

EVALUATION OF SOME WHITE WINES' DYNAMIC VISCOSITY AND CORRELATION WITH OTHER PHYSICAL PARAMETERS

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Abstract

The study sought to evaluate the dynamic viscosity of Chardonnay and Sauvignon Blanc dry and semi dry wines and to correlate it with other physical parameters. The samples originated from vineyards situated in different geographical regions of Romania (Banat, Transylvania, Oltenia, Muntenia, Moldavia and Dobruđja). A supplementary sample was introduced, a blending variety originating from the Cotesti vineyard (Moldavia region). Based on previous studies in the literature, the wine samples were considered to possess Newtonian fluid characteristics. Therefore, the wines' dynamic viscosity was computed using a mathematical formula, using an indirect method. The dynamic viscosity of the dry Chardonnay wine at 20°C ranged between 1.5446 mPa·s (ISSA-Transylvania Hills) and 1.6602 mPa·s (Tarnave Jidvei region - Transylvania), while the one of the semidry Chardonnay varied from 1.6756 mPa·s (Tarnave Jidvei region - Transylvania) to 1.5344 mPa·s (Ovidiu-Dobruđja). The blending variety's dynamic viscosity had a mean value of 1.5627 mPa·s. The pH of the samples from the two varieties ranged between 2.97 (Dobruđja) and 3.46 (Banat), while for the blending variety we obtained the lowest value, with the exception of the dry Chardonnay originating in Dobruđja.

Key words: °Brix, colour, pH, viscosity, white wine.

INTRODUCTION

Vine cultivation on Romanian territories is associated with a strong tradition, which gets lost in the mist of time. Recent tendencies of consumer preferences are more likely oriented towards white wine. Some of these varieties are rich in aromatic compounds, offering to the wines an intense and specific flavour and high gustatory and olfactory qualities. An example of such a variety is the Sauvignon Blanc. On the other hand, there are white varieties with a lower content of aromatic compounds, but in which, the chemical composition of the skin and core offers during the maturation original and interesting organoleptic properties. Such an example is the Chardonnay, a variety well appreciated by select consumers.

Dry and semidry varieties are characterized by an increased content of vitamins and minerals, natural antioxidants and anti-inflammatory

substances. Usually, they are moderately alcoholised and much flavoured.

The Sauvignon Blanc is renowned for its fresh citric, melon and gooseberries flavours. The Chardonnay, considered, a sovereign among the white wines, is recognized by it's a cheerful and bright yellow-gold colour. It is a versatile variety, with green apple, peach and citric flavours.

Originating from Burgundy, Chardonnay is the most popular vine variety in the world. Its cultivation area is spread from New Zealand to South Africa and serves to the preparation of many sparkling wines, including the renowned Champagne. It is a vigorous, equilibrated and malleable variety, that very easily takes over the characteristics of the terroirs and of the barrels in which it is kept. Therefore, it is considered an “author wine”, with the ability to reflect the personality of the producer. The variety is rich in an important number of chemical substances,

such as alcohols, organic acids, esters, aldehydes, acetals and phenolic compounds. Previous studies have identified the concentrations of the most important non-volatile organic acids: tartaric acid (2-6 g/l), malic acid (0.1-5 g/l), citric acid (0.1-0.8 g/l), gluconic acid (0.1-2 g/l), galacturonic acid (0.5-2 g/l), succinic acid (0.5-1.5 g/l) and lactic acid (0.1-0.5 g/l). The number and variety of these acids are responsible of the freshness and fruity character of the Chardonnay wine. They also serve as the main preservers of the wine's flavour (Țârdea et al., 2000).

The pH is an important biophysical factor, closely connected to the wine's sensorial properties and colour. Along with the acidity, it plays an important role in the preservation of the wine's flavour, most particularly in its sourness and astringency.

It has been found that climatic changes affect the anthocyanins, substances with an important impact on wine's colour. Temperatures above 30°C are associated with lower concentrations of these compounds. The pH can affect the equilibrium between the different types of anthocyanins and lead to polymerization or condensation reactions of the pigments (Claire Payan et al., 2023).

