

STUDIES ON THE MAIN COMPOSITIONAL PARAMETERS AT SOME ORGANIC WINES

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Abstract

It was analyzed white and red wines from 5 ecological varieties cultivated in the Dragasani vineyard: Cabernet Sauvignon, Novac and Negru de Dragasani – varieties for red wines; Tamaioasa Romaneasca and Sauvignon blanc – varieties for white wines. The production of grapes in the ecological system has been analyzed, as well the sugars and acidity content in the grape. The organic wines were analyzed in terms of chemical characteristics: alcoholic strength (vol% alcohol), residual sugar content (g/L), total acidity (g/L sulfuric acid), total dry extract (g/L), acidity volatile (g/L acetic acid) and glycerol content (g/L). At the analyzed red wines, we also see the content of wines in polyphenols, tannins and anthocyanins. All analyses were performed by the standard methods (Tardea, 1980). The results of the analyzes show that, although the production of organic grapes is much lower than in the conventional system, the compositional parameters recorded higher values, which included wines in superior wines.

Keywords: Cabernet Sauvignon, ecological varieties, polyphenols.

1. INTRODUCTION

Conventional viticulture is one of the agricultural activities that consume the most phytosanitary products (fungicides and pesticides). Indeed, the vine, *Vitis vinifera* is a plant very sensitive to diseases, especially in case of high humidity, conducive to the development of fungi (mildew, powdery mildew, black rot etc). Thus, to ensure production, farmers use a range of pesticides and fertilizers in a preventive and non-curative manner. From an environmental point of view, the use, sometimes non-rational of these chemicals has important consequences. Soil and water pollution, exhaustion of local biodiversity, health risks to grape and wine consumers are just a few examples (Atkin, 2012).

Regarding conventional wine, raw material is not the only source of pollution. It also intervenes in various oenological practices, as well as wine bottling, transport, etc.

In organic viticulture, the basic elements are the preservation of all resources, including soil, the elimination of synthetic fertilizers and pesticides, the exclusion of genetically modified organisms and the use of specific wine culture methods (Remaud et al., 2008).

Obtaining organic wine involves, besides organic raw materials, natural winemaking techniques and the elimination of chemical products from the technological flow of wine (Fotopoulos, 2003).

Chemicals are replaced by those of vegetable, animal or mineral origin, such as arabic gum, gelatin, casein, bentonite, kieselgur etc. (Bernabeu, 2008).

Organic wine is a wine produced in accordance with the principles of organic farming. This is a wine obtained from a production (viticulture) and grape processing process (winemaking) meeting the specifications of the European official rules that control this name.

Obtaining organic wines is done according to the European regulation that specifies the rules for the production, processing, labeling and import of organic products (Guthey and Whiteman, 2009).

The regulation entered into force in 1991 and was updated in 2007 and 2008. From a legislative point of view organic viticulture is based on European regulations 834/2007 and 889/2008 covering all European organic products. Starting in 2012, European regulation (203/2012) is expanding, including organic wine production, which is labeled and marketed under the name of "organic wine".

2. MATERIALS AND METHODS

Our studies were conducted in the vineyard Drăgășani (the wine-growing zone of Muntenia and Oltenia Hills). The biochemical analysis of the obtained organic wines (harvest 2016) was done in the Laboratory of Fermentative Biotechnologies of the Faculty of Biotechnology in Bucharest. The basic chemical parameters aimed the alcoholic strength, determined by the distillation method and expressed in vol% alcohol; content in reducing sugars, determined by Schrool method (g/L sugars); total acidity, determined by titrimetric method, expressed in g/L tartaric acid; volatile acidity, determined with the *Saunier Cazenave* device, expressed in g/L acetic acid; *Tabarié* method for total dry extract (g/L); incineration dry extract method for the ashes; glycerol content, determined by reaction Malaprade (Tardea, 1980; Recueil des methodes internationales d'analyse des vins, 2011).

The polyphenolic composition of wines was judged by the content in polyphenols, tannins and anthocyanins. Analyzes have been carried out in the wine by UV-VIS spectrometry techniques (Giusti M, 2001; Harbertson, J.F et al., 2003). Total content of polyphenols have been determined by spectrophotometric technique (DO_{280}). Tannins have been determined by the Ribereau-Gayon method (1972) and tannins structure after Glories method, based on the following indicators: gelatin index (for astringent tannins); HCl index (for condensed tannins); ethanol index (for the macromolecular association tannins-polysaccharides). These indicators was determined by spectrophotometric method at $\lambda = 280$ nm (Glories Y, 1984). The anthocyanins (were determined by the discoloration technique with SO_2 (Dallas C., 1994).

