



# Effect of Pruning Intensity on the Chemical Composition of the Gara Shany Table Grape Variety in the Conditions of the Absheron Peninsula

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## Abstract

*The bud load influences the number of the fruitful shoots, fertility and productivity coefficients, total harvest, as well as the quality of the bunches, chemical composition, mechanical characteristics, transportability, and storage ability of the grapes. The quality of the grapes is decisively influenced by plant formation, pruning length, and soil and climatic conditions of the growing area. In this study, we investigated the influence of pruning length on the process of sugar accumulation in the juice of the Gara Shany local table grape variety grown on the Absheron peninsula, Azerbaijan. The pruning was performed in different lengths: 2, 4, 6, 8, and 10 buds. The highest sugar accumulation was noticed in the variants with pruning length for 6 and 8 buds. The highest productivity was also noted in these variants. The results allow us to recommend pruning the Gara Shany variety to 6 or 8 buds.*

**Keywords:** Pruning Length, Sugar Accumulation, Productivity.

## INTRODUCTION

The sugar content of the berries is a very important indicator, which largely determines the direction of use of the grapes. Besides varietal specifics, maturity, terroir, weather conditions of the year, the degree of spread of diseases and pests, the sugar content is considerably influenced by the techniques applied [1,2].

Pruning is among the most important operations in viticulture, and it is important to determine the optimal pruning length for each variety in each region. The length of pruning strongly affects the indication of buds' fruitfulness, which leads to changes in the size and location of the productive zone of the shoots. Too severe pruning leads to the reduction of the productive zone and its shift to the base of the shoot, and, on the contrary, when too many buds are left, this zone shifts upward by the shoot length. That's why the errors made when determining the pruning length seriously influence the quantity and quality of the harvest of a certain variety.

It has been established that in some varieties, which are prone to developing shoots from buds located far from the base of the shoot, short pruned, their productivity decreases for several years. In table grape varieties, too short pruning leads to a considerable decrease in the commercial grape yield, suitable for fresh consumption and long-term storage. To determine the productive shoots' optimal pruning

length, it is necessary to take into account that the nature of the productivity of buds along the shoot is conditioned by varietal specifics and growing environment. Demands for the quality of the harvest depend on its intended use. It should also be taken into account that buds can be damaged by late frosts, as well as the state of development of annual shoots. In years with severe frosts, the length of productive shoots is determined by the nature of bud damage along the shoot. This depends on where on the shoot the affected buds are located; shoots are pruned longer than usual.

To correlate the pruning length of productive canes with the vigor of annual shoots, "upper and lower thresholds" are established for each variety to determine this parameter. This means that more buds are left on canes with greater vigor. In addition to yield, bud load affects the amount of sugars and acids contained in the berry juice. Excessive bud load results in relatively small bunches, excessive looseness, and a poorer chemical composition of the berries. Conversely, insufficient bud load leads to reduced yield, which may not be acceptable to producers [2, 3,4].

## MATERIALS AND METHODS

The study was conducted in the vineyard of the Ampelographic Collection of the Azerbaijani Research Institute of Viticulture and Wine-making. The Collection is situated on the Absheron peninsula in the eastern part of the country, on the coast of the Caspian Sea. The Absheron Peninsula has a dry

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subtropical climate. The average annual temperature is 14°C, and the sum of active temperatures exceeds 4000°C. Annual precipitation is 200-300 mm; it's worth noting that in the recent past, annual precipitation on the Absheron Peninsula did not exceed 200-250 mm; due to global climate change, this figure has increased. Thus, there are signs of a gradual transition from continental to temperate climate in this area. The soil is predominantly sandy and calcareous.

The object of the study was a local table grape variety, Gara Shany (Fig.1). The variety number in the VIVC (Vitis International Variety Catalogue) [5] is 21990. Here is a short description of this variety:



**Figure 1**

The variety belongs to the group of the Black Sea basin (proles pontica Negr.). The leaves are of medium size, bright green, and five-lobbed. The flower is hermaphroditic. The bunches are large, conical-cylindrical, and of medium density. Berries are of medium size, round, and dark blue. The flesh is juicy, the taste is harmonious. The variety has a medium ripening period, vegetation period lasts 130 days. Gara Shany is resistant to diseases, but susceptible to Lobesia Botrana. The yield is up to 100 c/ha.

The shoots were pruned in five different lengths: 2, 4, 6, 8, and 10 buds. During the growing season, the uvological parameters of the bunches and berries, as well as changes in the chemical composition of the berry juice, were studied. The experiments were conducted using a standard methodology, and the ampelodescriptors of the International Organization of Vine and Wine [6] were used to evaluate the results.

For statistical accuracy, we used the ANOVA and Tukey's HSD (Honestly Significant Difference) test ( $p < 0.05$ ).

### RESULTS AND DISCUSSIONS

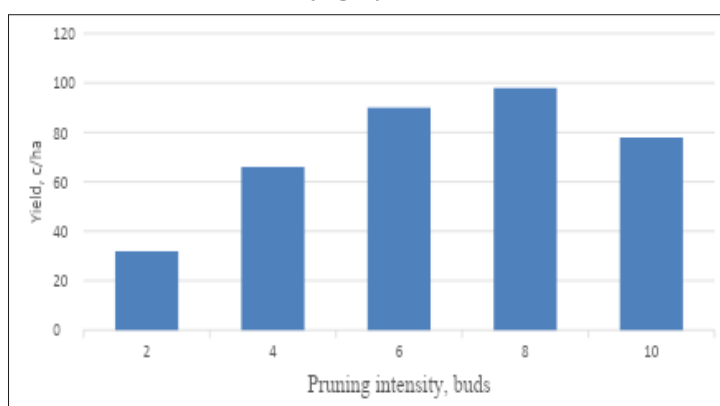
Below, we present the results of the study on the change of the sugar content in the juice of the Gara Shany variety.

**Table 1.** Sugar content in different pruning intensities

Variety	Pruning length, buds	Sugar content				increase, %
		15-20 of August		10-14 of September		
		g/100 cm <sup>3</sup>	OIV 505	g/100 cm <sup>3</sup>	OIV 505	
Gara Shany	2	16,1	5	18,1	7	12
	4	16,2	5	18,4	7	14
	6	16,2	5	18,6	7	15
	8	16,4	5	18,9	7	15
	10	16,2	5	18,4	7	14

The results are significant at  $p < 0.05$  for all experiment variants.

In literary sources, there are different opinions regarding the optimal pruning length to achieve the desired level of sugar content, from 2 to 10 buds [1,3,4]. Our research showed that all treatments demonstrated similar absolute increases in berry juice sugar content, ranging from 12 to 15%. According to the OIV 505 ampelodescriptor, sugar content across the treatments corresponded to the 7 points value (high) for all pruning variants. It should be noted that as the berries ripened, with a gradual decrease in acidity, the berry flavor became more harmonious. It is also important to note that the best yield results were also achieved for the treatments identified (Fig. 2).



**Figure 2.** Yield on different pruning intensities

According to the indicated experimental variants, the average bunch weight was about 180 g (score 3 according to the ampelodescriptor OIV 502), the yield per bush was up to 4.5 kg (score 9 according to the ampelodescriptor OIV 504), and the yield per hectare was up to 98.8 c.

## CONCLUSIONS

Thus, in the conditions of the Absheron peninsula, to get a better yield, it is recommended to prune the Gara Shany variety to 6-8 buds.

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