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The Investigation of the Untapped Winemaking Potential of the Grape Variety "Hastakot"

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ABSTRACT

Research works demonstrate a rising demand for high-quality wine in Armenia. Our objective was to produce premium red and rosé wines using the relatively unexplored grape variety "Hastakot". Throughout the research, we utilized various winemaking technologies to produce red and rosé wines of the grape variety "Hastakot". Simultaneously, multiple physicochemical and sensory attributes were investigated in the produced must and wine. The obtained results highlight the ability to make unique wines from the grape variety "Hastakot", indicating a potential market impact and gaining consumer appreciation.

Introduction

Red wines are made of red grape varieties. The latter differ from white wines not only in color, but also in flavor and astringency. Red wine is richer in substances extracted from the solid parts of grapes and useful microelements (Gabrielyan, 2021).

The hallmark of red wine is its brilliant crimson hue, devoid of any black or brown undertones. It should possess a harmonious, full-bodied character, delicately velvety texture, and exhibit a subtle balance of acidity and astringency. The careful selection of grape varieties plays a pivotal role in red wine production. Grapes should contain an ample amount of coloring substances (Muradyan and Aghajanyan, 2012).

Rosé wines are made from red grape varieties. There are several techniques available for making rosé wines. The most prominent ones include:

"Gravity separation of grape must" (Saignée): The production of top-quality rosé wines often relies on using this technique. The principle of this method is based on the natural separation of grape juice, typically around 40-50 % of the total volume, during grape processing, solely due to the force of gravity. This separated must is then fermented following the technique used in white wine production. This particular style of winemaking finds significant popularity in France, especially in regions like Provence and Burgundy.

Pressing: The core of the technique involves pressing red grapes, post destemming and crushing, until the must with the desired color and composition is obtained.

Subsequently, the obtained must undergoes standard procedures for white wine fermentation.

Moderate infusion: This is regarded as the most popular technique globally; it involves pouring the destemmed and crushed mass into a container for maceration. The maceration continues until the winemaker determines that the desired amount of phenolic substances has been extracted. Following this process, the mass is pressed and proceeds to fermentation.

Separation of liquid mass during fermentation: In this scenario, the grapes undergo destemming and crushing before being directed to the fermentation tank without immediate pressing. As the fermentation progresses and a satisfactory amount of phenolic compounds is extracted, the winemaker decides to separate the liquid part of the fermentation mass. This separated liquid continues to ferment in a distinct container (Pascal Ribereau-Gayon and Denis Dubourdieu 2006).

Materials and methods

In light of the outlined goal, we have defined the following key objectives:

Examine "Hastakot" grape variety.

Assess the untapped winemaking potential of "Hastakot" grape variety by producing both red and rosé wines of this particular grape variety.

Scrutinize the physicochemical indicators throughout the winemaking procedures.

Analyze the olfactory attributes of the resulting wines.

The subject of the research is "Hastakot" grape variety and the red and rosé wines produced from it. The raw material for making red and rosé wines was "Hastakot" grape variety, a local variety found in individual vines or small groups within the old vineyards of the Meghri region. Several clones of this variety have been discovered and are currently under study. The upper part of a young vine is light green with a subtle rosé tint, while the newly sprouted leaves display a light green color with a faint red hue, and they are slightly pubescent. The grape bunches are medium-sized, cylindrical or cylindrical-conical, with varying levels of density. The fruit is typically medium to large, round, and black. The skin is of medium thickness and firmness, and the fruit is juicy with a pleasant taste (Melyan, et al., 2019).

The grapevine of "Hastakot," cultivated in the national grape collection vineyard, was utilized in the production of red dry table wine. The grapes were harvested at the point of technical ripeness to create dry red wines. The harvested grapes were carefully transported in small boxes to the winery to prevent damage. The grapes were then destemmed and crushed using a horizontal roller crusher-destemmer. Subsequently, a mono pump was utilized to transfer the crushed mass to a tank, where yeast was added to initiate fermentation. The fermentation process continued for 7 days, followed by a 5-day maceration period with the grape skins. Once the fermentation was complete, the pulp was pressed. After pressing, the wine was pumped to a tank where malolactic bacteria were introduced to initiate malolactic fermentation. Finally, the wine was poured into 25-liter glass containers.

The rosé wine was also made from "Hastakot" grape variety using appropriate equipment and auxiliary materials. The grapes were harvested during the period of technical ripeness, transported from the vineyards to the winery in small boxes, and were destemmed. Only the gravity fraction was collected during the pressing process. After pressing, the must was transferred to a container. Bentonite was added to clarify the must. After the must was clarified, it was racked. Three days after the commencement of fermentation, aeration was applied to the wine. Throughout the entire fermentation period, the sugar content in the must was assessed daily, influencing the pace of fermentation – whether to accelerate or decelerate. Additionally, in case of rose wines, the wine was transferred into 25-liter glass containers.