The blend between the Sauvignon Blanc and the Chardonnay is an excellent dry, white wine, with a golden colour with green reflexions, perfectly complemented by rich floral and fruity flavours (elderflower, citrus, pineapple and grapefruit). This wine combines the characteristics of two special varieties: the queen and king of the white wines.

At 5°C, the wines behave as a non-Newtonian fluid (Trávníček et al., 2016), whereas at temperatures above 10°C they have the characteristics of a Newtonian fluid - with a linear relationship between the shear stress and deformation (Košmerl et al., 2000; Neto et al.; 2015; Yanniotis et al., 2005).

The viscosity is the property of the fluids to oppose resistance to flow, as result of the mechanical interaction between the constituent particles. For the fluids flowing in laminar regimen, the friction force (F) between the sheets of liquid is proportional with the contact surface between the sheets (S) and the speed gradient dv/dx . The expression of the friction force is provided by Newton's formula:

$$F = \eta \cdot S \cdot \frac{dv}{dx},$$

where: η = the dynamic viscosity coefficient.

If it remains constant and independent of the speed gradient dv/dx , the fluid is called newtonian (non-associated liquids); otherwise the liquid is considered non-newtonian (Neagu et al., 2024).

There is a limited number of studies in the literature to examine the dynamic viscosity of the dry wines. The viscosity of a wine tends to increase with its content of sugar, polysaccharides and aminoacids (Burns & Noble, 1986; Gawel et al., 2016; Jones et al., 2008; Vidal et al., 2004).

The aim of the present study was to investigate the viscosity of dry and semidry varieties of Sauvignon Blanc and Chardonnay, as well as of a blend sample of the two and to evaluate its correlation with other physical and chemical parameters, such as the density, electrical conductivity, pH, °Brix, colour intensity, chromatics, coloration, etc.

MATERIALS AND METHODS

White Wine Samples

There were studied a total of 22 white wine samples, as follows: 9 samples of Chardonnay dry white wine, 5 samples of Chardonnay semidry white wine, 7 samples of Sauvignon Blanc semidry white wine and one sample of Sauvignon Blanc Chardonnay blend white wine. The samples originated from different vineyards in the Banat, Transylvania, Muntenia, Moldavia and Dobruja regions. The blend sample included in the study originated from the Cotesti vineyard (Moldavia).

The wine bottles were bought from local stores and kept at room temperature.

All the samples consisted of wines produced out of grapes harvested in 2023. For each wine sample there were determined the viscosity. The density, the pH, the electrical conductivity and °Brix were measured within 4-5 hours after opening the wine bottle.

Table 1 depicts the geographical region of origin and the alcohol content of the investigated white wines.

Table 1. The list of the investigated white wine samples, specifying the geographical region originating wine cellar, as well as the alcohol content corresponding to each sample

Group	Geographical Region	Sample Details	Wine cellar	EtOH (%)	Vol
Dry CHARDONNAY	Transylvania	S1	ISSA-	12.5	
	Transylvania	S2	VILLA VINEA	13	
	Transylvania	S3	JIDVEI	12.5	
	Oltenia	S4	SIMBURESTI	13	
	Moldavia	S5	BECIUL DOMNESC	13	
	Muntenia	S6	PRINCIAR TOHANI	13	
	Banat	S7	RECAS SOLE	12.5	
	Dobrudja	S8	ANA MARIA	12.5	
	Muntenia	S9	PRAHOVA VALLEY	13	
Semidry CHARDONNAY	Transylvania	S10	JIDVEI	13	
	Oltenia	S11	SIMBUREL DE OLT	13	
	Muntenia	S12	ALAI	12.5	
	Dobrudja	S13	OVIDIU	13.5	
	Moldavia	S14	HERMEZIU- RĂVASE	12	
Semidry SAUVIGNON BLANC	Transylvania	S15	JIDVEI	13.5	
	Moldavia	S16	BECIUL DOMNESC	13	
	Muntenia	S17	TOHANI	12.5	
	Muntenia	S18	BUDUREASCA	13.5	
	Oltenia	S19	CASTEL VINARTE	12	
	Dobrudja	S20	DOMENILE OSTROV	12.5	
	Banat	S21	CASTEL HUNIADE-RECAS	12.5	
CHARDONNAY-SAUVIGNON BLANC blend	Moldavia	S22	TATA si FIUL	-	