Wines have been noted: CS – *Cabernet Sauvignon* wine; NV – *Novac* wine; NDR – *Negru de Dragasani* wine; TR – *Tamaioasa Romaneasca* wine; SB – *Sauvignon Blanc* wine.

3. RESULTS AND DISCUSSIONS

Organic grape production is smaller compared to conventional crop production; for example, in a classic system, the *Cabernet Sauvignon* variety records an average production of 10.5 t/ha, and the *Novac* variety in favorable years can reach up to 15 t/ha. Small yields of grapes per hectare are one of the reasons that lead to lower profit (Figure 1).

Small grape production is offset by high sugar concentrations, 2016 being a good year for the accumulation of sugars and phenolic compounds in grapes. Among the varieties, there is *Sauvignon blanc* with a significant sugar content of about 235 g/L (Figure 2). Red wine varieties have slightly lower concentrations but also significant. This difference is since black grapes are harvested in the organic system at a concentration of about 200-210 g/L; reason is that anthocyanins and polyphenols in general have a maximum grape concentration at a certain maturation time, which

coincides with black grapes with this sugar value. Total acidity is normal, slightly higher in white wines.

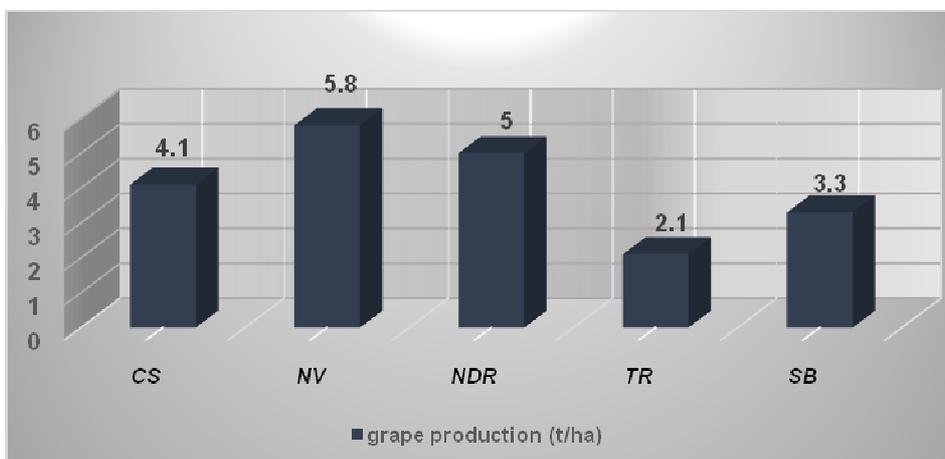


Figure 1. Production of grapes in the ecological varieties (t/ha)

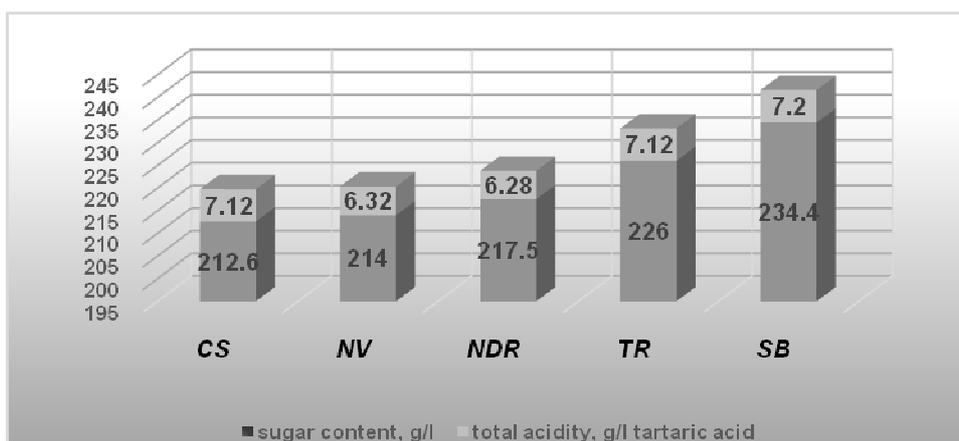


Figure 2. The content of grapes in sugars (g/L) and total acidity of grapes (g/L tartaric acid)

