STUDIES ON THE ORGANOLEPTIC CHARACTERISTICS OF SOME ROSÉ WINES FROM STRUNGA WINERY

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Abstract

Climatic conditions, genotype and appropriate technology are very important for successful wine cultivation and obtaining quality products. To describe a wine-growing climatic zone, climatic parameters were used, which show the binary and ternary interaction between climatic conditions: light, temperature, humidity, precipitation and solar radiation. Through current research, it was aimed to highlight the influence of climatic conditions on the organoleptic characteristics of rosé wines from the Fetească neagră and Busuioacă de Bohotin grapes obtained during the years 2020-2021. This study includes the description of the Strunga viticultural center, the technological flow of obtaining the chosen wines, results of physical-chemical analyzes and sensory characteristics of wines varieties respectively V1 and V2, V3 and V4 .This two wine variants from 2020 have a lower acidity but at the same time a higher alcohol concentration compared to those from the 2021 harvest. The results of the research in terms of sensory evaluation revealed that both variants of the year 2021 were the most appreciated for most of the characteristics.

Key words: Fetească neagra, Busuioacă de Bohotin, climatic conditions, quality, *terroir*

Wine is a significant example of human ingenuity, even if it is not necessary for our existence. When we talk about the many repercussions of climate change, wine may not be the first thing you think of, but vineyards around the world are already experiencing disruption. Solar radiation, light intensity, temperature, soil and air humidity, wind movement, and quality are the main factors used to assess the climate of a pogdoria. Overall, while the significance of rosé wine to humanity may not be earth-shattering, it is undoubtedly an important part of human culture and history and one that impacts our social, economic, and natural well-being.

The basic environment of the vineyards has remained fairly consistent over the millennia, being dramatically altered only by extreme changes in the world's climate. Such variations in wine-growing regions as well as changes in vine phenology have been caused by such changes occurring as temperature increases or decreases. (Malheiro A.C. *et al*, 2010; Santos J.A. *et al*, 2012).

One of the most commonly used but least understood winemaking words is terroir. When this idea was applied to wines, it led to the acceptance that a wine region is a collection of *terroirs*, some of which are better than others, and that each *terroir* gives the wine a distinctive quality that cannot be found elsewhere (James J., 2014).

High-quality wines are produced from grapes grown in a variety of soil types, as no one soil is considered optimal from a soil perspective. However, each type of soil gives a variety of its distinct flavor and mouthfeel (Cotea V.D., 1985)

In addition to translating the composition of the grapes into the best possible wine by using appropriate winemaking procedures, winemakers can also affect the so-called *terroir* favorably or less favorably (Seguin G., 1986). The vast majority of wine writers agree that human influence on terroir in one form or another is a factor. Each wine-growing region in Romania differs from one another in that it has a unique *terroir*, to which the varieties studied, respectively Fetească neagră and Busuioacă de Bohotin, have adapted and which result in wines of exceptional quality. The combination of all these factors creates a unique *terroir*, specific to a particular vineyard or wine-producing region.

Strunga Winery is a relatively new winery, which started its activity only in 2017, realizing in the first years a small production of 10 thousand bottles, currently they have produced half a million

bottles of wine. Due to the favorable climatic circumstances of the area (rainfall, climate, exposure, slope, duration of sunshine), it is possible to grow varieties with a high yield, and ultimately to produce wines of superior quality.

The main purpose of this study is to analyze some climatic categories that can affect the organoleptic and physico-chemical properties of the wines obtained from the Fetească neagră and Busuioacă de Bohotin grape varieties during the years 2020-2021.

MATERIAL AND METHOD

The hills characteristic of the wine production we are analyzing, where the grapes are planted, have a popular name for several hundred years. The Pârjolita Hill has an area of approximately 100 hectares, of which the Strunga Winery owns 41.66 ha and the Calda hill 45 ha.

