Cryoextraction Of Grapes And Its Influence On Physical And Chemical Indicators Of Wine Materials

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ABSTRACT

In order to produce and expand the range of export-oriented wine products from technical grape varieties, "cryoextraction" was studied as a non-traditional grape processing method for Uzbekistan. Scientific research has established the possibility of using cryoextraction of grapes grown in Uzbekistan to improve the physicochemical characteristics of wine materials. This method is promising in the technology of producing unique, high-quality wines that will harmoniously combine high acidity with high sugar content while maintaining the varietal aroma with an overlay of aroma formed by the production technology.

Keywords:

Winemaking and viticulture of the Republic of Uzbekistan occupies a decisive place in the socio-economic development of the country. Uzbekistan has a rich raw material base and favorable soil and climatic conditions for the production of valuable wine products. Today, winemakers face a big task - to provide the population of the republic with high-quality wines and supply them to the world market [1].

Technical grape varieties of Uzbekistan are considered low-acid, but even if at the moment of technological maturity they have sufficient acidity (for example, Bayan-Shirey) - 6-7 g / dm ^{3} , but even at the time of grape harvest , at one moment they can lose acidity, while simultaneously increasing sugar content Therefore, innovative research began with grape processing , with the goal of finding ways and technological methods for preserving and increasing the acidity of grapes. Subsequently, this will affect the formation of quality, varietal characteristics, and maintaining the competitiveness of export-oriented finished products . Its role is to conduct innovative research and advanced technologies necessary to maintain and increase the competitiveness of Uzbekistan's wine products. [2].

An analysis of available raw materials resources revealed the need for their rational use in order to produce high-quality competitive wines.

Icewine wines were originally created in the 1700s, native to the cold-climate wine regions of Europe - Germany and Austria, ideally suited to the climatic conditions of Canada, developed in Australia, but not typical for the hot climate of Asia and its saline soils. But at the same time, in Uzbekistan in 2019, from 18,256 hectares of vineyard area under technical varieties, a harvest of 19,972 tons of grapes was produced. Of these, 11,005 tons were received for processing and the trend of overproduction of finished products continues , with low demand in the domestic market . It should be noted that the

European markets are also overcrowded, so there is a need to develop innovative technologies for the production of export-oriented products, expanding its range, oriented to the East.

Let us give a description of European and domestic grape varieties . In Germany, its homeland, Eiswein is prepared from the Rhine Riesling grape variety, a technical grape variety of medium ripening period. The clusters are medium, small cylindrical, cylindroconical, medium dense. The berries are medium, small, round, yellow-green with a golden-brown tan. The skin is thin, durable, covered with clearly visible brown dots. The pulp is juicy and melting. Productivity 90-120 c/ha. Used for the preparation of table wines and champagnes, as well as strong and dessert wines. The grapes are harvested at a sugar content of 17-19% and a titrated acidity of 7-9 g/ dm^3.

For research, we selected two technical varieties of grapes grown in Uzbekistan: Bayan-shirey, a late-ripening variety, medium or large clusters, loose, cylindrical or cylindrical-conical, dense. The berries are medium, almost large, round, greenish-yellow, with brown spots when ripe. The skin is medium thick and covered with a waxy coating. The pulp is juicy. Productivity 120-200 c/ha. Recommended for the production of dry wines and juices. The grapes are harvested with a sugar content of at least 18%.

Muscat Uzbekistan - late ripening grape variety. The clusters are very large, branched, of medium density. The berries are large, obovate, greenish-yellow. The skin is dense. The pulp is fleshy-juicy, crispy, with a nutmeg aroma. Productivity 400-450 kg-ha. Used for consumption in raisined and fresh form.

The grapes were left on the vine until December, after harvesting they were artificially cryoextracted at a temperature of -8°C. Experimental options for obtaining frozen grape juice and Icewine type wine material:

1-must of Bayan wider grape variety - without low-temperature treatment; 2-must of Muscat Uzbekistan grape variety without low-temperature treatment; 3-must of Bayan Shirey grape variety with low temperature processing; 4-must of Muscat Uzbekistan grape variety with low-temperature processing.

Low-temperature processing of grapes results in a high degree of extraction, completeness and concentration of components and aroma in the final product. Ripe berries are dehydrated through constant icing and thawing. This process concentrates the sugars, acids, and extractives of the grape berry, enhancing the aroma and giving the Icewine wine material the complexity of its taste [3]. The water in the berry freezes and forms ice crystals, which separate from the sugars, acids and flavor components. After pressing, the ice crystals began to melt and the sugar level of the extracted juice of the Bayan-shirey variety increased by 17% and by 25% for Uzbekistan Muscat.