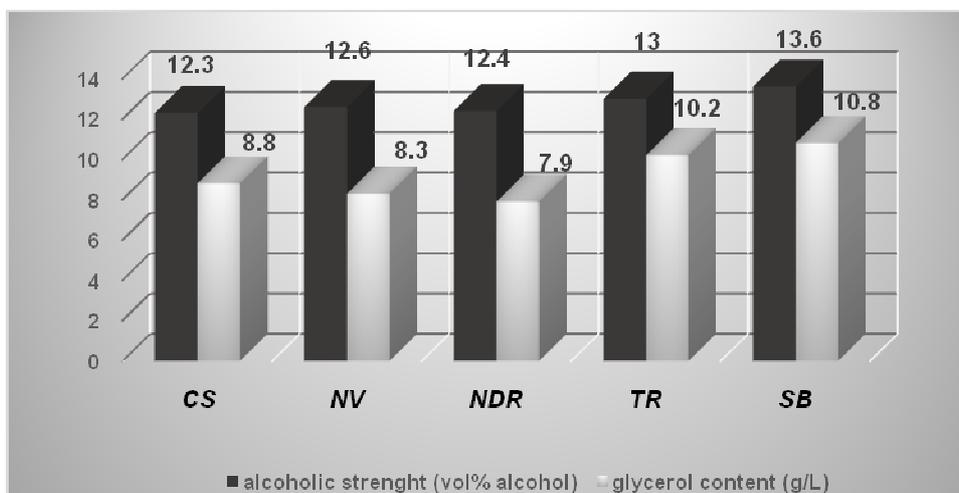


Figure 3. Alcoholic strength (vol% ethyl alcohol) and glycerol content (g/L) of organic wines

Alcoholic strength of wines is a very important parameter for the quality of wines, the alcohol content not only ensures the organoleptic qualities of the wines but also their conservation and biological stability. The organic wines studied showed higher levels of alcoholic strength, a resultant concentration in sugars; the *Sauvignon* variety with a 13.6% vol. strength and the *Tămâioasa Românească* variety with 13% vol. However, all 5 varieties had very good accumulations of sugars and therefore an optimal alcoholic strength (Figure 3). The glycerol content, which correlates positively with the alcoholic strength of wines, shows high values, giving soft and rounded wines.

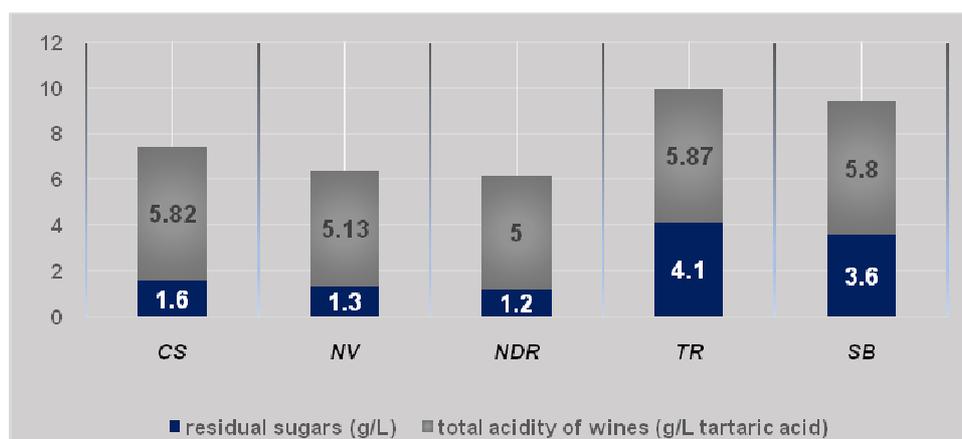


Figure 4. The content of ecological wines in residual sugars (g/L) and total acidity of ecological wines (g/L tartaric acid)

Total acidity has been optimal for all wines; the *Tămâioasa Românească* wine had a higher acidity than the average alcoholic strength, but due to the high alcoholic strength the wine was not unbalanced (Figure 4).

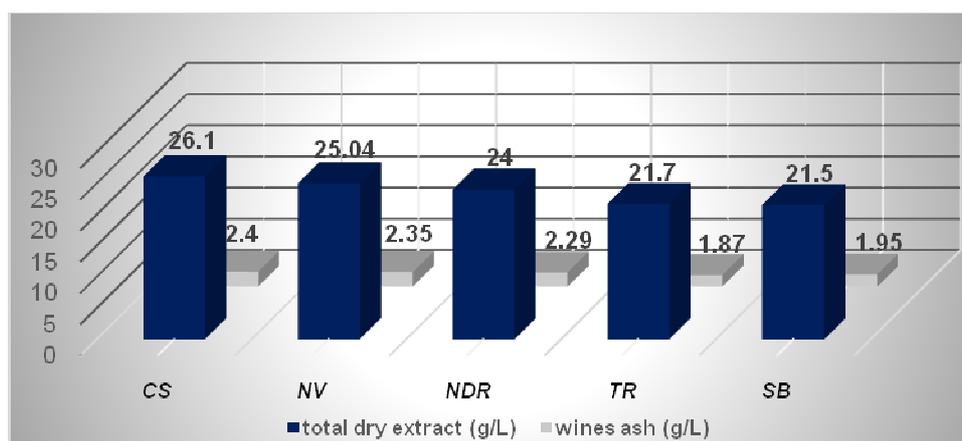


Figure 5. Content of ecological wines in total dry extract (g/L) and wines ash (g/L)

