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QUALITY CHARACTERISTICS OF THE WHITE WINE GRAPE VARIETY DIMYAT UNDER CONTINENTAL CLIMATE CONDITIONS

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Abstract: *The Dimyat (V. vinifera L.) variety is one of the oldest and most widespread white wine grape varieties in Bulgaria, with deep historical and cultural roots in traditional viticulture. The aim of this study is to assess the technological potential and quality indicators of the grapes and wines produced during the 2023 and 2024 harvests. The proportion of normally developed berries in the bunches is 95.20% and the theoretical yield reaches 85.32%. The average bunch dimensions are 17.82 × 12.25 cm, and the dimensions of the berries are 18.05 × 16.10 mm. Chemical composition of the grape juice is characterized by a lower sugar content of about 20.35% and a higher titratable acidity (6.67 g/l), representing a well-balanced technological grape ripeness. The main physicochemical indicators of the wines produced from two harvests analyze the correlation with the degree of grape ripeness. Differences in the alcohol content were observed, ranging from 12.21% in 2023 to 11.44% in 2024. The content of total phenolic compounds was higher in the first year (231.68 mg/l) compared to 177.80 mg/l in the second year and pH values of 3.14 remain relatively stable. The Dimyat variety has good technological potential for producing quality white wines, as variations in climatic conditions in different years have a significant impact on the raw material and final product. Results can be used to optimize technological practices in grape processing and to improve the quality and stability of wines.*

Keywords: *alcohol, color intensity, Dimyat, mechanical composition of the bunch and berry, physicochemical analysis of wine, sugars, titratable acidity, total phenols, white wine*

• Introduction

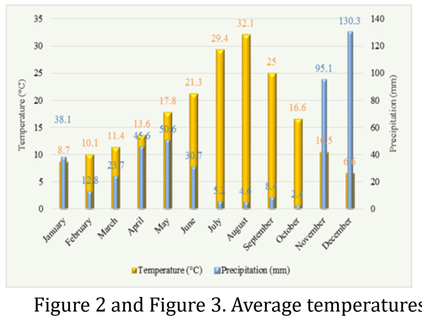
Climatic conditions are a key factor influencing grape quality. Year-to-year variations in temperature and precipitation lead to differences in sugar content, acidity and phenolic composition within a single variety. Consequently, the assessment of technological potential should be conducted within a specific agro-ecological region and across multiple vintages (COSTA et al., 2020). The mechanical composition of the bunch and berry involves the quantitative ratio between stems, berries, skins, seeds, mesocarp and is linked to must yield and the potential for extracting various chemical substances during processing. The relative proportions of skins and seeds are of particular importance, as they are significant sources of phenolic compounds (FERNÁNDEZ DE SIMÓN et al., 1993; YONCHEVA et al., 2023). In white wine production, higher sugar content at harvest can lead to higher potential alcohol levels, whereas excessive sugar accumulation combined with insufficient acidity can disrupt the wine's balance (JORDÃO et al., 2015; MIRA DE ORDUÑA, 2010). This study aims to investigate the quality parameters of grapes and wine from Dimyat variety under continental climate conditions characterized by sharp temperature fluctuations.

• Material and method

The study utilized Dimyat variety, planted in 2005 at the Eastern Thracian Lowland region of the Republic of Bulgaria. The inter-row spaces are cultivated mechanically and the vineyard is cultivated under non-irrigated conditions. Dimyat is a mid to late-ripening variety, with a period of approximately from 180 to 200 days from budburst to technological ripeness. The vines demonstrate excellent recovery capacity following frost damage, though this capacity is poor after drought periods. It is a dual-purpose variety (Figure 1). For determination of the parameters characterizing grape quality following analyses were performed: Determination of sugar content using an Abbe laboratory refractometer (%); Determination of titratable acidity via titration with 0.1 N NaOH (g/dm^3); Analysis of the mechanical composition for grape bunch and berry. Wines from each vintage were produced using the same technological process for dry white wines like follow: grape reception, sorting, destemming, pressing, must separation, sulfiting/protection against oxidation, clarification, alcoholic fermentation, separation from gross lees, completion of fermentation, stabilization, filtration, bottling and storage. Physicochemical analysis was performed on the finished wines (BAMBALOV, 2009). The following parameters were analyzed: relative density (g/dm^3), alcohol (%), sugars (g/dm^3), total extract (g/dm^3), sugar-free extract (g/dm^3), titratable acids (g/dm^3), volatile acids (g/dm^3), free sulfur dioxide (mg/dm^3), total sulfur dioxide (mg/dm^3), total phenols (mg/dm^3) and color intensity. Climatic data for the period were obtained from meteorological station located within the vineyard. The parameters presented include mean monthly air temperature (°C) and precipitation (mm), characterizing the climatic conditions of the study area (Figures 2 and 3).



