



UNIVERSITY OF LIFE SCIENCES "KING MIHAI I" FROM  
TIMISOARA  
"YOUNG PEOPLE AND MULTIDISCIPLINARY RESEARCH  
IN APPLIED LIFE SCIENCES"  
section  
"HOTICULTURE, FORESTRY AND BIOTECHNOLOGY"



21-22 November 2024



"Young people and multidisciplinary  
research in applied life sciences"

## Physical and chemical parameters of Sauvignon Blanc dry white wines from different areas in Romania

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Wine holds an important part in the alimentary sector of the global economy, that can be partly explained by its beneficial effects on human health. Its various chemical compounds, like the polyphenols and the flavonoids, not only contribute to exceptional sensorial properties, but also offer antioxidant, anti-inflammatory and anticarcinogenic protection. Wines' chemical composition can be described in terms of physicochemical parameters. The aim of the present study was to evaluate physical and chemical parameters for the Sauvignon Blanc dry white wine originating from vineyards in different regions in Romania (Banat, Transylvania, Muntenia, Moldavia and Dobruja). Our analysis showed significant variations of some physical parameters, such as pH, viscosity, Brix degree and electrical conductivity. Spectrophotometry was used in order to evaluate color intensity and shade at 420 nm, 520 nm and 620 nm, with 420 nm as the predominant wavelength. Our results show significant differences. Samples originating from Banat (Mocrea) and Transsylvania (Jidvei) had a higher viscosity, while the electrical conductivity showed larger values in the Transylvania (Jidvei) and Dobruja (Alira) samples.

### • Introduction



Sauvignon Blanc is one of the main white varieties in the world regarding cultivated surface and wine volume, adapted for various climate and soil conditions. There are over 5000 ha cultivated with this variety in Romania, a country occupying the 7th place in the world regarding grapes and wine production.

The aim of the present study was to investigate certain physicochemical parameters, such as viscosity, density, electrical conductivity, pH, Brix degree and color parameters for Sauvignon Blanc dry white wine, originating from different vineyards in Romania.

### Material and method

#### White Wine Samples

We analyzed 8 Sauvignon Blanc dry white wine samples, originating from different vineyards and different regions in Romania. The wine bottles were bought from local shops and kept at room temperature. We measured the viscosity, density, pH, electrical conductivity and Brix degree for each wine bottle, respectively wine sample, in maximum 4 to 5 hours after opening.

#### Determination of physical and chemical parameters

The physical and chemical parameters were determined according to the International Organization of Vine and Wine (OIV) standardized methods described in the Technical Regulation "Analysis methods in wine production" (HG RM no.708 from 20.09.2011). The relative viscosity was determined with the Ubbelohde viscometer. The amount of dissolved solids was measured in Brix degrees, using a portable refractometer (VWR), allowing measurements within a 0-54% range. The density was determined with the pycnometer standardized method. The pH and the electrical conductivity were determined with a CONSORT 3010 multiparameter analyzer. Conductance measurements were preceded by calibration and distilled water conductance was below 50 µS. A wine's color is completely defined by lightness, cromatics (defined by the dominant wavelength dominant) and purity. The color's intensity is given by convention by the following expression:  $I = A_{420} + A_{520} + A_{620}$ , considering 3 decimals. The color N is given by convention by the following expression:  $N = A_{420}/A_{520}$ , where  $A_{420}$ ,  $A_{520}$  and  $A_{620}$  are wine's absorbance measured by spectrophotometry at 420, 520 and 620 nm with a VIS Metertech spectrophotometer.

To account for repeatability, all measurements were performed three times and the values were introduced in an Excel database. Mean values with standard deviations were computed. In order to test the difference between the mean values of the studied variables, one-way Anova test was used. Pearson correlation coefficient was computed to analyze the linear correlation between the different measured variables. Significance was considered for  $p < 0.05$ .