Cold winters and hot summers with irregular and more frequent winds from the north and west, winter and south and south-west in spring, with significant rains in early summer are characteristics of the region where the Strunga Winery is located. The range of average annual temperature values is 8.3°C -9°C. The typical annual amount of atmospheric precipitation is 500-550 mm, with irregular frequency.

The technological versions used for the production of rosé wines in the Strunga Winery follow the stages of the general technological flow. The location of the weather station Strunga (47.17°N 26.98°E, 171m), is chosen by standards that guarantee the regional representativeness of the measured elements, is the place where meteorological measurements are made.

Determination of temperatures-thermometers are mounted at a height of 2 m from the ground on the meteorological platform in the shelter.

Determination of precipitation - The rain gauge is buried at least 60 cm below the ground surface. When the water level is halfway between two divisions, the data obtained by measuring the amounts of precipitation are entered in a register that corresponds to the respective time calculated in the interval 7:00-19:00.

Determining the duration of sunshine- Automatic equipment with a global radiation sensor was used to calculate the effective glow duration. They are mounted on the station's metal pole.

The analyses were completed by the methodology of the *International Organization of Vine and Wine 164/2015* which is based on the techniques described in state and international standards, as well as those found in the specialized literature. The determination of the alcoholic concentration and the total acidity were carried out according to STAS 6182/6-70 respective STAS 6128/1-79

Determination of the color of wines by the CIE Lab 76 method- Analytik Jena Specord 200 UV-VIS spectrophotometer was used to identify the color. To measure absorbances, cuvettes with an optical path were used that were suitable for each wine sample by 0.2 cm to reduce absorbance errors. According to STAS 6182/35-75, it involves expressing the color of rosé wines by shade and intensity. Based on the absorption spectra observed for each sample, the chromatic parameters (L, +a, +b, -a, -b) of Fetească neagră and Busuioacă de Bohotin rosé wines were calculated using CIE Lab 76 techniques.

Sensory analysis

The proposed evaluation method, Closed Tasting, was approached for the first time by the International Union of Oenologists (UIO) for the organoleptic evaluation of the technological variants obtained as a result of the winemaking process in 2020 and 2021.

RESULTS AND DISCUSSIONS

The information presented in the following tables was provided by the private meteorological station within the Strunga Winery for two consecutive years.

Table 1

The results obtained regarding the analyzed climatic factors

Month/Year	Precipitation (mm)		Annual temperatures (°C)		Duration of sunshine (hour)	
	2020	**2021**	**2020**	**2021**	**2020**	**2021**
January	4.6	26.9	2.4	0.3	103.4	48.1
February	44.7	28	4.7	-0.3	91.7	89.4
March	17.6	42.6	7.3	4.1	139.2	115.6
April	2.8	42.6	12.1	8.5	244.3	129.6
May	95	81.2	14.1	15.2	156	167.1
June	136.8	107.2	21	20.2	180.2	173.6
July	48.2	86	22.2	23.9	213.2	231.7
August	11.4	79.2	23.5	21.5	257.3	208.9
September	69.8	27	19.9	15.8	207.2	149.1
October	68.6	0.4	13.9	10.2	81.9	142.4
November	7.8	6.8	5.2	7.3	62.8	85.6
December	50	90.8	1.7	0	21.5	21.8
Annual average	**46.5916**	**51.5583**	**12.3**	**10.6**	**1758.7**	**1562.9**

Table 1 shows us that the year 2020 recorded an average of only 46.59 mm, the value obtained from the average of each individual month. Compared to 2020, 2021 turned out to be much wetter, accumulating an average of 51.55mm.

On the other hand, due to the more abundant precipitation in 2021, the average annual temperature was 10.6°C, thus resulting in a lower value than in 2020. The duration of sunshine (insolation) registers significant values in the station: 1758.7 h in 2020 and 1562.6 h in 2021. Since the climatic circumstances vary from year to year, the grapes used in the winemaking process have different physico-chemical properties, which also implies a change in the finished product obtained.