Total dry extraction is another quality parameter for wines, which gives the wine its fullness, extraction and characteristic flavor. The ecological wines studied showed high values of the extract, above the average for most wines (Figure 5).

The content of the wines in mineral substances is expressed by the ash of the wine; mineral substances participate in the taste of the wine, giving a feeling of freshness and flavor. The content

of grapes in mineral substances is higher than that of wine, varying according to the vine variety, Eco pedoclimatic conditions of the vineyard and climatic conditions of the harvest year, harvest health and hygiene, cultural treatments applied to vines, etc. The content of the wines in the ash is normal, the wines presenting normal values, in equilibrium with the values of the total dry extract (Figure 5).

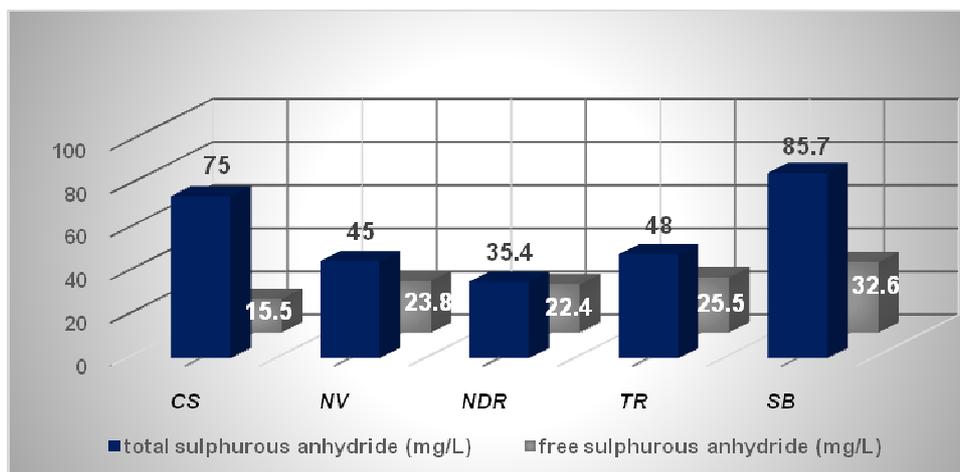


Figure 6. The content of ecological wines in the sulphurous anhydride (SO_2 total and free, mg/L)

In Figure 6 shows the content of wines in sulfur dioxide, a very important analysis for organic wines, since sulfur dioxide is an acceptable substance but in a lower amount. From the graph analysis, the sulfur values in wine are quite low, slightly higher in white wines compared to red ones, which is natural because white wines are treated with higher sulfur dioxide concentrations, being more susceptible to oxidation than the other.

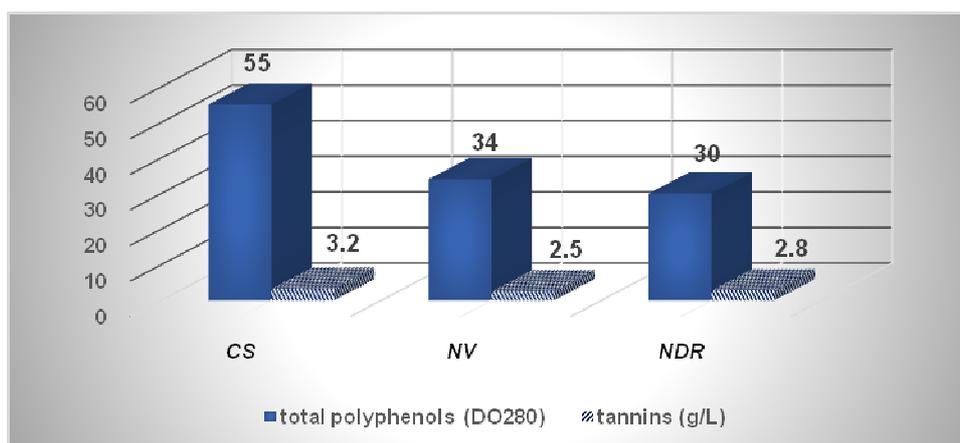


Figure 7. Total content of ecological wines in polyphenols (DO_{280}) and tannins (g/L)

The values of the polyphenolic content of the wines are optimal, specific to the polyphenolic potential of the studied varieties (Mazza G., 1995; Mazza G. et al., 1999). The tannin concentration has slightly lower values compared to the average of the varieties studied, cultivated in the conventional system (Figure 7).