Physical and chemical parameters measurement

The physical and chemical parameters were measured according to the standardized and OIV methods recommended by the Technical Regulation “Analysis methods in wine production” (HG RM no 708 of 20.09.2011), the research was conducted in the Biophysics laboratories within the University of Medicine and Pharmacy “Victor Babes”, Timisoara.

The determination of the absolute viscosity coefficient is associated with practical difficulties, therefore it is accepted the use of the relative viscosity coefficients (η_{rel}). The relative viscosity is defined as the ratio between the viscosity of the liquid to be determined and the viscosity coefficient of the reference liquid.

The formula enabling the computation of the dynamic viscosity coefficient is:

$$\eta = \eta_0 \cdot \frac{t \cdot \rho}{t_0 \cdot \rho_0}$$

where, t = the flowing time for the liquid to be determined; ρ = the density of the liquid to be determined at a given temperature; t_0 = the flowing time of the distilled water in seconds; ρ_0 = distilled water density at a given temperature; η_0 = water viscosity at given density and temperature. ρ_0 and η_0 are provided by STAS tables.

The relative viscosity was determined with the Ubbelohde viscometer at 20°C.

The Brix degree was measured with a portable refractometer (VWR) allowing measurements within an interval between 0-54%.

The density of the wine samples was determined by the pycnometric standardized method (Neagu et al., 2024). There were used 10 ml pycnometers and an analytical balance with a 0.001 g accuracy (Sartorius TEI53 S).

The pH measurements- an important feature for the vinification process- were carried out using the analytical methods recommended by the International Organisation of Vine and Wine (OIV) (OIV, 2012).

The pH, as well as the electrical conductivity, were determined with the CONSORT 3010 multiparametric analyser. The measurements were preceded by an initial calibration. The conductance of the distilled water was checked, with an upper limit of 50 μ S.

A wine's colour is completely defined by 3 parameters: brightness, cromatic (defined as the dominant wavelength) and purity. The intensity of the colour (I) is given, by convention, by the following expression: $I = A_{420} + A_{520} + A_{620}$, using 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} represent the absorbance of the wine measured by spectrophotometry at the following wavelengths: 420 nm, 520 nm and 620 nm. The spectrophotometry measurements were carried

out with a VIS Metertech spectrophotometer. (Neagu et al., 2024). For an improved accuracy, all measurements were performed three times and the standard deviation (SD) was computed for each wine sample. The analysis of variance (ANOVA) was used in order to test for the differences between the samples. The statistical significance was set at $p<0.05$.

RESULTS AND DISCUSSIONS

The measurements results for the dry and semidry Chardonnay are presented in Table 2 and respectively in Table 3. The values for the semidry Sauvignon Blanc and for the Chardonnay-Sauvignon Blanc blend can be found in Table 4, respectively in Table 5.

Table 2. Physical and chemical parameters of Chardonnay dry white wines varieties (mean value $\pm$ SD)

