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## ANNUAL DIFFERENCES IN CHANGE OF CHEMICAL COMPOSITION DURING MATURATION

**Abstract.** *In the process of ripening, due to the chemical processes occurring in the composition of the berry, its taste becomes more balanced. In the course of our research, we investigated the change in the organoleptic properties of grape varieties of medium (Gara Shany) and late (Agadayi and Moldova) ripening periods. There were held two tastings with a gap of two weeks. On the results obtained, it was determined that the evaluation mark of the Gara Shany variety slightly decreased, that of the Aghadayi variety remained unchanged, and of the Moldova variety – increased considerably. Such a situation can be explained by the difference in ripening periods of the studied varieties. Also, these results are to some extent consistent with the results of studies on changes in the chemical composition of the berries of these varieties: minimal changes were noted in the chemical composition of the Gara Shany variety, much more significant in the Agadayi variety, and the highest changes are noted in Moldova variety. From the foregoing, we can conclude that as a result of abnormal heat - a manifestation of climate change - the grapes reached maturity much earlier than normal; the process of changing the sugar/acidity ratio in early ripening varieties slowed down significantly, while in late-ripening varieties the process of increasing sugar content and reducing acidity continued, and the taste of these varieties became more harmonious.*

**Keywords:** variety, maturity, sugar content, acidity, climatic conditions.

**Introduction.** The choice of optimal harvesting time depends on the main indicators that determine the taste characteristics of the grapes - sugar content and acidity, as well as their ratio. The sugar content in grapes is mainly influenced by the degree of ripeness, variety, meteorological conditions of the year, and damage caused by diseases and pests. Higher sugar content is associated with its full physiological maturity, after which the increase in sugar stops and its level stabilizes. At this point, the weight of the bunches also increases. Therefore, if the grapes are harvested before they reach full maturity, the sugar content and yield of the vines are relatively low. It is impractical to store fully ripe bunches on vines; although the relative sugar content increases due to evaporation, the overall yield decreases. After 10 days of reaching full ripeness, the loss of sugar is 40-50 kg/ha. Therefore, when the grapes reach full maturity, they should be harvested in a short time. Requirements for the quality of the crop differ depending on the intended use: for cognacs and sparkling wines, the optimal sugar content is 16-20%, for table wines - 17-21%, and for fortified wines - 19-22%.

Weather conditions also greatly affect the timing of ripening and accumulation of sugar. The temperature of 28-30°C and sufficient humidity create favourable conditions for the accumulation of sugar. At temperatures above 35°C, the intensity of the increase in sugar content decreases, and prolonged drought leads to a decrease in sugar content. According to some authors, in dry areas, irrigation can increase the sugar content of berries. Conversely, if the soil is sufficiently moist, irrigation will lower the sugar content. As for the agricultural technology used, with an appropriate

level of pruning and vine formation, creating favourable lighting and heat conditions, an additional 1-1.5% sugar can be obtained [1-7].

**Materials and methods.** The studies were carried out in the Institute's Ampelographic Collection located on the Absheron Peninsula. The climate is subtropical. High temperatures in dry and hot summers are moderated by strong northerly winds. Winter is relatively mild, mostly cloudy, with frequent rains and sometimes snow. The average annual temperature is 13.5-14.4°C, the sum of active temperatures is 4192-4461°C, and the total amount of solar radiation is 130-135 kcal/cm<sup>2</sup> (most of them - 80-90 kcal/cm<sup>2</sup> occur in summer), annual rainfall - 200-250 mm. The coldest month is January (3.0-3.8°C), while the hottest months are July and August (up to 42°C). The number of frost-free days is 308, sunny - 220-230. The territory of the peninsula is subject to strong winds. In addition to improving plant transpiration, an increase in wind speed increases evaporation, resulting in dry soil. The highest level of evaporation is observed in July-August, and the lowest - is in February. The soils of the peninsula are predominantly sulphurous-sandy and clayey; saline brown soils are the most common. It should also be noted that due to global warming, the annual amount of precipitation on the peninsula has increased from the usual 200-250 mm in recent years to 250-300 mm. Thus, the type of climate could gradually change from continental to temperate.

Technological, biochemical, physiological and organoleptic studies were carried out within the framework of research work in the vineyards and the laboratories of the Azerbaijani Research Institute for Viticulture and Winemaking. Classical and modern research methods were used [8,9].

The sugar content of the berries was determined with a refractometer, and the acidity was determined by titration.

**Results and discussions.** The sugar content of juice is the main feature that determines the organoleptic value and direction of the use of grapes. Our studies have shown that in the process of ripening, the sugar content of all studied variants increased by 2.7-15.4%, depending on the variety.

In addition to the sugar content, the taste characteristics and quality of processed products are greatly influenced by another important indicator - the acidity of the juice. In our studies, the acidity of different varieties gradually decreased by 2.8-6.7%.

Table 1

### Change of biochemical composition during maturation

Variety	Year	Sugar, g/100 sm <sup>3</sup>					Titrated acidity, g/dm <sup>3</sup>				
		19.08	OIV (505)	03.09	OIV (505)	change %	19.08	OIV (506)	03.09	OIV (506)	change %
Moldova	2020	14,5		19,9		+37	13,2		6,1		-46
	2021	22,1	7	25,5	9	+15,4	7,5	5	7,0	3	-6,7
	2022	17,2		19,7			11,6		8,1		
Agadayi	2020	16,2		19,1		+18	9,3		6,1		-52
	2021	17,1	5	18,2	5	+6,4	3,2	1	3,0	1	-6,2
	2022	14,6		18,6			10,5		5,3		
Gara shany	2020	16,2		18,6		+15	9,1		5,1		-78
	2021	14,8	3	15,2	3	+2,7	3,7	1	3,6	1	-2,8
	2022	18,6		21,3			6,3		3,7		

Although regular processes occurred in all variants of the experiment - an increase in sugar content and a decrease in acidity, it should be noted that the intensity of these processes in the 2021 season was significantly lower than in 2020. This can be explained by extremely hot weather at the

end of summer of latter season, due to which the grapes reached full maturity much earlier than usual.

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### **РІЧНІ ВІДМІННОСТІ У ЗМІНІ ХІМІЧНОГО СКЛАДУ ПРОТЯГОМ ДОЗРІВАННЯ**

*У процесі дозрівання, завдяки хімічним процесам, що відбуваються в складі ягоди, її смак стає більш збалансованим. У ході наших досліджень ми досліджували зміну органолептичних показників сортів винограду середнього (Гара Шани) та пізнього (Агадаї та Молдова) строків дозрівання. Було проведено дві дегустації з інтервалом у два тижні. За отриманими результатами встановлено, що оцінка сорту Гара Шани децю знизилася, сорту Агадаї залишилася без змін, а сорту Молдова – значно підвищилася. Таку ситуацію можна пояснити різницею в термінах дозрівання досліджуваних сортів. Також ці результати певною мірою узгоджуються з результатами досліджень зміни хімічного складу ягід цих сортів: мінімальні зміни відмічено в хімічному складі сорту Гара Шани, значно більш суттєві у сорту Агадаї та найбільші зміни відзначені у сорту Молдова. З усього вищесказаного можна зробити висновок, що в результаті аномальної спеки - прояву зміни клімату - виноград досягав зрілості набагато раніше норми; процес зміни співвідношення цукор/кислотність у ранньостиглих сортів значно сповільнився, а у пізньостиглих продовжувався процес підвищення цукристості та зниження кислотності, смак цих сортів став більш гармонійним.*

**Ключові слова:** сорт, стиглість, цукристість, кислотність, кліматичні умови.