The wines obtained during the two consecutive years 2020-2021, obtained from the Busuioacă of Bohotin (V1 and V2) and Fetească neagră (V3 and V4) grape varieties, vinified rosé, constituted the research material that was subjected to the following determinations.

Table 2

The main physico-chemical characteristics of the analyzed wines

Composition features	Experimental variants			
	V1	V2	V3	V4
Alcohol concentration (% vol.)	12.1	12	13.3	13
Total acidity (g/L tartaric acid)	4.3	4.5	3.5	3.8
Malic acid (g/L)	1.7	4.2	3.1	4.3

The alcohol content of the examined variants did not change appreciably during two years. Due to the climatic conditions of 2020, varinates V1 and V3 have accumulated a higher concentration of 12.1% and 13.3%, respectively. Similar results were obtained by the V2 and V4 variants from 2021, which showed modest variations compared to the previous year by 12% in the case of V2 and 13% for V4. 2020 was a dry year with high temperatures that affected the studied wines and resulted in a lower acidity of 4.3 for sample V1 and 3.5 for sample V3 due to dryness.

In contrast, the year 2021 turned out to be rainy and cooler as a result the wines have more acidity, 4.5 in the case of the V2 sample and 3.8 in the case of the V4. The difference in malic acid content is caused by the fact that 2021 was a rainy year which resulted in higher acid accumulation.
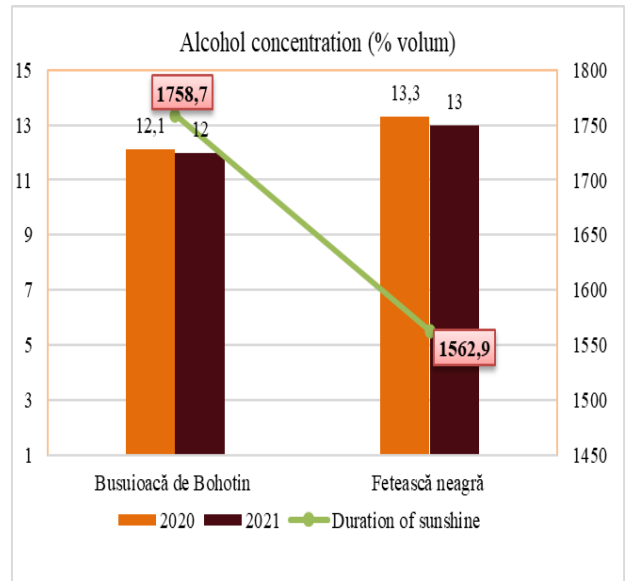

Figure 1 **Correlation alcohol concentrationduration of sunshine**

In the first graph, it can be observed that the duration of sunshine in 2020 totaled 1758.7 hours. This indicates that 2020 was a dry, arid year with little rainfall which caused the grapes to ripen faster and accumulate more sugars. As a result, the wine had an alcohol content of 12.1% in V1 and 13.3% in the case of sample V3. Due to other factors at play, the year 2021 is significantly shorter, totaling only 1562.9 hours.