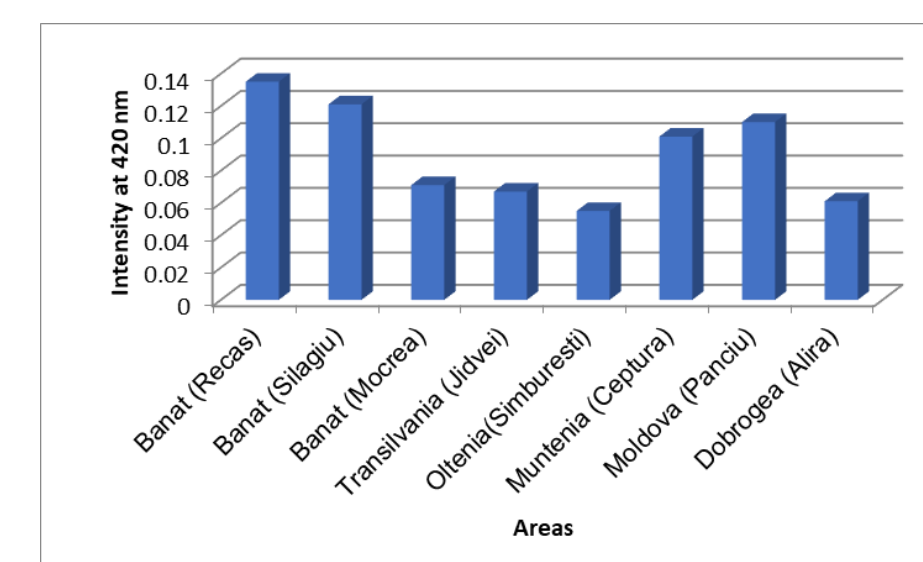
### • Results and discussions

The pH is a fundamental parameter in wine industry. Its value highly influences wine's properties, such as the color, the oxidation or the biological and chemical stability. In our samples, the pH varied between 3.07 and 3.29. The lowest value was measured in the wine originating from the Silagiu vineyards (Banat) and the highest in the one from Alira vineyards (Dobrogea), reaching 3.29. Regarding the alcohol content, the viscosity and the Brix degree, we found a stronger correlation for the wines originating from the Banat region. A previous study has found a viscosity of approximately 1.40 mPa·s for a commercial wine with a 12% alcohol content at 25°C [16]. For the dry Sauvignon Blanc there were reported a mean dynamic viscosity of 1.225 mPa·s at 25°C and 6.95 Brix degrees for a 13.75% alcohol content [7]. Temperature is a physical parameter that influences viscosity in an inversely proportional relationship. Our measurements were performed at 20°C and wine's viscosity ranged between 1.5272 mPa·s for the sample originating from Recas vineyards and 1.6359 mPa·s for the one from Mocrea vineyards, situated also in the Banat region. Concerning viscosity, there are significant differences between the samples originating from different geographical regions ( $p < 0.05$ ), as well as between samples originating from different cellars in the same region, like the Banat one ( $p = 0.0008$ ). Regarding the electrical conductivity, the highest value was obtained for the sample S8, from Alira cellar, in the Dobruja region (1.69 mS/cm) and the lowest value, of 1.17 mS/cm, in the sample from Panciu cellar, in the Moldavia region. The electrical conductance is an indicator of the salt content in the wine. There are significant differences between the wine samples originating from different geographical regions ( $p < 0.05$ ), but also between wine samples originating from the same region, like Banat ( $p = 0.004$ ). The highest density was found in the wine originating from the Recas vineyards (Banat), while the lowest, in the sample form the Moldavia region (Panciu).

Pearson correlation coefficient matrix between values of viscosity, Brix degree, and alcohol content measurements for Banat's wine samples

|             | EtOH(%)  | Brix degree | Viscosity |
|-------------|----------|-------------|-----------|
| EtOH(%)     | 1        |             |           |
| Brix degree | 0.969315 | 1           |           |
| Viscosity   | 0.968623 | 0.877806    | 1         |

The color is one of the most important available visual features, offering a considerable amount of relevant information. Wine color is defined completely by the lightness, the chromatic and the purity. The chromatic is represented by the dominant wavelength (which characterizes the color) and by the purity of the color. The dominant wavelength in the description of wine's chromatic is 420 nm.



Variation of the absorbance (A) at 420 nm

### • Conclusions

The results of our study have found differences in the chemical composition of the wines originating from different geographical regions, shown by the variations of the physical parameters that we investigated. These parameters can be used in the evaluation of the wine quality (especially the viscosity). Our study indicates differences in the dynamic viscosities measured for the commercial wines. The Sauvignon Blanc originating from Banat (Mocrea) and Transylvania (Jidvei) showed higher viscosity and pH. We also found positive correlations with chemical parameters, such as the pH. There are only a few studies in the literature to investigate the association between the pH and the viscosities of wines, which could become a future direction of investigation.