova, the best productions are made (Pușcă, 2010).

Muscat Ottonel was obtained by hybridization between Muscat de Saumur x Chasselas dore. The variety accumulates 190-210g / l of sugars, and at over-maturation it reaches 250-270 g / l, while having aromatic substances. Its ecological plasticity is high, but the superior results are obtained in the vineyards of Transylvania and northern Moldavia (Clarke O. and Margaret Rand, 2001).

Sauvignon Blanc variety comes from France, where it occupies large areas. The sugars are accumulated in large quantities 195-220g / l and the total acidity is 4.5-5, 5 g / l H₂SO₄. Higher results are obtained in southern Moldova, the Transylvania Plateau and Dobrogea, the sub-Carpathian vineyards in Oltenia (MacNeil, 2001).

Settling experiences. The experimental factors studied were: the irrigation regime - with two graduations (irrigated/ non-irrigated), fertilization - with three graduations of organic fertilization (poultry manure/ha - V₁=0,5kg / V₂=1kg / V₃=1.5kg) and biological material - with four graduations (Fetească Regală / Muscat Ottonel / Sauvignon Blanc / M - control culture). The present paper presents the determinations results on the influence of the three factors on the grape's levels of sugar, acidity and pH.

The sugar content of grapes it has a key role in the quality of wine, since this determines the alcohol content of the wines. For winemaking the sugar content of grapes is probably the most important parameter. Grapes' sugar composition during grape ripening is an important phenomenon that has a great impact on the quantity and quality of alcohol in wine. Sugar level is often used to assess ripeness as an essential indicator, to mark the harvest and to establish the winemaking strategy. Sugars are essential for the fermentation process that will result in alcohol quantity and quality (for a sugar content of 17 g is obtained 1 ° degree alcoholic strength) (Jordão et al., 2015).

Besides sugars, organic acids are the most important biochemicals in grape juice. The organic acids have a big influence on the taste of the wine, colour, pH and stability. The grapes acid composition is influenced by many factors such as variety, micro-climate, irrigation and fertilization. The acid levels in ripe grapes are higher in a cool region than in a warmer region. The acidity is an important parameter for the quality evaluation of juice and wine. The organic acid content of the wine and grape juice is an important ingredient for the pH value of the post-production. Although acidity and pH are related, the correlation is neither direct nor predictable. Due to the biochemical reactions of the organic acids, H⁺ ions are released and they are measured and expressed in terms of pH. Understanding the complex correlation between acidity and pH is crucial for making great wines (Dharmadhikari,1994).

RESULTS AND DISCUSSIONS

In each of the two experimental years, 2017 and 2018, quantitative and qualitative determinations of production were made in order to assess the degree of influence of each of the three experimental factors and their graduations.

The effect of experimental factors on sugar composition 2017-2018

From the data presented in the first chart (Fig. 1) it can be observed that in 2017, the irrigation regime and fertilization does not significantly influence the sugar content in the two cultivars Fetească Regală and Muscat Ottonel.

Irrigation and fertilization had a positive impact on the plant sugar level in Sauvignon Blanc cultivar.

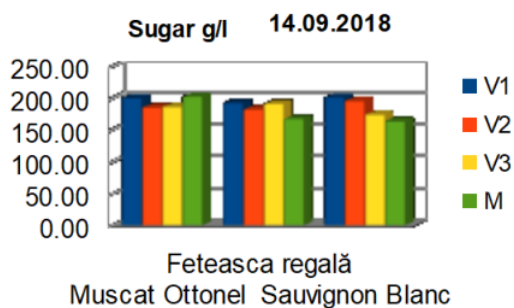
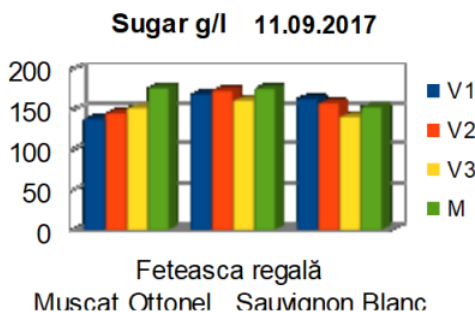


Figure 1. Sugar content in grapes - 2017

Figure2. Sugar content in grapes - 2018

In the second chart (Fig. 2) it can be seen that in 2018, in the conditions of more frequent watering and fertilization there was a significant positive impact on the plant sugar level on the two cultivars of Fetească Regală and Sauvignon Blanc. But the irrigation regime and fertilization does not significantly influence the sugar content in the Muscat Ottonel cultivar. In 2018 the sugar content in the cultivars is higher than in 2017.

