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**BIOLOGICAL AND CHEMICAL COMPOSITION OF GRAPES AND THE TECHNOLOGY FOR PRODUCING MOLASSES AND JUICE CONCENTRATE FROM INDUSTRIAL GRAPE VARIETIES***N. Ch. Narkabulova,**Associate Professor, Tashkent State Agrarian University**A. O. Ismoilov,**Master's Student, Tashkent State Agrarian University***Abstract**

This article analyzes the scientific basis of the production processes of high-quality bekmes and juice concentrates from technical grape varieties grown in Uzbekistan. The processes of mezga extraction, CaCO<sub>3</sub>-based distillation, vacuum-boiling, and low-temperature concentration presented in the article were studied. The effect of the temperature regime in the range of 65–90 °C to achieve a sugar concentration of up to 70% was studied, and it was found that the efficiency of vacuum apparatus is higher than that of traditional open distillation.

**Keywords**

Grapes, bekmes, concentrate, distillation, vacuum apparatus, sugar content, technological process.

Grapes are the third most widely produced processed product in the world, following apples and oranges. The large-scale production of grapes is directly related to the variety of its composition and processing possibilities. From the grape pulp, products such as juice, wine, elixir, raisins, and others are produced. Additionally, medical and cosmetic oil can be extracted from its seeds, and phenolic substances are obtained from its skins and juice. The biological value of grape pulp is associated with its content of mineral salts, vitamins (A, B1, B2, B6, RR, S), and microelements (Mn, Cu, Al, Cr, Zn, B, Rb, Ti, V, Co, Ni), all of which play key roles as participants and catalysts in many physiological processes in the human body. The substances like Ca, K, Fe, Mg, and P in the grape pulp are extremely beneficial for the human organism as structural and blood-forming materials. Today, the total grape yield exceeds 78.5 million tons, with major producers including China (12.6 million tons), Italy (8.4 million tons), France (6.2 million tons), Spain (5.9 million tons), the United States (5.4 million tons), and Turkey (4.2 million tons). Uzbekistan ranks 11th in this list with a total production of 1.8 million tons.

**Results and Analysis: Biochemical Composition of Grape Juices**

It is well known that the quality and the nutritional value of the final products like grape juice, wine, and elixirs are directly influenced by the biochemical composition of the grape pulp, including the sugar content, total acidity, and the presence of biologically active substances. These characteristics make grapes not only valuable for processing but also as a natural product with high nutritional value.

In Uzbekistan, varieties such as Bayan Shirey and Saperavi from the *Vitis vinifera* L. species are widely cultivated. In this study, the biochemical characteristics of 5 white and 6 black grape varieties grown in the Parkent region were analyzed, comparing them to these well-known varieties. Laboratory tests revealed the following parameters in the samples: total sugar content,

total acidity, soluble solids content, juice pH, phenolic compounds, and antioxidant activity (measured by the ABTS method).

The analysis showed that in white grape varieties, the highest sugar content in grape juice was observed in Muscat Rose (26.1%), which was 3.8% higher than the control – Bayan Shirey variety (22.3%). The lowest sugar content was found in the Rkatsiteli variety (18.7%), which was 3.6% lower than the control. The sugar content in the other varieties ranged from 19.8% to 21.8%.

Among the red grape varieties, the highest sugar content was found in the Rangdor variety (23.8%), which was 3.6% higher than the control – Saperavi variety (25.2%). The lowest sugar content was found in the Pino Nuar variety (20.3%). The sugar content in the other red varieties ranged from 21.9% to 23.4%.

From a technological perspective, a higher sugar content in grape juice signifies a higher nutritional value, energy (calories), and sweetness of the products obtained. However, the total acidity of the juice is also an important indicator, as it balances the sweetness and imparts a distinct sweet-sour taste.

The total acidity in the white grape varieties also varied depending on the biological characteristics of the varieties. The highest acidity was found in the Riesling variety (10.6%), which was 5.2% higher than the control – Bayan Shirey variety (5.4%). The acidity in the other white varieties ranged from 5.9% to 9.5%.

For red grape varieties, the total acidity ranged from 7.3% in the Morastel variety (which was 3.1% lower than the control) to 10.6% in the Pino Nuar variety (which was 0.2% higher than the control).[2]

In the production of high-quality functional products, the presence of powerful antioxidant compounds such as flavonoids, flavonols, flavan-3-ols, phenolic acids, and stilbenes is crucial. These compounds are more abundant in black grape varieties. Our analysis revealed the presence of polyphenol compounds with antioxidant activity, such as quercetin, apigenin, kaempferol, gallic acid, rutin, and cis-3,4',5-trihydroxystilbene (resveratrol), in the black grape varieties grown in Parkent. The following table shows the content of polyphenol compounds in the grape juices from different black grape varieties. [3]

**Table 1: Phenolic compounds and their content in grape juice of black grape technical varieties of grapes grown in the conditions of the Parkent region, mg/100 g**

Varieties	Quercetin	Apigenin	Kaempferol	Gallic acid	Rutin
Saperavi	28,364	12,610	12,674	471,801	11,736
Xindogni	28,314	26,514	-	280,753	21,640
Morastel	27,995	15,428	-	456,594	19,750
Rangdor	27,928	13,324	15,754	448,573	28,364
Kaberne Savinyon	43,328	45,326	-	1367,395	-
Pino Nuar	29,750	-	-	451,678	-
Mayskiy	27,840	-	-	635,627	-
$\Sigma K\Phi_{05}=\$	<b>1,10</b>	<b>1,03</b>	<b>1,03</b>	<b>25,50</b>	<b>0,83</b>
$Sx=\%$	<b>3,61</b>	<b>4,54</b>	<b>4,68</b>	<b>4,34</b>	<b>4,09</b>

#### Discussion and Conclusion:

1. The largest grape bunches in the white grape varieties were observed in the Soyaki variety (770.3 g), whereas the smallest were found in the Riesling variety (89.8 g). The average bunch weight in the other varieties ranged from 191.1 g to 345.7 g.

2. Among the black grape varieties, the largest bunches were found in the Rangdor variety (362.8 g), and the smallest in the Cabernet Sauvignon variety (72.3 g).
3. The highest juice yield during pressing was recorded in the Muscat Rose, Riesling, and Kuldjinskiy varieties, ranging from 74.6% to 76.2%.
4. The highest juice yield in the black grape varieties was recorded in the Rangdor and Mayskiy varieties (77.5% and 74.4%, respectively).
5. Among the white grape varieties, the Muscat Rose had the highest sugar content (26.1%), while the lowest was in the Rkatsiteli variety (18.7%).
6. Among the black grape varieties, Rangdor had the highest sugar content (25.2%), and the lowest was in the Pino Nuar variety (20.3%).
7. The black grape varieties contained significant amounts of polyphenolic compounds like quercetin, apigenin, kaempferol, gallic acid, rutin, and resveratrol.
8. The highest quercetin content was observed in the Cabernet Sauvignon variety (43.328 mg/100 g), while the highest apigenin content was also found in this variety (45.326 mg/100 g).
9. The highest resveratrol content was found in the Pino Nuar and Rangdor varieties, with values of 151.5 and 149.2 µg/100 g, respectively.

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