

Influence of the parental forms on the storage ability of the newly evolved grape varieties

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Grapes are an important source of various vitamins and minerals, and cold storage is a way to prolong their consumption period. In Azerbaijan, there are about 600 varieties, the majority of them being table ones, and it is necessary to determine the varieties most suitable for long-term storage. As objects of study, we chose two new hybrid varieties created at the Azerbaijani Institute of Viticulture and Wine-making. The grapes were stored at 0...-1°C temperature and relative humidity of 95% for three months. To prevent decay, we used weekly fumigation with sulphur anhydride. In the Azeri hybrid variety, the outcome of standard production after storage was 72%. So, this variety appeared promising for further studies to determine the optimal harvest time and clarify storage technologies.

Keywords: *Variety, storage ability, type of losses, perspective*

INTRODUCTION

Azerbaijan is among the most perspective regions for the development of viticulture in different use directions. The favourable location, various natural conditions in connection with mountainous-plane orography, and considerable diversity of the climatic and soil conditions of viticulture regions make it possible to grow here the grapes of all ripening periods for processing and for local consumption, long-term storage and transportation to industrial centres, as well as drying (Panahov et al., 2010; Sharifov, 2013). Due to their nutrition and diet characteristics, grapes positively affect human health (Restani et al., 2016; di Lorenzo et al., 2015, 2016). However, as a seasonal product, the grape's shelf life is restricted to 3 to 4 months. One of the ways to extend the period of fresh grapes consumption is by organizing its cold storage during the winter season. Storageability means the ability of grape bunches to preserve their appearance and

organoleptic features for several months without considerable weight losses and damages caused by phytopathological and physiological diseases. The individual traits of the variety are the most important indicator that provides the success of a grape's long-term storage (Jeneyev, 1971; Ahmadi and Vafaei, 2023). Not all the best table grape varieties are fit for storage and transportation because of the thinness of their skin. Azerbaijan is the country of origin of the numerous table grape varieties distinguished by good taste, attractive appearance, transportability and storage ability. Also, highly productive introduced varieties with high-quality berries are widespread here. Unfortunately, a relatively low number of varieties are suitable for long-term storage. Fully ripened varieties of the late-ripening period, with pulpy and crusty berries and loose bunches, are more appropriate for this purpose, for example in the conditions of Azerbaijan, these

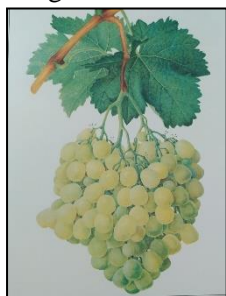
are Aghadayi, Tayfi pink, Gara shany, Tabrizi, Moldova, etc. (Negrul et al., 1973; Asadullayev and Abasova, 2012; de Lorenzis et al., 2015).

At different times, researches were carried out in Azerbaijan on the selection of grape varieties suitable for long-term storage. In this publication, we present the results of cold storage of Azeri (Katta-Kurgan x Tabrizi) and Genjevi (Ag Shany x Bayanshira) varieties created at the Experimental Station in Ganja, west of Azerbaijan Republic.

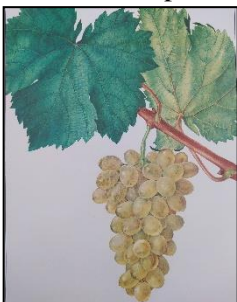
MATERIALS AND METHODS

Below are the short descriptions of the parental forms of the studied varieties.

Ancestors of the **Azeri** variety – Katta Kurgan and Tabrizi.



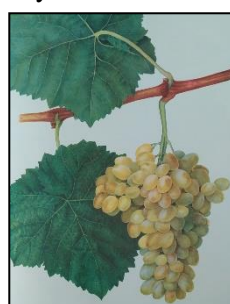
Katta-Kurgan - table grape variety of the late period of ripening. Homeland - Central Asia. It belongs to the eco-geographical group of oriental grape varieties. The leaves are large, fan-shaped, slightly dissected, five-lobed, smooth, glabrous. The flower is functionally feminine. Clusters are large, wide-conical, winged, loose or of medium density, and weigh an average of 400 g. Berries are large, round-oval or obovate, light green. The skin is thick and fragile. The pulp is fleshy, juicy, and tender. The period from the beginning of bud break to consumer maturity of berries is 145 days at a sum of active temperatures of 2950°C. Shoot maturation is good. Bushes vigorous. Productivity is 70-80 c/ha. Relatively resistant to fungal diseases. The frost resistance is weak. The yield is used for fresh consumption and drying.