The effect of experimental factors on acidity and pH level 2017-2018

In 2017 the regime of irrigation and fertilisation had a positive effect on the acidity level on all three varieties Fetească Regală, Muscat Ottonel and Sauvignon Blanc.

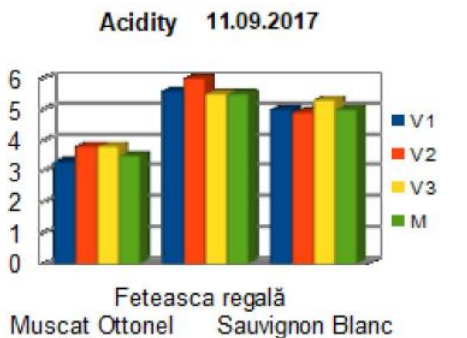


Figure3 Acidity level in grapes - 2017

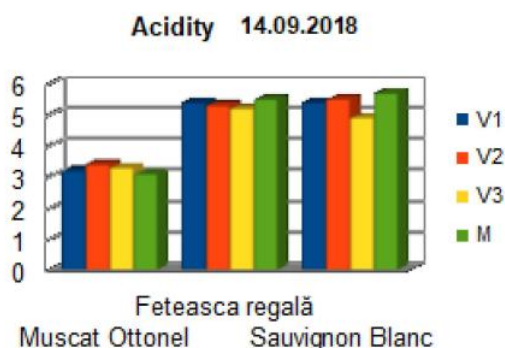


Fig 4. Acidity level in grapes - 2018

From the data presented in Fig. 4 it can be observed that in 2018, the irrigation regime and fertilization does not significantly influence the acidity level in the two cultivars Fetească Regală and Sauvignon Blanc. Irrigation and fertilization had a positive impact on the plant acidity level in Muscat Ottonel cultivar.

From the data presented in Fig. 5 it can be observed that in 2017, the irrigation regime and fertilization has significantly influenced the pH level in V1 of the Muscat Ottonel cultivar and in the V1/V2/V3 of the Sauvignon Blanc cultivar. The conditions of more frequent watering, fertilization had a negative impact on the plant pH level in the cultivar of Fetească Regală. From the data presented in Fig. 6 it can be observed that in 2018, in the conditions of more frequent watering and fertilization there was a significant positive impact on the pH level on the two cultivars of Fetească Regală and Sauvignon Blanc. But the irrigation regime and fertilization had a negative influence on the pH level on (V1/V2) and

a positive influence for V3 in the Muscat Ottonel cultivar.

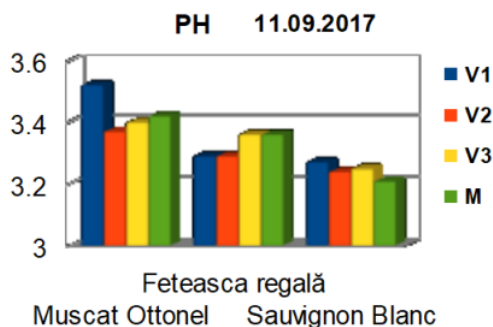


Figure 5. PH value in grapes - 2017

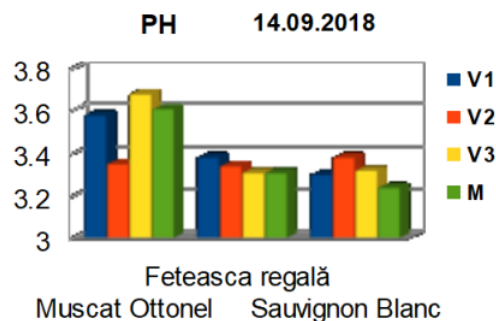


Figure 6 PH value in grapes - 2018

CONCLUSIONS

Following the analysis of the results of the experiments conducted in the Jidvei vineyard, the three tested factors (irrigation regime, the degree of fertilization and the biological material) influenced the sugar content, the acidity and pH value of grapes.

Irrigation had a significant effect on the plant sugar and pH level in 2018, but it had a lower influence on the sugar and pH level in 2017.

The organic fertilization graduation (poultry manure) caused significant increases in sugar and pH levels only in 2018. The fertilisation graduation influence negative the level of sugar in 2017.

In 2017 irrigation and fertilisation had a positive effect on the acidity level on all three cultivars. The conditions of more frequent watering, fertilization had a positive impact on the plant acidity level in Muscat Ottonel cultivar in 2018.

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