

MAIN INDICATORS OF YIELD OF NATIVE TABLE AND RAISIN GRAPE VARIETIES DISTRIBUTED GOYGOL DISTRICT, AZERBAIJAN

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Abstract. In the paper the main phenological phases as sap flow, bud break, flowering, crop ripening and physiological maturity, hereditary differences are studied in the territory of the Goygol region of Azerbaijan. For the first time the phenology of table and raisin of the various grape varieties was studied. The use of the above varieties for the development of kishmish and table viticulture in the Goygol region, was considered appropriate. It is shown that these varieties can be used both when laying new vineyards in the Ganja-Dashkasan economic region, and for research and enrichment of the grape plant gene pool in the Republic of Azerbaijan.

Keywords: *grapes, variety, phenology, raisin.*

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1. Introduction

Currently, Azerbaijan is undergoing a dynamic process of improving the varietal assortment of grapes. In improving the quality of grape products, the variety is of great importance and determines the direction of its use. In the technology of production of grape products, varietal differences also affect the quality of all types of products. The sustainable development of the agro-industrial complex is aimed at increasing scientific support and introducing innovative developments, especially to increase and preserve the fertility and productivity of grape crops (Ageyeva, 2019; Badouin *et al.*, 2020).

Under the current conditions the value of the grape variety is increasingly growing in of increasing the stability of the productivity of agrocenosis. This is due to the fact that this element of productivity, unlike growing technology, is the most independent of both environmental and energy and at the same time economic pressure and has the potential of a rapid increase in the area under this crop and the production of environmentally friendly products (Kravchenko, 2019a,b; Troshin *et al.*, 2019).

Currently, from the annually produced wine production of 40 million tons falls on the European continent, 9.2 million tons - on the American continent, 6.4 million tons - on the Asian continent. The world's largest exporters of table grapes are Italy, Spain, Turkey, the United States and Bulgaria. The countries of Europe (67%) account for 6 million tons of table grape production, Asia - 1 million tons, America - 1.5 million tons, African countries - 0.3 million tons. Italy annually exports 336-337 thousand tons to the world market, Bulgaria - 100-130 thousand tons, Spain - 90-140 thousand tons of table grapes.

Taking into account the growing consumer demand for seedless grapes in the world and the replenishment of the domestic assortment with new raisin varieties, this is the most important task aimed at increasing the efficiency of viticulture (Nenko *et al.*, 2019).

In Azerbaijan, along with valuable table and technical varieties, they also grow valuable kishmish grape varieties such as “Ag oval kishmish”, “Ag kishmish”, “Chakhray kishmish”, “Kyrmyzy kishmish”, “Kahvei kishmish”, “Yumru kishmish”, “Kara Kishmish, Dash Kishmish, Mparmari Kishmish, Kyor Kishmish, Absheron Kishmish, Khircha Kishmish”, “Sabza”, “Sultani Kishmish” and others, which, unfortunately, are exposed to the above stress factors every year. Therefore, to improve the quality and endurance of valuable kishmish grape varieties, research work on clonal breeding has been and is being carried out. To improve the quality and endurance, the study of variations was carried out by the method of individual selection, formed as a result of the variability of the soil. Separately, by the method of individual selection of clonal breeding, vegetative generations of highly productive varieties and valuable shoots were studied, the presence or absence of heredity was revealed, and those with valuable economic indicators transmitted by inheritance were selected and recommended to farms (Salimov *et al.*, 2018).

One of the main and important regions of viticulture in the Republic of Azerbaijan is the Ganja-Dashkesan economic region. Favorable soil and climatic conditions create ample opportunities for the development of viticulture in this area, as well as other agricultural crops. Appropriate measures were taken in the Goygol and Samukh regions of the Ganja-Dashkesan viticulture zone to increase the production of viticulture and other agricultural crops.

Azerbaijan, being one of the oldest centers for the development of viticulture in the world, has a rich gene pool of native and introduced cultivars and wild forms of grapes. As is known, in the populations of most ancient grape varieties, along with variations with positive properties, there are also variations with negative indicators. This leads to a decrease in the yield of vineyards and a deterioration in the quality of grapes. To solve this problem, it is important to clear populations of valuable grape varieties from variations and genotypes with negative characteristics through approbation, clonal and phytosanitary selection, as well as to identify and propagate biotypes and clones of grapes with positive economic indicators in order to increase the quantity and quality of the crop. Works in this direction are the most relevant today and form the basis of priority research in the field of viticulture (Huseynov *et al.*, 2018; Royo *et al.*, 2018).

The aim of the paper is the study of the following problems:

- Biodiversity of table and raisin grape varieties of the species *Vitis vinifera* L in the Goygol region;
- Assessment of agrobiological genetic characteristics;
- Biomorphological characteristics of varieties grown at different times;
- Ampelo-descriptor coding, identification of native and introduced varieties that are widely distributed;
- Introduction of promising varieties into the region.