All the research carried out during the grape ripening process, as well as investigations related to grapes and wines were conducted in the educational laboratory of the EVN Wine Academy.

Picture 1. Wine storage containers.

All applied methods are endorsed by the International Organization of Vine and Wine (OIV) and adhere to international standards (OIV, 2016, ISO 5495:2005, ISO 4120:2021 (International Organization of Vine and Wine, "Compendium of International Methods of Wine and Must Analysis", OIV-18 RUE D'AGUESSEAU-75008.-PARIS, Muradyan, et al., 2017).

The results of the conducted research were compared with the provisions of current legislation, including GOST-32030-2013, GOST P 52523-2006, and GOST P 55242-2012. Additionally, they were assessed against the regulatory document set forth by the "International Organization of Vine and Wine" (OIV-MA-C1-01), which specifies the maximum permissible limits.

Results and discussions

In the concluding month of the ripening process for "Hastakot" grape variety, an examination was carried out to assess the content and changing dynamics of the specified physicochemical indicators. It is crucial to note that sampling for each grape variety was conducted at regular 7-day intervals.

The period for observing changes in indicators spans three weeks, during which the sugar content increased from 128 g/l to 211 g/l, total acidity decreased from 8.3 g/l to 7.5 g/l, and malic acid content dropped from 1.9 g/l to 1.5 g/l. Notably, there was an observed increase in the concentration of nitrogen substances during this timeframe.

These observations capture the content and dynamics of changes in various physicochemical indicators in wines produced from the extensively studied "Hastakot" grape variety (Table 1, 2).

Anthocyanins are red pigments primarily found in the grape skin, occasionally in the fruit itself, and they possess a structure similar to flavonoids (Table 3). The color of anthocyanins is notably influenced by pH levels; in general, lower pH values result in a more stable compound, which contributes to the red coloration. During the fermentation process, phenolic substances emerge and undergo continuous transformations (Jacobson, 2006).

Various flavor characteristics of wine made of "Hastakot" grape variety were assessed and compared using a rating method of sensory evaluation.

Table 1. The content of some physicochemical indicators of the grape samples "Hastakot"*

INDICATORS					
Sugar content, g/l	**Total acidity, g/l**	***pH***	***$NH4^+$*, mg/l**	**YAN, mg/l**	**Malic acid, mg/l**
128	8.3	2.75	100	119.7	1.9
158	7.7	2.95	118	278	1.8
211	7.5	3.1	139	315.2	1.5

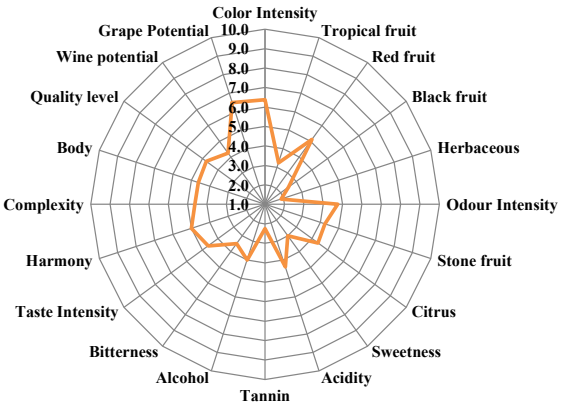
Table 3. The content of total phenols and anthocyanins in the examined wines.

Samples	**Indicators**	
	Total phenols, mg/l	**Total anthocyanins, mg/l**
Red wine	2940	608
Rosé wine	2586	128,9

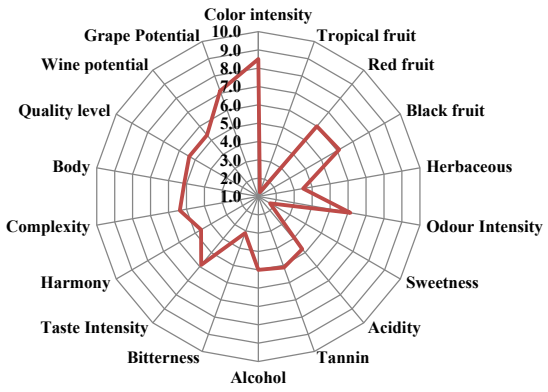
Table 2. The content of some physicochemical indicators in the examined wines*

Physicochemical indicators	**Alcohol**	**Total acids**	**Volatile acidity**	**Extract**	**Brought extract**	**Sugar**	***pH***	**Free *SO^2***	**Total *SO^2***	**Reductons**
Unit of measurement	Vol. %	g/l	g/l	g/l	g/l	g/l	-	mg/l	mg/l	mg/l
Red wine	12.8	5.1	0.4	28.9	28.9	0.1	3.1	45.9	133.6	1.39
Rosé wine	12.6	5.6	0.3	29.3	28.9	0.1	3.0	47	109.5	1.40

*Composed by the authors.