Sample no	Areas	pH	Brix degree	Viscosity (mPa·s)	Density at 20°C	Electrical conductivity (mS/cm)	Wine color (A420nm)	I	Color (N)
S1	Transylvania (ISSA)	3.31	8.3	1.5446 $\pm$ 0.002	0.9915	1.76 $\pm$ 0.041	0.096	0.11	8.72
S2	Transylvania (VILLA VINEA)	3.24	9.5	1.6367 $\pm$ 0.014	0.9963	1.63 $\pm$ 0.049	0.108	0.126	6.75
S3	Transylvania (JIDVEI)	3.42	9.9	1.6602 $\pm$ 0.003	0.9952	1.67 $\pm$ 0.02	0.096	0.106	9.6
S4	Oltenia (SIMBURESTI)	3.2	9.3	1.6261 $\pm$ 0.008	0.9962	1.67 $\pm$ 0.01	0.087	0.107	7.9
S5	Moldavia (BECIUL DOMNESC)	3.16	8.6	1.6235 $\pm$ 0.003	0.9947	1.56 $\pm$ 0.02	0.09	0.118	8.5
S6	Muntenia (PRINCIAR TOHANI)	3.26	10.5	1.6345 $\pm$ 0.009	0.9968	1.57 $\pm$ 0.015	0.123	0.174	4.55
S7	Banat (RECAS SOLE)	3.46	7.3	1.5460 $\pm$ 0.006	0.9931	1.91 $\pm$ 0.07	0.118	0.14	5.61
S8	Dobrudja (ANA MARIA)	2.97	7.2	1.6101 $\pm$ 0.002	0.9905	1.32 $\pm$ 0.04	0.114	0.129	8.14
S9	Muntenia (PRAHOVA VALLEY)	3.35	7.6	1.6305 $\pm$ 0.001	0.9925	1.55 $\pm$ 0.01	0.25	0.28	11.36

Table 3. Physical and chemical parameters of Chardonnay semi dry white wines varieties (mean value $\pm$ SD)

Sample no	Areas	pH	Brix degree	Viscosity (mPa·s)	Density at 20°C	Electrical conductivity (mS/cm)	Wine color (A420nm)	I	Color (N)
S10	Transylvania (JIDVEI)	3.43	8	1.6756 $\pm$ 0.001	0.9932	1.67 $\pm$ 0.0321	0.101	0.119	6.31
S11	Oltenia (SIMBUREL DE OLT)	3.18	7.5	1.6230 $\pm$ 0.001	0.9933	1.36 $\pm$ 0.0009	0.101	0.135	4.04
S12	Muntenia (ALAI)	3.37	7.6	1.6197 $\pm$ 0.007	0.9954	1.82 $\pm$ 0.0009	0.099	0.15	3.66
S13	Dobruja (OVIDIU)	3.4	7.8	1.5344 $\pm$ 0.003	0.9031	1.47 $\pm$ 0.0014	0.089	0.091	8.9
S14	Moldavia (HERMEZIU-RAVASE)	3.56	7.9	1.6229 $\pm$ 0.021	0.9997	1.96 $\pm$ 0.0550	0.11	0.14	5

Table 4. Physical and chemical parameters of Sauvignon semi dry white wines varieties (mean value $\pm$ SD)

Sample no	Areas	pH	Brix degree	Viscosity (mPa·s)	Density at 20°C	Electrical conductivity (mS/cm)	Wine color (A420nm)	I	Color (N)
S15	Transylvania (JIDVEI)	3.28	7.8	1.6237 $\pm$ 0.002	0.9899	1.41 $\pm$ 0.0818	0.068	0.079	17
S16	Moldavia (BECIUL DOMNESC)	3.26	7.7	1.6496 $\pm$ 0.004	0.9919	1.5 $\pm$ 0.017	0.054	0.066	5.4
S17	Muntenia (TOHANI)	3.52	7.9	1.62581 $\pm$ 0.004	0.9938	1.85 $\pm$ 0.058	0.112	0.128	9.33
S18	Muntenia (BUDUREASCA)	2.88	8	1.6607 $\pm$ 0.004	0.9921	1.08 $\pm$ 0.028	0.055	0.064	18.3
S19	Oltenia (CASTEL VINARTE)	3.02	7.5	1.6157 $\pm$ 0.005	0.9918	1.37 $\pm$ 0.032	0.052	0.059	26
S20	Dobrudja (DOMENIILE OSTROV)	3.17	7.8	1.6027 $\pm$ 0.002	0.993416	1.47 $\pm$ 0.032	0.115	0.13	9.58
S21	Banat (CASTEL HUNIADE-RECAS)	3.18	7.3	1.5612 $\pm$ 0.013	0.997009	1.32 $\pm$ 0.011	0.07	0.087	5.38