Tabrizi - Azerbaijani table grape variety of medium ripening. It belongs to the eco-geographical group of oriental table grape varieties. The leaves are large, five-lobed, funnel-shaped, dark green, shiny, slightly reticulate-wrinkled, glabrous below. The type of

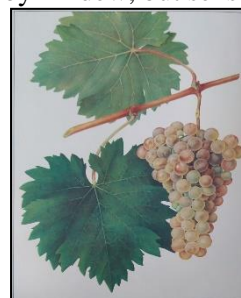
flower is hermaphroditic. Bunches are medium, conical, and dense. The berries are medium, oval, white, and golden when overripe. The peel is elastic, durable, and pruinose. The pulp is juicy. The period from the beginning of bud break to the full ripening of grapes is 140 days at a sum of active temperatures of 3490°C. Shoot maturity is good. Bushes are vigorous. Productivity is 100-150 c/ha. Variety is slightly damaged by mildew, and non-resistant to oidium, frosts and *Lobesia botrana*. Highly transportable and of good storage ability. The yield is used for fresh consumption.

Ancestors of the **Genjevi** variety – Ag shany and Bayanshira.



Ag shany - Azerbaijani table grape variety of medium ripening period. It belongs to the eco-geographical group of oriental grape varieties. The period from the beginning of bud break to the full maturity of berries in Azerbaijan is on average

121 days at a sum of active temperatures of 2600°C. Bushes are vigorous. The leaves are large, pentagonal in shape, slightly dissected, with barely prominent lobes, there is no pubescence below. The petiole notch is tightly closed. The lower blades overlap one another very deeply. The flower is functionally feminine. The clusters are medium or large, wide-conical or cylindrical-conical, sometimes with developed lobes, branched at the base, density varies depending on pollination. The berries are large, oval, somewhat asymmetrical, whitish-yellow, golden yellow when fully ripe, and light brown on the sunny side. Shoot maturation is good. Productivity is 50-90 c/ha, with irrigation 200-400 c/ha. The variety is drought tolerant. Ag shany is slightly damaged by mildew, but sensitive to oidium.



Bayanshira – Azerbaijani wine grape variety of late ripening period. It belongs to the eco-geographical group of oriental grape varieties. The leaves are large, rounded, five-lobed, medium dissected, folded or funnel-shaped, grooved,

glabrous below. The petiolate notch is lyre-shaped with a sharp bottom or closed with a lumen. The flower is hermaphroditic. Clusters are medium or large, loose, cylindrical, dense. The berries are medium, almost large, round, greenish-yellow, with brown spots when overripe. The peel is of medium thickness, covered with a wax coating. The pulp is juicy. The period from the beginning of bud break to the harvesting maturity of grapes is 165 days at a sum of active temperatures of 3500°C. Shoot maturation is good. Bushes are

vigorous. Productivity is 120-200 (when irrigated - up to 350 c/ha). The grape variety Bayanshira is moderately resistant to mildew, oidium, sensitive to frost and drought, grey mould and phylloxera.

RESULTS AND DISCUSSION

Below we present the ampelographic descriptions of studied grape varieties using Multi-crop passport descriptors (MCPD) for Grapevine (Alercia et al., 2015).

Table 1. Description of the Azeri grape variety







Azeri B (AZE007)				
Multi Crop Passport Descriptor Data				
	Color of berry skin	green		
	Variety name	Azeri		
	Genus, Species	VITIS VINIFERA LINNÉ		
	Country of origin of the variety	Azerbaijan		
	Use (crop name)	WINE GRAPE		
	Holding institution	<i>Scientific Research Institute of Viticulture and Winemaking of Azerbaijan</i>		
Priority descriptor data				
OIV 004	Young shoot: density of prostrate hairs on the shoot tip	3-low		
OIV 051	Young leaf: color of upper side of blade (4 th leaf)	2- yellow		
OIV 068	Mature leaf: number of lobes	2- three		
OIV 070	Mature leaf: area of anthocyanin coloration of main veins on the upper side of blade	1- only at the petiolar point		
OIV 076	Mature leaf: shape of teeth	3- both sides convex		
OIV 079	Mature leaf: degree of opening / overlapping of petiole sinus	9- strongly overlapped		
OIV 084	Mature leaf: density of prostrate hairs between main veins on lower side of blade	1- none or very low		
OIV 087	Mature leaf: density of erect hairs on main veins on lower side of blade	1- none or very low		
OIV 223	Berry: shape	2-globose or 3- broad ellipsoid		
OIV 225	Berry: color of skin	1- green yellow		
Bunch / berry descriptor data				
OIV 202	Bunch: length (peduncle excluded)	9-very long (about 170-230 mm)		
OIV 204	Bunch: density	5- medium		
OIV 206	Bunch: length of peduncle of primary bunch	3-short (about 30-40 mm)		
OIV 209	Bunch: number of wings of the primary bunch	2- (1 – 2 wings)		
OIV 220	Berry: length	7- long (about 18-23 mm)		
OIV 221	Berry: width	5 medium (about 17-22 mm)		
OIV 502	Bunch: single bunch weight low	7- high or very high (about 750-860 g)		
OIV 503	Berry: single berry weight	7- high (about 4-5 g)		
	Agronomic features			
OIV 301	Time of bud burst	5- medium		
OIV 303	Time of beginning of berry ripening (veraison)	5- medium		
OIV 351	Vigor of shoot growth	7- strong		
OIV 504	Yield per m ²	9- very high		
OIV 505	Sugar content of must	7- high (about 19-20%)		