2. Research methodology

In the experimental part of the paper work, raisins and table grape varieties were used as research material: Ag oval kishmishi, Chekhray kishmishi, Sary kishmishi, Khashabagy kishmishi, (a clone of the Sary kishmishi variety), Ag Khalili, Ag shany, Ganja gyzyly uzumy, Gara Huseyni, Gara Shany and Tabrizi grown in the Goygol region.

In the course of scientific research, phenological, biomorphological characteristics of grape varieties were carried out on the basis of generally accepted methods in viticulture.

3. Results

Goygol region is one of the main wine-producing regions of the Republic of Azerbaijan. Thanks to folk selection, valuable native and introduced grape varieties are widely distributed in this region. The grape varieties studied by us: Ag oval kishmishi, Chekhrai kishmishi, Sary kishmishi, Khashabagy kishmishi, (a clone of the Sary kishmishi variety), Ag Khalili, Ag Shany, Ganja gyzy grape, Gara Husseyini, Gara shany and Tabrizi are varieties of kishmish and table directions.

During the study period on the territory of the Goygol region, the main phenological phases were studied: sap flow, bud break, flowering, crop ripening and physiological maturity, as well as hereditary differences in the development of grape varieties grown in raisin and table directions.

The course of the main phenological phases of cultivars of grapes is presented in the table below (table 1).

The course of the general sap flow. On the territory of the Goygol region, in the identified table and raisin varieties, an average indicator of the total sap flow covering the years 2018-2020 was determined. It has been established that the general sap flow in the studied table and raisin varieties was recorded on the dates 19.03 - 24.03. It is noticed that the difference in the course of the general sap flow between varieties is 5 days. The earliest sap flow was observed in the variety Gara Husseyini and Gara shany, and the latest – Ag shany.

It has been established that, depending on the variety of grapes cultivated in a given area, soil and air temperature, the age of the vine, the development of the root system, the ecological region in which it is located and other factors affect the course of the general sap flow in the vineyards.

Bud burst

Budding on the bushes begins when the temperature in the soil is above 15 ° C. Mass development of buds in kishmish and table grape varieties is observed in 15.04-21.04. The blooming of buds in the Gara Shany variety was observed before any other variety, and Sary kishmishi was the latest to open the buds. The average air temperature during this period was 13.0-16.4 ° C, and soil moisture was 80-85%. The duration of bud development on bushes in the region was 7-9 days. There was no significant difference between varieties in mass bud break. This hereditary feature can be explained by the fact that they have the same origin.

Flowering.

To start flowering in the studied varieties, the optimum temperature was 25-32 15°C, the sum of active temperatures was 380-420oC. Mass flowering in kishmish and table varieties was observed from 05 to 10 June. The earliest flowering cultivar was Ag Khalili, the most late flowering cultivar was Gara shany. Flowering time was 8-9 days.

Harvest ripening.

Genetic differences in grape varieties are more pronounced in the ripening phase. The occurrence of genetic variations in different varieties of grapes is largely characterized by the value of the active temperature in the area, the amount of moisture in the soil and the number of sunny days. From a physiological point of view, the ripening

of the grape harvest is divided into the period of early ripeness, the period of technical ripeness and the period of physiological ripeness. In table varieties, the crop is harvested until the period of physiological ripeness

Among the table and kishmish varieties studied by us, the fastest ripening of the crop was observed in the Ag oval kishmishi variety 28.07, and in the Ganja gyzyl grape variety-26.09.

Leaf drop: With the natural fall of the grape bush, the leaves acquire a characteristic autumn color, the leaves easily come off the shoots. The gradual fall of yellow or red leaves from the lower nodes of some vines, even with a slight wind, is noted as the day the leaf fall begins.

Sometimes, unlike natural leaf fall, due to a severe drought in the fall, there are sharp disruptions in the life of the grapes, the leaves begin to dry and fall off prematurely. In the Goygol regions, the period of leaf drop was observed in the first half of November.

4. Main indicators of yield

The more shoots that develop in early spring in grape varieties, the number of fruiting shoots will increase proportionally. The formation of shoots depends on the development of the vine in the previous year. Under the conditions of normal agrotechnical care, after flowering, shoots begin to form in the axils of the leaves for the next year, and, depending on the course of development, the number of generative shoots also increases.

Table 1. The course of the main phenological phases of cultivated grape varieties (2018-2020)