Table 5. Physical and chemical parameters of the blend Sauvignon-Chardonnay white wines variety (mean value $\pm$ SD)

Sample no	Areas	pH	Brix degree	Viscosity (mPa·s)	Density at 20°C	Electrical conductivity (mS/cm)	Wine color (A420nm)	I	Color (N)
S22	Moldavia (TATA si FIUL)	3.01	7.4	1.5627 $\pm$ 0.006	0.9737	1.47 $\pm$ 0.025	0.12	0.15	5.45

The density of a solid, liquid or gas is defined as the ration between its mass and volume, therefore it represents the mass of the volume unit. Since the volume of any given object varies with its temperature, the density will change accordingly. Hence, when determining the density, the temperature must be taken into account.

It is aknowledged that the density of the wine is directly influenced by the sugar content in the sample and that the alcohol has a lower density by comparison to the water. Therefore, the specific density of the wine is 0.8 times lower- or with 20% lower. As the sugar in the grape must is consumed, transforming it into alcohol, the density decreases. The fermentation completed, the specific weight of the wine should be smaller or approximately equal to 1 g/cm³ (Pickering et al., 1998, Cretescu et al., 2024).

Among the dry Chardonnay, the smallest density- 0.9905 g/cm³- was recorded in the wine originating form the Ana Maria cellar (Dobrudja) and the highest- 0.9963 g/cm³- in the wine from Villa Vinea wine cellar (Transylvania). The lowest density in the semidry Chardonnay was 0.9031 g/cm³, in a wine originating from Ovidiu cellar (Dobrudja), while the highest, 0.9997 g/cm³, was found in a wine from Hermeziu-Ravase (Moldavia).

The wine originating from Jidvei wine cellar (Transylvania) had the lowest density (0.9899 g/cm³) among the semidry Sauvignon Blanc. In the same cathegory the highest density was obtained for a wine originating from Recas cellar (Banat), reaching a value of 0.9970 g/cm³. In a previous study, our reasearch team obtained the highest density also for a wine originating from the Recas cellar (Banat), a dry Sauvignon Blanc (Cretescu et al., 2024).

For the blend Chardonnay-Sauvignon Blanc, developped by the Tata si Fiul cellar (Moldavia) it was found a 0.9737 g/cm³density.

Usually, the acidic or basic character of any solution is described in terms of hydronium ions concentration, converted in the pH scale. The

pH of the wine influences not only the final flavour of the product, but also colour, the oxidation and its chemical stability. Therefore, the determination of the pH becomes essential and must be considered a key parameter in appreciating the quality of a given wine.

There are several studies finding for the pH of the wine rather large limits, between 2.8 and 4. However, most of the producers try to maintain the pH of the white wines between 3 and 3.5 and the one of the red wines between 3.3 and 3.8. The pH of a wine is correlated with its content of acids. A higher concentration of acids is associated with a smaller pH value and vice versa. A pH between 2.97 and 3.56 is considered ideal for a wine (Jacobson, 2006; Trávníček et al., 2016).

When monitoring a wine for longer periods of time, extreme values of pH are associated with a deterioration of its qualities. Higher pH values affect a wine's stability, are associated with a loss of its complexity and sometimes with a murine odour. On another hand, lower values of the pH can affect the colour of the red wine, as well as the fullness of the flavour. (Schneider, 2004)

In the dry Chardonnay cathegory the pH variates from 2.97, in the wine originating from the Ana Maria cellar (Dobrudja) up to 3.46 in the one from Recas cellar (Banat). For the semidry Chardonnay the pH ranged from 3.18 for the wine originating in Oltenia to 3.56 for the one developpped at Hermeziu cellar (Moldavia). The Sauvignon Blanc wines had the pH between 2.88 and 3.55.