Saccharomycess was introduced vini Rkatsiteli 6. CHKD was prepared by reseeding them from agar-agar onto the sterile wort under study [4]. At each reseeding, the volume of wort was increased. The rapidly fermenting yeast mixture was introduced in an amount of 8% of the wort volume.

In the first variant, fermentation began on the second day, the color of the foam is bright orange with small individual brown islands, the height of the foam is 1-3 cm, the bubbles are uniform (0.5-1 mm), yeast grounds are present.

The third version of the wort after low-temperature treatment, fermentation proceeds vigorously, with high foam from 5 to 9 cm. The bubbles on the surface of the fermenting wort are small, with increasing altitude they become larger, there are islands of dead yeast cells, but from below it is pushed by fresh white light bubbles. The color is identical to the color of the first variant, where the wort was not subjected to low-temperature treatment.

Now let's compare the fermentation process of processed and untreated must of Uzbekistan Muscat grapes. In the second option, the bubbles are small and large interspersed, the foam height is approximately 2 cm, homogeneous, there are also islands. There are also many dead cells in the biomass throughout the volume. Low-temperature processed wort ferments vigorously, the bubbles are approximately uniform, heavy, 0.5-2 cm in size. There are brown islands in the volume of the container. The bubbles in the center are fresh and white. The color is slightly lighter than the prototype.

At the end of post-fermentation, a physical and chemical analysis of experimental and control samples of dry wine materials was carried out.

Conducted an organoleptic assessment of wine materials. Ice wine materials had a fresh, resonant taste and aroma with intense acidity that cleanses the palate and gives the wine freshness, depth, longevity and a long finish. The aroma of Bayan Shirey Icewine was distinguished by its freshness and pleasant floral-fruity aroma. Apparently, the floral-fruity aroma develops precisely during the fermentation period, since the Bayan Shirey grape variety has a mediocre taste and does not differ in varietal aroma. At the same time, low-temperature processing of grapes contributed to the concentration of flavor-forming substances in the raw materials.

Table 1

PHYSICO- chemical indicators of wine materials

No.	indicators	No low temperature treatment		With low temperature treatment	
		Bayan wider	Muscat Uzbek	Bayan wider	Muscat Uzbek
1	Strength, vol%	15.5	14.9	17.2	16.7
2	Acidity, mg/dm ^{3}	4.5	3.3	3.7	4.2
3	Volatile acidity, mg/dm ^{3}	0.59	0.33	0.73	0.66
4	Sugar content, %	footprints	1.2	2.6	3.2
5	Sulfur, mg/dm ^{3}	44.8	57.6	32.0	32.0

The wine material of the prototype Uzbekistan Muscat variety had an uncharacteristically weak aroma for this grape variety. This is explained by the fact that complete vigorous fermentation of the must contributes to the loss of varietal aroma, especially since the grapes were harvested at late ripeness.

European wines of the Icewine type usually have 15 vol% actual alcohol, but no more than 22 vol%, often from 17 to 20 vol%. Fermentation is either completely inhibited or stopped by adding alcohol (grape brandy), leaving a lot of unfermented sugar.

In the test samples, further fermentation was carried out until the residual sugar content was within 1-3%. In experimental samples, the strength of the wine material is accumulated through the natural alcoholic fermentation of sugars concentrated during low-temperature processing of grapes. After fermentation in option 7 with wine material of the Bayan-shirey variety, the strength is equal to -17.2 vol%; for wine material Muscat Uzbekistan - 16.7 vol.%

Acidity is another important characteristic of Icewine. It is this acidity that sets Icewine apart from most other dessert wines, and when it is in perfect balance with the high sugar content created by the natural freezing process, it makes Icewine such a unique and truly great wine.

When low-temperature processing of Bayan wider grapes occurs, the titratable acidity value remains unchanged (3.6 mg/dm^3), while Muscat increases. It has been established that the fermentation process does not identically affect the value of titratable acidity: in wine materials of the Bayan Shirey variety without low-temperature treatment, the acidity increases to 4.5 mg/dm ^{3}, and in wine materials of the Bayan Shirey variety obtained by fermentation of cryoextracted grapes, the titratable acidity decreases. The behavior of the Muscat variety in terms of titratable acidity is somewhat different. Low-temperature processing somewhat concentrates the acidity of both the must and the wine material.

Conditional indicators of Icewine type wine such as acidity, sugar content and alcohol content are accumulated only through synthesis under natural conditions of technological production. therefore, the technology for processing cryo-extracted grapes grown in Uzbekistan will improve the quality, uniqueness, originality and competitiveness of wines.

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