| Varieties | General sap flow, mass | Bud burst | | Flowering | | Ripening of grapes | | From bud burst, day | | Leaf drop |
|---|------------------------|-----------|----------|-----------|----------|--------------------|----------|---------------------|---------------------------|-----------|
| | | mass | duration | mass | duration | mass | duration | Before flowering | Before the harvest ripens | |
| Goygol region | | | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| Raisin and table varieties | | | | | | | | | | |
| Ag oval kishmishi | 20.03 | 20.04 | 8 | 05.06 | 9 | 28.07 | 25 | 37 | 110 | 20.11 |
| Cekhrai kishmishi | 23.03 | 19.04 | 8 | 06.06 | 8 | 5.08 | 28 | 35 | 117 | 16.11 |
| Sary kishmishi | 22.03 | 21.04 | 9 | 06.06 | 10 | 29.07 | 29 | 39 | 115 | 18.11 |
| Khashabagy raisins, (a clone of the Sary kishmishi variety) | 21.03 | 18.04 | 7 | 07.06 | 9 | 02.08 | 27 | 38 | 118 | 24.11 |
| Ag Khalili | 21.03 | 17.04 | 8 | 05.06 | 9 | 10.08 | 32 | 38 | 115 | 24.11 |
| Ag Shany | 24.03 | 17.04 | 7 | 08.06 | 8 | 15.09 | 35 | 38 | 156 | 18.11 |
| Ganja gyzyl grape | 23.03 | 18.04 | 9 | 09.06 | 9 | 26.09 | 30 | 39 | 181 | 21.11 |
| Gara Husseyini | 19.03 | 17.04 | 8 | 07.06 | 10 | 21.08 | 34 | 38 | 140 | 21.11 |
| Gara shany | 19.03 | 12.04 | 7 | 10.06 | 9 | 8.09 | 31 | 43 | 155 | 19.11 |
| Tabrizi | 20.03 | 20.04 | 8 | 06.06 | 9 | 17.09 | 35 | 42 | 158 | 15.11 |

Table 2. Main indicators of yield (2018-2020)

| Varieties | Number of developing buds | | Fruiting shoots | | The number of clusters in one bush | Yield coefficient | | Yield per bush, kg |
|---|---------------------------|------|-----------------|------|------------------------------------|-------------------|------|--------------------|
| | Pieces | % | Pieces | % | | fruiting shoots | bush | |
| Ag oval kishmishi | 49,0 | 90,5 | 29,6 | 60,4 | 29,1 | 1,1 | 0,63 | 8,0 |
| Cekhrai kishmishi | 51,0 | 97,1 | 32,6 | 63,9 | 33,5 | 1,3 | 0,66 | 7,0 |
| Sary kishmishi | 51,2 | 91,0 | 32,5 | 63,4 | 36,4 | 1,2 | 0,75 | 8,5 |
| Khashabagy raisins, (a clone of the Sary kishmishi variety) | 53,0 | 92,0 | 30,5 | 57,5 | 32,5 | 1,2 | 0,71 | 6,5 |
| Ag Khalili | 51,0 | 92,0 | 30,3 | 57,1 | 34,1 | 1,0 | 0,51 | 7,5 |
| Ag Shany | 42,5 | 97,0 | 28,2 | 66,3 | 30,5 | 1,5 | 0,69 | 8,0 |
| Ganja gyzyly | 50,0 | 97,2 | 28,6 | 57,2 | 30,2 | 1,2 | 0,56 | 9,0 |
| Gara Husseyni | 51,0 | 94,1 | 31,6 | 61,9 | 33,4 | 1,3 | 0,56 | 6,5 |
| Gara shany | 66,0 | 82,5 | 28,5 | 43,1 | 32,8 | 1,3 | 0,75 | 9,5 |
| Tabrizi | 68,0 | 84,6 | 35,5 | 52,2 | 39,8 | 1,5 | 0,72 | 14,0 |

In the Goygol region, the percentage of shoots developing in kishmish and table varieties was 82.5-97.1%, and the number of fruit-bearing shoots was 43.1-66.3%. In viticulture, the number of clusters on the vines is one of the hereditary traits that form the basis of productivity. In the studied kishmish and table varieties, this figure was 29.1 - 38.9 units. The coefficient of yield of bushes in kishmish and table varieties was 1.0 - 1.5. The grape yield of these bushes was 0.51-0.75 (Table 2).

The use of productive varieties in vineyards is one of the main factors in increasing economic efficiency. Therefore, for the period of the study of varieties, the average three-year yields from one bush were calculated. The lowest yield among raisin and table grape varieties was 6.5 kg for the raisin variety Khashabagi, and the highest for the Tabrizi variety.

5. Conclusion

Goygol region is one of the important regions for the development of viticulture. In the course of scientific research, for the first time in the conditions of the Goygol region, the phenology and productivity of table and raisin grape varieties were studied as: Ag oval raisins, Pink raisins, Sary raisins, Khashabagy raisins, (a clone of the Sary raisins variety), Ag Khalili, Ag shany, Ganja gyzyly grape, Gara Huseyni, Gara Shany and Tabrizi.

As a result of the research work, it was revealed that, from the studied grape varieties of table and raisin directions in the Goygol region, the Ag oval raisin variety with a period of 110 days has a short vegetative period, followed by the varieties Sary raisins and Ag Khalili with vegetation periods of 115 days. Of the studied grape varieties in the Goygol region, the Ganja gyzyly grape variety is the most late-ripening variety with a vegetative period of 181 days.

For the first time in the Goygol region, the phenology of table and raisin grape varieties Ag oval raisins, Pink raisins, Yellow raisins, Khashabagi raisins (a clone of the Yellow raisins variety), Khalili white, Shany white, Ganja gyzył raisins, Guseini black, Shany black and Tabrizi was studied. It is shown that the use of the above varieties for the development of kishmish and table viticulture in the Goygol region is appropriate.

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