The Chardonnay-Sauvignon Blanc blend wine, from the Tata si Fiul cellar (Moldavia) had a pH of 3.01. When comparing the pH values of the semidry Sauvignon Blanc wines originating from different regions in the country, the differences are not statistically significant ($p = 0.6762$). On the contrary, the differences between the dry Chardonnay varieties are very significant ($p < 0.001$).

The alcohol content is influenced by several factors, such as the maturity of the grapes at

harvest, the processing technology or the fermentation technology (Kaltzin, 2012).

Previous research has found a connection between the sugar content of the grapes at harvest and the quality of the wine (Burg et al., 2013). A wine is considered strong when the alcohol content ranges between 12% and 14%. A high carbohydrates content, offered offered by quality grapes, ensures a fermentation without temperature regulation, with a high alcohol content, usually above 13% (Trávníček et al., 2016).

The dynamic viscosity for commercial Chardonnay dry wines at 20°C ranged from 1.5446 mPa·s to 1.6602 mPa·s and from 1.5344 mPa·s to 1.6756 mPa·s for the Chardonnay semidry wines and from 1.5612 mPa·s to 1.6607 mPa·s for the Sauvignon semidry white wines.

When analysing viscosity for the dry Chardonnay, the differences are significant between the samples originating from different geographical regions ($p = 0.0342$), as well as between samples originating from different cellars in the same region. Such an example is offered by the wines developed in Transylvania ($p < 0.001$). A similar situation is present for the semidry Chardonnay and Sauvignon Blanc, with significant differences in the dynamic viscosity between the wines originating from from different geographic regions ($p < 0.001$).

Previous research has found a viscosity of approximately 1.4 mPa·s in a commercial wine with 12% alcohol content at 25°C (Pickering et al., 1998).

Danner et al. (2019) reported a dynamic viscosity between 1.448 mPa·s and 1.529 mPa·s for a dry Chardonnay wine at 20°C. Christelle Abou Nader et al., 2017, reported a mean dynamic viscosity of 1.225 mPa·s for a dry Sauvignon Blanc with 6.95°Brix and a 13.75% alcohol content, at 25°C.

The present study complements previous research suggesting that viscosity is an important feature for tasters. The variation across the different varieties and geographical regions could likely become a criterion in the discriminatory process, as well as in the evaluation of the quality.

Table 6 showcases the Pearson correlation coefficients between viscosity, Brix degrees, pH and the alcohol content for the dry Chardonnay samples.

Table 6. Pearson correlation coefficient matrix between values of, viscosity, Brix degree, pH and alcohol content measurements for all wine samples of Chardonnay dry wine

	EtOH (%)	pH	°Brix	Viscosity
EtOH (%)	1			
pH	0.36425	1		
°Brix	-0.1141	0.132992	1	
Viscosity	-0.20444	-0.19208	0.593691	1

The Pearson correlation coefficients between the physical parameters for the semidry Chardonnay analyzed in the present study are presented in Table 7.

Table 7. Pearson correlation coefficient matrix between values of, viscosity, Brix degree, pH and alcohol content measurements for all wine samples of Chardonnay semidry wine

	EtOH (%)	pH	°Brix	Viscosity
EtOH (%)	1			
pH	-0.50253	1		
°Brix	-0.08459	0.806063	1	
Viscosity	-0.43595	0.043109	0.227937	1

Table 8 illustrates the Pearson correlation coefficients between the viscosity, Brix degrees, pH and alcohol content for semidry Sauvignon Blanc samples.

Table 8. Pearson correlation coefficient matrix between values of, viscosity, Brix degree, pH and alcohol content measurements for all the semidry Sauvignon Blanc samples

	EtOH (%)	pH	°Brix	Viscosity
EtOH (%)	1			
pH	-0.13651	1		
°Brix	0.574979	0.062275	1	
Viscosity	0.555702	-0.16752	0.773302	1

There can be observed a correlation between the alcohol content, the viscosity and the Brix degrees. It can be explained by the connection between the viscosity and the sugar content and the and the composition of the wine, illustrated by the Brix degrees. It is also justified by the common production techniques used for the commercial wines.