Picture 2. The aroma wheel of "Hastakot" rosé dry wine *(composed by the authors)*.



Picture 3. The aroma wheel of "Hastakot" red dry wine *(composed by the authors)*.

The results are presented below. Fifteen specialists participated in the tasting. Initially, tasting participants identified a range of characteristics using the descriptive method. These descriptors were subsequently categorized into groups, with a specific emphasis on highlighting the most prominent attributes. Following this, the intensity of these characteristics was rated using a 1-to-10-point scale. Upon summarizing the final results, aromatic wheels were developed to represent the sensory indicators of the wines (Wang, 2019).

According to the sensory indicators, the rosé wine made of the grape variety "Hastakot" can be characterized. The color of the rosé wine was rated as quite intense, with noticeable fruit aromas-primarily red fruits and very little tropical notes. No green aromas were detected. The overall intensity of the general aromas was considered above average, with the presence of observed red berries, rated at a medium intensity. The sweetness of the wine was evaluated as very low, while acidity was rated as medium. The amount of tannins in the rosé wine made from "Hastakot" grape variety was estimated to be low, which is highly favorable for the light rosé wine. The overall flavor intensity of the wine received a high rating. Based on the evaluations, it can be concluded that the rosé wine made of "Hastakot" grape variety is harmonious.

The red wine derived from "Hastakot" grape variety exhibits a notably high color intensity. It features distinct fruity aromas, with a prevailing presence of black fruit notes and a substantial presence of red fruit aromas. Notably, there are no discernible tropical fruit aromas, and only a few herbal hints were detected in the wine. The overall intensity of the wine's aromas was rated as above average. The sweetness of the wine was assessed as very low, while its acidity was found to be quite high. The wine exhibited a notable elevation in tannin levels, indicating an astringency presence. The alcohol sensitivity is moderate, and bitterness is low. The overall flavor intensity of this red wine, made of "Hastakot" grape variety, was also rated above average.

In summary, this wine is generally regarded as having a medium harmony and above-average aromatic complexity. Based on the final evaluation, this wine is categorized as having medium potential. It is noteworthy, however, that the winemaking potential of the "Hastakot" grape variety itself was assessed as high.

Conclusion

"Hastakot" grape variety and the capabilities of making rosé and red wines of it were investigated, resulting in the determination that it is indeed feasible to produce wines of this grape variety that adhere to international standards. Notably, the overall quality of both rosé and red wines received an above-average rating. Additionally, the potential of these wines, assessed based on the characteristics of sensory indicators, exceeded the average standard. The assessment, rooted in the sensory indicators of wine, highlighted an above-average potential for wines derived from "Hastakot" grapes.

The research has revealed captivating perspectives on the winemaking capabilities of "Hastakot" grape variety. Nonetheless, we firmly advocate for a pressing need for more comprehensive and profound research in the future, a commitment we have consistently undertaken.

References

1. Gabrielyan, A.H. (2021). Grape and wine quality control: The role of chemical and organoleptic analyzes in winemaking, Yerevan, - pp. 3-48 (in Armenian).
2. ISO 5495:2005 - Sensory analysis — Methodology https://www.iso.org/standard/31621.html.
3. International Organisation of Vine and Wine https://www.oiv.int/.
4. International Organisation of Vine and Wine. "Compendium of International Methods of Wine and Must Analysis", OIV-18 RUE D'AGUESSEAU-75008.-PARIS, Edition 2016. - Vol. 2. - 762 p.
5. Jean, L. Jacobson (2006). Introduction to Wine Laboratory Practices and Procedures. United States of America: Springer Science + Business Media, inc, - 375 p.
6. Melyan, G., Safaryan, D., Nersisyan, A. (2019). Ampelography, Yerevan, - pp. 61-70 (in Armenian).
7. Muradyan, Z., Aghajanyan, Zh. (2012). Winemaking and juice production, Yerevan (in Armenian).
8. Muradyan, Z., Mikayelyan, M., Avetisyan, A. (2017). Methodological instructions for the investigation of physicochemical indicators of wine. ANAU, Yerevan, - pp. 23-55 (in Armenian).
9. Pascal Ribereau-Gayon, Denis Dubourdieu (2006). Handbook of Enology - The Microbiology of Wine and Vinifications (2nd Edition); John Wiley & Sons Ltd, England http://dx.doi.org/10.1002/0470010363.
10. Wang, Q.J., Spence, C. (2019). Is complexity worth paying for? Investigating the perception of wine complexity for single varietal and blended wines in consumers and experts. Aust. J. GrapeWineRes, - pp. 248-250 http://dx.doi.org/10.1111/ajgw.12382.

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