STUDY OF SOME SPARKLING WINES OBTAINED FROM LOCAL VARIETIES OF WHITE GRAPES IN THE COTNARI VINEYARD

STUDIUL UNOR VINURI SPUMANTE OBŢINUTE DIN SOIURI AUTOHTONE DE STRUGURI ALBI ÎN PODGORIA COTNARI

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Abstract. *Abstract. Cotnari vineyard is one of the oldest vineyards in Romania with a long history in wine production, the first historical mentions of the Cotnari vineyard dating from the 14th century. The terroir conditions in this vineyard allow production of both still wines and, more recently, sparkling wines of the highest quality. The study aimed to obtain data on the sensory analysis of the following sparkling wines: Frâncuşă 2017 (V1), Frâncuşă 2018 (V2), Grasă de Cotnari 2017 (V3), Grasă de Cotnari 2018 (V4), Tămâioasă românească 2017 (V5), Tămâioasă românească 2018 (V6), and also their correlation with the results obtained from the physico-chemical analyses performed. The sensory analysis was performed in two stages (a series of sensory indices specific to sparkling wines obtained in the Cotnari vineyard were identified and then, a quantitative analysis, by allocating scores from 0 to 9 for the previously established indices). Regarding the physical-chemical analyses, the following parameters were of interest: alcohol concentration, total acidity, density, total dry extract and non-reducing dry extract, sugars, free and total sulphur dioxide.*

Key words: Cotnari, sparkling wines, sensory analysis, physical-chemical analyses

Rezumat. *Podgoria Cotnari este una dintre cele mai vechi pogdorii din România cu o istorie vastă în producerea vinurilor. Condiţiile de terroir din această podgorie permit atât obţinerea de vinuri liniştite cât şi mai nou, cea de vinuri spumante de cea mai bună calitate.*

Studiul a avut drept scop obţinerea de date privind analiza senzorială a următoarelor vinuri spumante: Frâncuşă 2017 (V1), Frâncuşă 2018 (V2), Grasă de Cotnari 2017 (V3), Grasă de Cotnari 2018 (V4), Tămâioasă românească 2017 (V5), Tămâioasă românească 2018 (V6) şi corelarea lor cu rezultatele obţinute în urma analizelor fizico-chimice efectuate. Analiza senzorială a fost realizată în două etape. În primă fază au fost identificaţi o serie de indici senzoriali specifici vinurilor spumante obţinute în podgoria Cotnari, cea de-a doua etapă presupunând o analiză cantitivă, prin alocarea de punctaje de la 0 la 9 pentru indicii stabiliţi în prealabil. În ceea ce priveşte analizele fizico-chimice, de interes au fost următorii parametri: concentraţie

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alcoolică, aciditate totală, densitate, extract sec total şi extract sec nereducător, zaharuri, bioxid de sulf liber şi total.

Cuvinte cheie: Cotnari, vinuri spumante, analiză senzorială, analize fizico-chimice

INTRODUCTION

Cotnari vineyard is located at the contact of the Suceava Plateau with the Moldavian Plain, at the intersection of the parallel of 47˚21 'north latitude with the meridian of 26˚25' east longitude. The transition between these two units is made on the eastern slope of Dealul Mare-Hârlău. This slope, known briefly as the Coast of Cotnari, is the territorial unit on which most of the vineyard develops. As a geographical settlement, the Cotnari vineyard is located in the North-Eastern part of Romania.

The quality of the wines obtained in Cotnari vineyard is ensured primarily by terroir (complex of factors related to the climate and soil of the region) (Vacarciuc *et. al.*, 2018). The natural conditions encountered here are among the most favourable for the cultivation of vines, the whole area being included in the C I area (Cotea, 2005; Fairbairn *et. al.,* 2014). In general, the sparkling wines obtained in the Cotnari vineyard are characterized by slightly reductive initial notes, but which open in aromas of citrus or white flowers, freshly mowed hay and slight notes of autolysis. They are balanced wines with very well represented acidities and equally well integrated, due to the fact that the raw material wines are obtained at the northern limit of vine cultivation in Moldova (between 47017 'and 47035' Northern latitude and 2605' Eastern longitude) (Cotea, 2005).

MATERIAL AND METHOD

The sample lot analysed was composed of the following six sparkling wines: Frâncuşă 2017 (V1), Frâncuşă 2018 (V2), Grasă de Cotnari 2017 (V3), Grasă de Cotnari 2018 (V4), Tămâioasă românească 2017 (V5), Tămâioasă românească 2018 (V6), obtained by classical method in Cotnari vineyard. These wines were analysed from a sensory and physical-chemical point of view. All the analysed wines were obtained by the *Champenoise* method (traditional method).