Regarding the structure of tannins, the *Cabernet Sauvignon* wine has a higher proportion of quality tannins (ethanol index) that give to the wine the corpulence and smoothness and a higher proportion of condensed tannins (HCl index).

The *Novac* variety shows the highest concentration of astringent tannins and the smallest quality tannins (Figure 8).

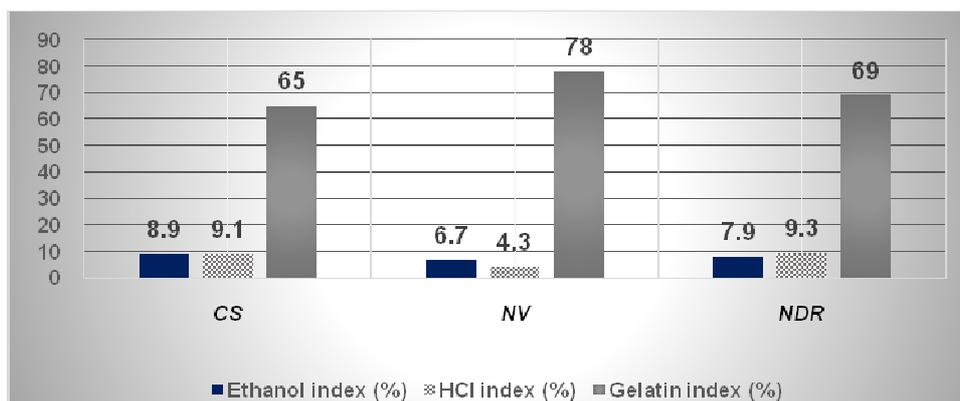


Figure 8. Structure of tannins in red wines (ethanol index, HCl index, gelatin index, %)

The content of anthocyanins is high, over the average of the varieties, the wines are intensely colored, although the content in polyphenols shows normal values (Figure 9).

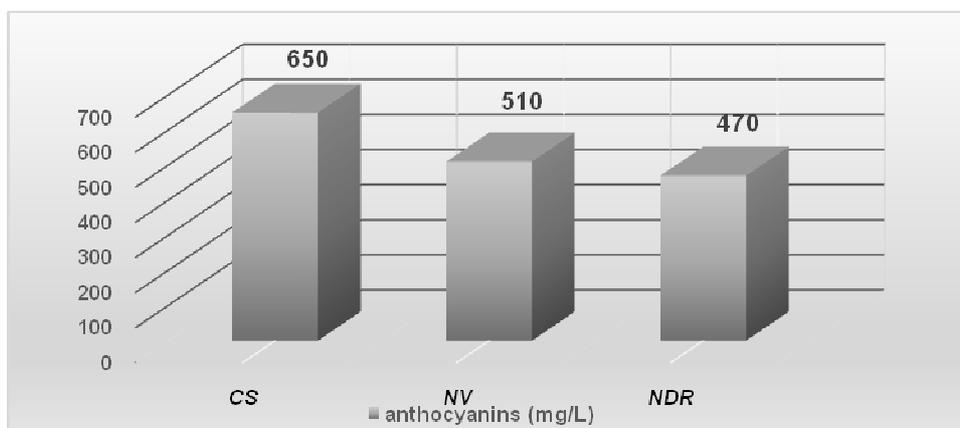


Figure 9. Content of organic red wines in anthocyanins (mg/L)

4. CONCLUSIONS

The ecological wines obtained in the Dragasani vineyard are quality wines, the main composition parameters are falling within the limits allowed for this type of wine.

Although the production of grapes in organic vineyards is much lower compared to that recorded by conventional culture, this is compensated by the high sugar concentration. Year 2016 (study year) was a good year for the accumulation of sugars and phenolic compounds in grapes. Among the varieties is *Sauvignon Blanc* with a significant sugar content of about 235 g/L.

Analysis of sulfur content showed low levels of wine in this substance. SO₂ is accepted in the production of organic wines but in much lower quantities compared to conventional winemaking.

The content of organic wines in polyphenols records normal values for red wines. The tannin concentration has slightly lower values compared to the average of the varieties studied, cultivated

in the conventional system. The content of anthocyanins is quite high, over the average of the varieties, and the wines are intensely colored on the background of a lower tannin content.

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