Table 9 shows the mean values of the pH, viscosity and Brix degrees for the dry Chardonnay, the semidry Chardonnay, the

semidry Sauvignon Blanc and the blend Chardonnay-Sauvignon Blanc wines originating from Moldavia. There can be observed significant differences between all the 4 categories of wines regarding the viscosity, the pH and the Brix degrees ($p<0.001$).

Table 9. Mean values for the pH, viscosity and Brix degrees for the wines originating from the Moldavia geographical region

Wine biophysical parameter	Dry Chardonnay	Semidry Chardonnay	Semidry Sauvignon Blanc	Chardonnay -Sauvignon Blanc blend
pH	3.16	3.56	3.26	3.01
Viscosity	1.6235	1.6229	1.6496	1.5627
°Brix	8.6	7.9	7.7	7.4

Regarding the electrical conductivity of the dry Chardonnay, the highest value was obtained for the S7 sample originating from Banat, 1.91 mS. For the semidry Chardonnay, the largest value was present in the S14 sample, from Moldavia, reaching a value of 1.96 mS. Lower values were recorded in the semidry Sauvignon Blanc, with a maximum of 1.85 mS for the S17 sample, originating from Muntenia. The blend Chardonnay-Sauvignon Blanc from Moldavia had a mean electrical conductivity of 1.47 mS. The electrical conductivity of the dry and semidry Chardonnay samples showed significant differences according to the geographical region ($p<0.001$). By the contrary, the differences were didn't reach the statistical significance for the semidry Sauvignon Blanc ($p = 0.9409$). Each cellar can use different wine production techniques, resulting in individual characteristics of their wines. However, a common feature of the Chardonnay, as well as of the Sauvignon Blanc is their light yellow colour -extending to a darker yellow, when the wine is kept in oak barrels, the intense aromatic concentration and the increased acidity (Lund et al., 2009; Peirano-Bolelli et al., 2022; Cretescu et al., 2024). The colour is one of the most important visual features of a wine, offering a large amount of relevant information. It is completely defined by the brightness, the chromatic and the purity. The chromatic is given by the dominant wavelength (which characterizes the colour) and by the purity of the colour. The dominant wavelength for the chromatic of the wine is 420 nm.

It is known that the Sauvignon Blanc has the highest intensity of the colour, while the Chardonnay has the most profound one. In addition, their colours are different lemon shades, from green lemon in the Sauvignon Blanc to average lemon to bright golden in the Chardonnay.

For the dry Chardonnay the highest intensity was obtained in the wine sample originating from the Princiar Tohani cellar (Moldavia) – 0.174. For the semidry Chardonnay the maximum was recorded in the sample from the Hermeziu-Ravase cellar (Moldavia), 0.140. smaller values were obtained in the semidry Sauvignon Blanc samples, with a maximum of 0.130 in the sample originating from the Domeniile Ostrov cellar (Dobrudja). The blend Chardonnay-Sauvignon Blanc had an intensity of 0.150.

CONCLUSIONS

The present study has found significant differences between the dry Chardonnay, semidry Chardonnay, semidry semidry Sauvignon Blanc and Chardonnay-Sauvignon Blanc samples regarding a number of biophysical parameters, such as the viscosity, the pH, the °Brix, etc. these differences illustrate the variation in their chemical composition. The dynamic viscosity for commercial Chardonnay dry wines at 20°C ranged from 1.5446 mPa·s to 1.6602mPa·s and from 1.5344 mPa·s to 1.6756 mPa·s for the Chardonnay semidry wines and from 1.5612 mPa·s to 1.6607 mPa·s for the Sauvignon semidry white wines. Regarding the dynamic viscosity, there are very significant differences between the samples originating from various geographical regions ($p<0.0001$). The alcohol content, the °Brix and the viscosity are correlated, illustrating the dependence to the chemical composition and the similar production techniques of the commercial wines.

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