Figure 1. Dimyat variety bunch



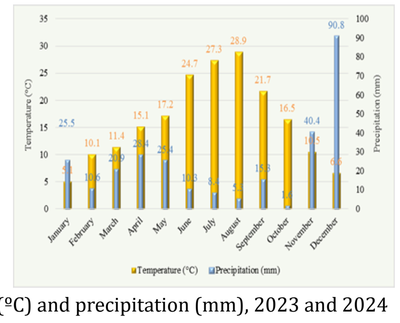


Figure 2 and Figure 3. Average temperatures (ºC) and precipitation (mm), 2023 and 2024

• Results and discussions

Mechanical analysis reveals that in 2023, normally developed berries accounted for 96.10% of the bunch, whereas in 2024 this figure dropped to 94.30% (Table 1). Regarding the structural composition of the berry in 2024 (Table 2), an increase was observed in the relative share of skins from 7.50% (2023) to 8.15% (2024) and seeds from 2.35% (2023) to 2.75% (2024) while the share of mesocarp decreased from 90.15% (2023) to 89.10% (2024). Physicochemical analysis of the wines shows that for the 2024 vintage, the alcohol content decreased from 12.21% to 11.43%, while total extract increased from 17.20 to 19.60 g/dm^3 and sugar-free extract rose from 15.92 to 17.96 g/dm^3 (Table 3).

Table 1. Bunch structure and construction, 2023-2024

Period (Year)	Normal berries,%	Skins, %	Milleranded berries, %	Dry berries,%	Theoretical mass,%	Average bunch size, cm	
2023	96,10a	3,90a	0,09a	0,67a	86,63a	18,75b	12,60a
2024	94,30a	5,70b	0,14b	0,89b	84,02a	16,90a	11,90a
Average	95,20	4,80	0,11	0,78	85,32	17,82	12,25

Table 2. Berry structure and construction, 2023-2024

Period (Year)	Skins, %	Seeds, %	Mesocarp, %	Average berry size, mm		Chemical composition of grape juice (must)	
				Length	Width	Sugars, %	Titratable acids, g/l
2023	7,50a	2,35a	90,15a	18,20a	16,30a	20,50a	6,54a
2024	8,15a	2,75a	89,10a	17,90a	15,90a	20,20a	6,80a
Average	7,82	2,55	89,62	18,05	16,10	20,35	6,67

Table 3. Physicochemical analysis of the wine, 2023–2024

Vintage/ Year Indicators	2023	2024
Relative density	0,9983	0,9941
Alcohol, %	12,21	11,43
Sugars, g/dm^3	1,28	1,84
Total extract, g/dm^3	17,20	19,60
Sugar-free extract, g/dm^3	15,92	17,96
Ph	3,13	3,14
Titratable acids, g/dm^3	6,29	6,53
Volatile acids, g/dm^3	0,71	0,83
Free sulfur dioxid, mg/dm^3	26,70	29,80
Total sulfur dioxid, mg/dm^3	123,30	130,10
Total phenols, mg/dm^3	231,68	177,80
Color intensity	1,144	1,030

• Conclusions

Drought conditions are associated with trends toward reduced bunch and berry sizes, a decrease in theoretical yield and changes in the relative proportions of the cluster's structural components. An increase in the relative proportion of skins and seeds, combined with a decrease in the mesocarp fraction indicates a shift in the berry's structural composition which is significant for assessing its technological characteristics. Must sugar content remained similar across both years, whereas titratable acidity increased in 2024. Differences in climatic conditions did not manifest uniformly regarding sugar accumulation and formation of the grape's acid composition. Wines from 2024 vintage exhibited lower alcohol content and higher extract levels, suggesting differences in grape chemical composition and/or the fermentation process. The relative stability of pH, combined with increased titratable acidity indicates that active acidity and total titratable acidity evolved differently between the two vintages. The reduction in total phenolics and color intensity in 2024 points to differences in the wines phenolic profiles, which may be attributed to both grape composition and processing or vinification conditions.