The sensory analysis was performed in two stages. In the first phase, a series of sensory indices (olfactory and gustatory) were identified by a team of ten tasters who identified flavors and tastes in 3 sparkling wines obtained by the traditional method in the conditions of the Cotnari vineyard. The results were centralized using an algorithm generated by the *mentimeter.com* site. The items thus identified were registered in a tasting sheet automatically generated online and thus, the same group of ten tasters analysed the 6 experimental samples, involving a quantitative analysis, by allocating scores from 0 to 9 for the indices established in phase I.

Physical-chemical analyses were performed in the *Oenology Laboratory* of the Horticulture Faculty within USAMV Iaşi, using the methods indicated in international standards as follows:

❖ Alcohol concentration - OIV-MA-AS312-01B
❖ Sugars - OIV-MA-AS311-01A
❖ Total acidity- OIV-MA-AS313-01
❖ Density - OIV-MA-AS2-01B

❖ Free and total sulfur dioxide - OIV-MA-AS323-04B
❖ Total dry extract - OIV-MA-AS2-03A.

RESULTS AND DISCUSSIONS

Table 1 presents the results obtained from the physical and chemical analyzes performed for the final wines. Regarding the alcoholic concentration, similarities of this parameter are observed for the samples obtained from the same variety but in different years. Thus, variants V1 and V2 (sparkling wines obtained from Frâncuşă) registered values of 12.4% and 12.1% vol. alcohol respectively, while V3, V4, V5 and V6 (samples obtained from Grasa de Cotnari and Tămâioasă românească) showed values between 11.7% and 11.9% vol. alcohol.

Table 1

Physical and chemical characteristics of sparkling wines obtained in Cotnari vineyard

Sample	Alc. concentration (%vol.)	Reducing substances (sugars) (g/L)	Total acidity (g/L tartaric acid)	Free sulphur dioxide (mg/L)	Total sulphur dioxide (mg/L)	Total dry extract (g/L)	Density (g/cm³)
V1	12.4	1.6	8.3	5.1	70.4	18.8	0.9909
V2	12.1	1.8	7.2	7.2	84.3	19.6	0.9917
V3	11.8	1.5	6.5	5.1	76.8	19.3	0.992
V4	11.7	1.9	6.5	6.4	69.1	23.7	0.9937
V5	11.9	11.3	6.7	29.2	131	30.5	0.9961
V6	11.8	10.7	6.5	26.9	145	29.4	0.9958

Depending on the sugar contents determined in the final wines, they can be classified according to local legislation in two categories: „*brut natur*" (V1, V2, V3, V4) and „*brut*" as in the case of V5 and V6. In direct correlation with this parameter is sulphur dioxide (free and total). Thus, in the case of wines with a low sugar content, the values of free sulphur dioxide do not exceed 7.2 mg/L, while for a good preservation of wines with higher sugar concentrations it was necessary to add a higher dose of sulphur dioxide, which led to concentrations such as 26.9 mg/L and 29.2 mg/L for free sulphur dioxide and 131 mg/L and 145 mg/L for total sulphur dioxide.

The values of the total dry extracts and of the densities vary directly proportionally within the same sample, observing in this case a direct correlation of them with the sugar content.

Total acidity is also an important quality factor, especially in the case of sparkling wines (Berger, 2007). A relatively high acidity is reflected in the taste profile by freshness, which is indispensable for sparkling wines. Also, high values of this parameter are a better guarantee for the clarity and stability of sparkling wines (Cotea, 2005). In the case of the analysed wines, a good representation of acidity is observed, the values of this parameter not falling below 6.5 g/L tartaric

acid (V3, V4 and V6) and reaching up to 8.3 g/L tartaric acid as seen in V1 (sparkling wine obtained from Frâncuşă).

The figures 1 and 2 show the results of the sensory analysis, numerical and respectively graphically expressed.

From the olfactory profiles of the six wines, several indices stand out with considerable values: citrus, mineral, floral, pineapple and peach. These olfactory characteristics are common to the six wines analysed, representing the terroir and the technologist. In the case of variants 1 and 2, the samples obtained from Frâncuşă, the top olfactory notes are: green apple, citrus, pineapple and toast. In the case of test V1, the one from 2017, the aromas of flowers, ripe banana and pineapple were better represented than in the case of the best samples of the same variety but made in 2018.

In the case of variants 3 and 4, the similarity of the two olfactory profiles is noticeable, given of course by the terroir and the imprint of the variety used, in this case Grasa de Cotnari. The slight differentiation between these two wines is given by aromas such as ripe banana, green banana and pineapple, which obtained different values following the sensory analysis. The most realistic explanation in this regard is the age of the wine (Gilc and Peña-Neirab, 2019). In the case of the wine from 2017 (variant V3) the aroma of green banana was less likely and those of pineapple and ripe banana were better scored.