As a consequence, the grapes accumulated less sugars, causing a lower alcohol concentration. In the case of analysed samples for the 2021 studied year, the sample highlights 12% for the V2 sample and 13% in the case of the V4 sample.
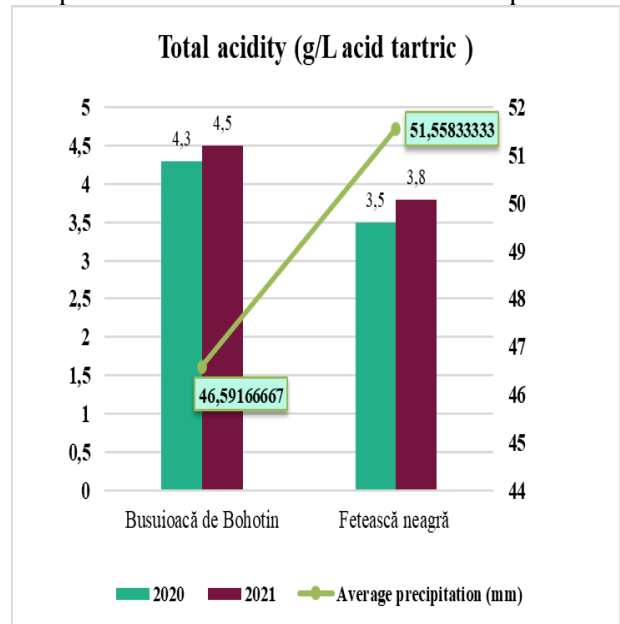

Figure 2 **Correlation between total acidity and precipitation**

In the case of the wines obtained from Busucioacă of Bohotin, a difference of 0.2 g/L tartaric acid can be observed, more in the case of

sample V2. In the case of the wines obtained from Feteasca neagră, the same difference can be observed this time of 0.3 g/L in the case of the V4 sample, both obtained in 2021.

Malic acid is a natural acid founded in grapes in a certain amount making it unstable in all circumstances, but especially in rosé wines.
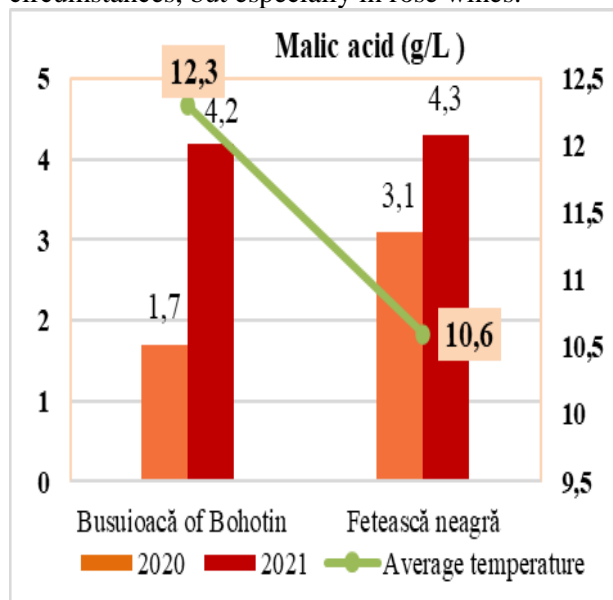

Figure 3 **Correlation between malic acid and average annual temperatures 2020-2021**

Due to the high temperatures of 2020, the malic acid in the samples highlighted less values as can be observed in *figure 3*, because it was metabolized leading to a decrease in it. As a result, it is visible in sample V1 with 1.7 g/L.

The fact that 2021 stood out to be a wet year, with low temperatures, the average being 10.6°C, encouraged the accumulation of malic acid in the grapes and later to be found in the analyzed wines. As a result, a higher amount of malic acid was found in samples V2 (4.2g/L) and V4 (4.3g/L).

The determination by the software DIGITAL COLOR ATLAS 3.3 of the chromatic properties of the wines made it possible to emphasize the color differences through a visual separation.

According to the data in *table 3*, the wine from the Fetească neagra variety from 2020 (V3) is the most intensely colored, unlike the one from 2021 with a slightly lower shade. In the case of the wine from the Busuiocă de Bohotin variety, the one obtained also in 2020 (V1) stood out as more intense. This is the result both of the grape variety of which it is part, as the amount of anthocyanins is in greater quantity in the 2020 samples, but also of the technique that the oenologist chooses to use to produce the desired wine in perfect balance.