Table 2. Description of the Genjevi grape variety

Genjevi B (AZE007)			
Multi Crop Passport Descriptor Data			
	Color of berry skin	green	
	Variety name	Genjevi	
	Genus, Species	VITIS VINIFERA LINNÉ	
	Country of origin of the variety	Azerbaijan	
	Use (crop name)	WINE GRAPE	
	Holding institution	<i>Scientific Research Institute of Viticulture and Winemaking of Azerbaijan</i>	
Priority descriptor data			
OIV 004	Young shoot: density of prostrate hairs on the shoot tip	1-none or very low	
OIV 051	Young leaf: color of upper side of blade (4 th leaf)	2- yellow	
OIV 068	Mature leaf: number of lobes	2- three or 3-five	
OIV 070	Mature leaf: area of anthocyanin coloration of main veins on the upper side of blade	1- only at the petiolar point	
OIV 076	Mature leaf: shape of teeth	3-both sides convex	
OIV 079	Mature leaf: degree of opening / overlapping of petiole sinus	5-closed	
OIV 084	Mature leaf: density of prostrate hairs between main veins on lower side of blade	1- none or very low	
OIV 087	Mature leaf: density of erect hairs on main veins on lower side of blade	1- none or very low	
OIV 223	Berry: shape	7- ovoid	
OIV 225	Berry: color of skin	1- green yellow	
Bunch / berry descriptor data			
OIV 202	Bunch: length (peduncle excluded)	9-very long (about 160-220 mm)	
OIV 204	Bunch: density	3-loose	
OIV 206	Bunch: length of peduncle of primary bunch	5-medium or 7-long (about 40-55 mm)	
OIV 209	Bunch: number of wings of the primary bunch	2- (1 – 2 wings)	
OIV 220	Berry: length	7- long (about 17-21 mm)	
OIV 221	Berry: width	5- medium (about 15-19 mm)	
OIV 502	Bunch: single bunch weight low	5-medium (about 370-430 g)	
OIV 503	Berry: single berry weight	5-medium or 7- high (about 4-6 g)	
Agronomic features			
OIV 301	Time of bud burst	5- medium	
OIV 303	Time of beginning of berry ripening (veraison)	3-early	
OIV 351	Vigor of shoot growth	7- strong	
OIV 504	Yield per m ²	9- very high	
OIV 505	Sugar content of must	7- high (about 18-19%)	

The experimental lot of Azeri and Genjevi grape varieties was put in cold storage in the Tovuz region in the western part of Azerbaijan and stored at 0°C and relative humidity of 95% for three months. To suppress the activity of epiphyte microflora, weekly fumigation with

sulfurous anhydride was applied. Tayfi pink and Tabrizi varieties served as control. The obtained results are shown in Table 3.

Table 3. Yield of standard product and composition of losses after 3 months of storage

Variety	Standard product, %	Losses composition, %		
		rotten	squashed	detached
Azeri	72	69	22	9
Genjevi	60	100		
Tayfi	87	70	30	
Tabrizi	100			

As we can see, the control varieties Tayfi and Tabrizi underwent long-term storage considerably better than the tested hybrids. It can be explained by the presence of worked storage technology for these varieties. At the same time, those created in our institute need the factors affecting the storage ability, such as ripening period, growing and storage conditions, - to be specified. Also, the study of the features defining the storage ability of the variety (transportability, natural weight loss, change of chemical composition and microflora during the storage period, etc.) should continue. Concerning the character of the losses, in the Azeri variety, they comprised mainly of microbiological rot, the amount of which was almost equal to the same indicator of the control variety of Tayfi. Both the paternal forms of this hybrid are distinguished by low transportability, and 22% of losses of the Azeri variety during the storage period consist of squashed berries; however, this is less than that in control. One of the paternal forms – the Tabrizi variety, is presumed to be little tolerant to sulfur dioxide, and during the fumigation, there could occur the destruction of peduncles and tissues of berries in the pedicel area; in the Azeri variety, we observed the considerable drying of the peduncle during storage period that led to 9% of losses because of the detached berries. As for the Genjevi variety, like one of the parental forms – Ag shany appeared to be significantly damaged by pathogenic microflora during the storage period; the losses (40%) entirely consisted of the rotten berries. In addition, by the end of the storage period, the bunches of this variety showed significant browning of the stem.

According to numerous literature sources, the individual characteristics of the variety have the most significant influence on the storage ability of the grapes (Burger et al., 2005; Ejsmentwicz, 2015, Potapenko and Ganich, 2015, 2016). The preliminary results indicate the presence of a visible connection between the physical-

mechanical features of the parental forms and the storage ability of the hybrid varieties studied. Judging the outcomes of the studies conducted, we can conclude that the studied hybrid varieties, especially Azeri, paternal forms of which possess the high (Tabrizi) and medium (Katta-Kurgan) storage ability, deserve to be subsequently studied for working out of the optimal storage technology.

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