Fig. 1 Olfactory profiles of sparkling wines

Fig. 2 Tasting profiles of sparkling wines

From the taste profiles of the analysed wines, represented graphically in figure 2, we can highlight some main indices that obtained high scores in all six samples analysed: tactile fineness of the bubbles, body, smoothness and taste persistence. Regarding the variants obtained from Frâncuşă, the graphics that highlight the taste sensations overlap in large proportions. The body and tactile finesse of the bubbles are noticeable in both cases, proof that both wines are balanced. The quality of the same two wines results from the high score obtained for the index on taste persistence. In the case of the V3 and V4 variants, the freshness for the 2018 sample was better scored, so the wine was younger. The tactile finesse of the bubbles as well as the taste persistence received scores almost maximum in the case of both wines, as it happened in the case of the unctuousness. Also, the crunchy taste sensation was well highlighted.

In the two wines obtained from Tămâioasă românească it was, as expected, the taste sensation of sweet that was well noted, considering the amount of remaining sugars identified in the physical-chemical analyses. Otherwise, the graphs that highlight the two taste profiles are similar, the body and tactile finesse of the bubbles being better scored in the case of wine in 2017.

Figure 3 presents the comparative organoleptic analysis of the six sparkling wines analysed. The global similarities of the analysed wines given by technology were the same for all wines but especially by climatic conditions, soil, geographical position, tradition (terroir).
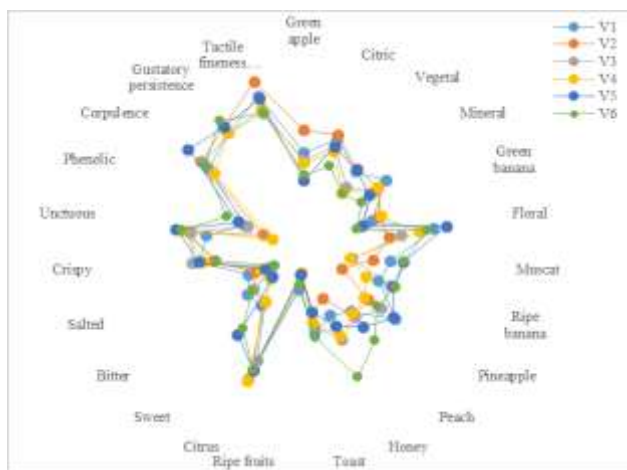

Fig. 3 The overlapping of olfactory and tasting profiles of the analysed wines

CONCLUSIONS

1. From the physical-chemical analysis applied to the experimental sparkling wines it could be observed that the wines obtained from the Frâncuşă and Grasă de Cotnari varieties can be included in the category „*brut natur*”, with no addition of sugar after the second fermentation and the variants obtained from

the Tămâioasă românească aromatic variety are classified according to the local legislation in the „*brut"* category. Correlating this analysis with the results obtained from the sensory analysis, it is concluded that the remaining sugars helped V6 and V5 samples to highlight the aromas such as: floral, honey, pineapple and muscat (variety specific flavour). Regarding the taste profile, the rest of the sugars in the V5 and V6 variants helped to amplify the sensations such as: body, persistence and the tactile fineness of the bubbles was better scored in the case of these two variants.

2. Another important observation is related to the correlation between the values of the total dry extract for the analysed samples and those of the taste perceptions. Thus, it was found that V5 (the sample with the highest value of the total dry extract) also obtained the best score for the body and buttery taste sensations.

3. It should be noted that in the case of the V1 sample (which has the highest value of total acidity) the tasters scored the citrus taste sensation with the highest values.

REFERENCES

1. **Berger R.G., 2007** - *Flavours and Fragrances* - Chemistry, Bioprocessing and Sustainability. Ed. Springer, Leipzig –Germania
2. **Cotea V.V., 2005** - *Tehnologia vinurilor efervescente*, Editura Academiei Române, Bucureşti
3. **Fairbairn SC, Smit AY, Jacobson D, Prior BA, Bauer FF., 2014** - *Environmental stress and aroma production during wine fermentation*. South African Journal for Enology & Viticulture
4. **Gilc Mariona, Peña-Neirab Á., 2019** - *Study of the changes in volatile compounds, aroma and sensory attributes during the production process of sparkling wine by traditional method*, Food Research International 119 (2019) 554–563, ISSN: 0315-5463, Canada
5. **Vacarciuc L., Bogatîi E., Melnic N., Minciuc A., 2018** - *The impact of eco-agrotehnic factors on grape quality for rosé wine*, Lucrări Ştiinţifice, Universitatea de Ştiinţe Agricole Şi Medicină Veterinară "Ion Ionescu de la Brad" Iaşi, Seria Horticultură, Vol.61 No.2 pp.93-98 ref.13