In terms of clarity (L*), all samples present high clarity, but sample V2's values of 98.07 stood out as the highest. However, the wines tend to have a distinct peach-salmon hue. With high values between 5.01 and 4.75 in samples V3-V4, the indication stood out as a strong predictor of green color intensity. The specific values of the red-green coordinates had lower values in the Busuioacă de Bohotin samples with 2.1 in the V1 sample and 1.74 in the V2 sample, which is also due to the fact that the variety it belongs to is lighter.

In the case of sample V3, it can be clearly observed that the b parameter belonging to the yellow-blue coordinate had higher values. In contrast, the b-values of samples V1 and V2 range from 5.31 to 3.12, while those of samples V3 and V4 range from 8.84 to 7.50.

It can deduce that the parameter a, has higher values in 2021, and the color, which is more intense in the samples of the year 2020, are both due to the more extreme heat conditions that emphasize these factors.

Table 3

CIE Lab 76 color parameters and chromatic color stimulation for the analyzed rosé wines

Experimental variants	Clarity L*	Chromaticity		Saturation/Chroma C	Tone H	The brightness	Tempt	Computer simulation of wine color
		a	b					
V1	97.26	2.17	5.31	5.73	67.73	0.31	1.73	
V2	98.07	1.87	3.12	3.64	58.98	0.19	1.57	
V3	95.09	5.01	8.84	10.16	60.43	0.57	1.48	
V4	95.48	4.75	7.50	8.88	57.67	0.50	1.42	

Based on the criteria listed above, the chromaticity of the tested samples corresponding to the two grape varieties considered was determined. From the low chromaticity and excellent clarity of the wines, it can be observed that the high temperatures and low rainfall had a semnificative impact on the color.

Saturation shows how much white is incorporated into the color. The saturation in the

analyzed samples had a maximum value in the V3 sample (10.16) and a minimum value in the V2 sample (3.64), which indicates that no wine blending was used in the technological process.

The tonality of the analyzed varieties from the two years is comparable, which indicates that there is not much variation between the sample values.

The sample from the Fetească neagră variety from 2020, V3, had a score of 60.43, instead in 2021 it had 57.67.

The samples from the Busuiocă de Bohotin variety in 2020 had a tonality of 67.73, while in 2021 it was slightly lower at 58.98. This indicates that temperature fluctuations, solar radiation and the acquisition technology have imprinted on this aspect.

According to the tasters, all versions are similar to each other, the difference is the intervention of climatic conditions as well as the unique technology, and the decision of the oenologist. *Figure 4* presents the diagrams made following the mathematical calculation of the wine bonus points received.

Olfactory profile of the obtained wines was slightly influenced by the climatic conditions, both wines vinified in the 2020 harvest year present the characteristics of rich wines, such as ripe fruit,

dried fruit, forest fruit and peony that transport you to a state of spirit of a pleasant summer night.

On the other hand, the wines produced in the 2021 harvest year had an aromatic profile nuanced by the aromas of citrus fruits, exotic fruits, wildflowers and rose, a fact due to the accentuation of the colder climatic conditions. The character of honey, basil, mineral and vegetal green were imprinted in all four varinates in a balanced way.

Regarding the taste profile of the 2021 samples, it was observed that due to the low temperatures and precipitation throughout the maturation period, the acidity of the wines is increased and a decrease in the intensity of the sweet, bitter and phenolic characteristics is observed. On the other hand, as can be seen in *figure 4*, the persistence and structure of the wines examined in 2021 stand out as increasing, compared to the unctuous character which is less
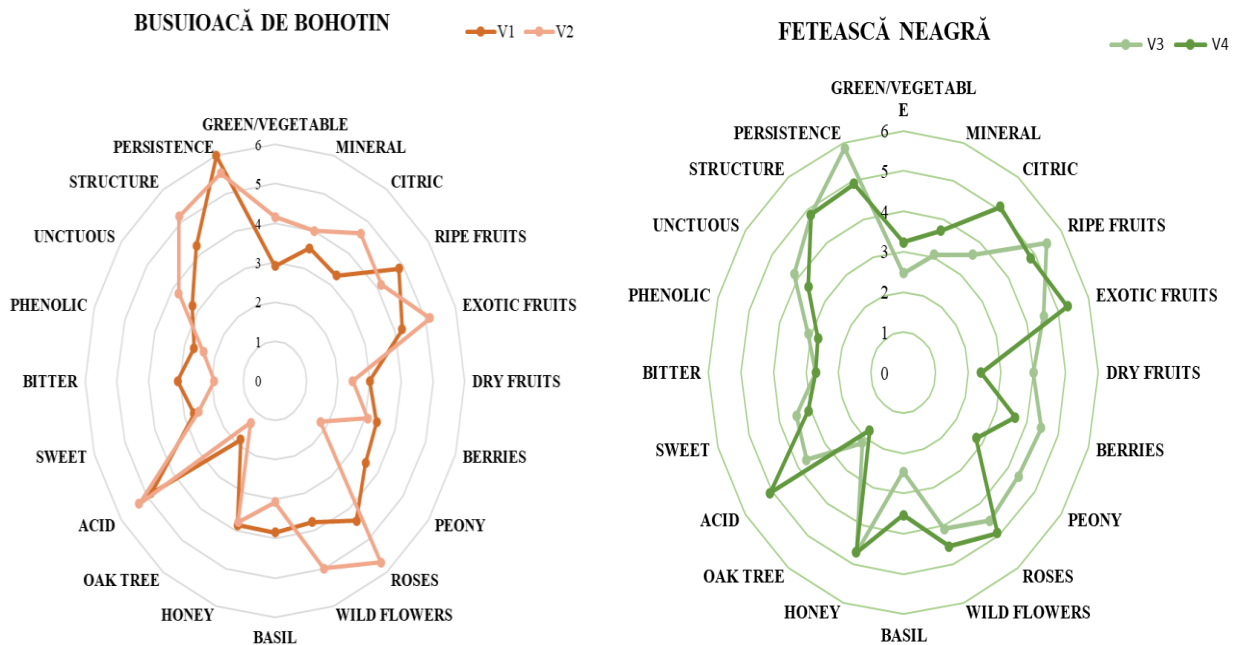

Figure 4 **Graphical representation of the tasting data for Fetească neagră and Busuiocă de Bohotin wine**

On the other hand, the taste profile of the wines made in 2020 reveals a decrease in acidity as a result of the warmer weather, which leads to the loss of freshness of the wines, which is not desirable. In both cases, the sweet character is perceived more strongly, weakening the other qualities. The V1 variant is reported to have a more consistent structure and high persistence after tasting, leaving a more pronounced aroma, although the unctuous character of both samples is noted to be in balance.

CONCLUSIONS

After conducting this study, the following were found: the year 2020 was warmer with an average temperature of 12.3°C, which caused a faster ripening of the grapes implicitly and a greater accumulation of sugars, leading to a higher alcohol concentration in V1 and V3 wines. From a sensory point of view, both wines show the characteristics of rich wines, such as ripe fruit, dried fruit, wild berries and peony that transport you to a pleasant summer night's mood. The

olfactory profile reveals a decrease in acidity as a result of the warmer weather, which leads to a loss of freshness in the wines, which is not desirable.

However, the year 2021 stood out as being the opposite of 2020, being marked by more significant amounts of precipitation with a total of 559.1 mm, which also dictated a decrease in average annual temperatures to 10.6 °C. This found an alcohol concentration slightly lower in both wines, 12 and 13, but with more acidity, 4.5 g/L tartaric acid in the case of sample V2 and 3.8 g/L in the case of V4. The aromatic profile of the wines is nuanced by the aromas of citrus fruits, exotic fruits, wildflowers and rose, a fact due to the accentuation of the colder climatic conditions.

In the end, it can conclude that no wine is the same from year to year, without a doubt. Nature is truly a lucky charm of Strunga Winery.

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