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Review Article

Study of the Morphological and Agricultural Characteristics of Gvara-Khutsubani Wine and Table Breeds and the Potential of Wines Obtained from them

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ABSTRACT

The report considers the issue that concerns the study of the morphological and agricultural characteristics of gvara-khutsubani wine and breeds for the table and the potential of wines obtained from them. As a result of experimental studies, the breeds of the vines cardinal, crimson sidles, black muscat, white muscat and wine breeds. The process of the phenological phase of all these breeds, biometric indicators, technical indicators and yield were studied. The potential obtained from the wine species is a specific characteristic of the wine obtained from the vine species; light yellowish, turning into dark red, rounded, aroma and bouquet, quality improvement during aging, high stability and healing agents.

Keywords: Cardinal; Crimson sidles; Phenological phase; Black muscat

INTRODUCTION

Georgia is the birthplace of vines and wine. This is confirmed by paleontological and archaeological materials, the variety of forms of the local wild vine and the widespread area in georgia and the caucasus, many breeds of the native vine. There are more than 500 breeds and polymorphoses of their botanical and agricultural signs, original technologies for the production of wine products [1]. Out more than 500 breeds common in Georgia, up to 80 are from Adjara, from where many are characterized by rich agricultural and technological indicators [2]. In the near past, viticulture received second place in the economy of the inner mountainous regions of Adjara, but due to a number of reasons, the progress of this area has been stopped, although now the prospects for viticulture and their progress are clearly expressed. More importantly, recently in Adjara, in the demonstration plantation of Gvara-Khutsubani, we checked the vine breeds, with the help of which the gene pool of these crops in the regions will be rich [3]. In scientific literature of recent years, it is more often considered as a food product, and biologically active substances, including phenolic compounds, play an important role in assessing its quality. Based on this, the study of phenolic compounds in the wine breeds of Chkhaveri, Ojaleshi, Krakhuna, Tsolikauri, Tsitska, Klardzhuli, Usakhelouri, Aleksandrouli is extremely important for regulating and improving the quality of oxidation processes. Red wine stands out for its high biological activity. It is characterized by bactericidal and antitumor properties, removes radionuclides from the body, reduces the increase in cholesterol, helps the hardness of cappellars and the collection of ascorbic acid in the liver [4]. Interest varieties of colored vines, red wine is increased due to their chemical composition, in particular, annotations, colorful substances of a polyphenolic nature, and dihydroquercetin and resveratrol. According to the literature, the polyphenol resveratrol belongs to phytoalexins, substances that are synthesized in large quantities under conditions of high humidity and enhances the natural immunity of the plant against fungal, bacterial and other diseases. All this gives us the opportunity to show grape varieties with high antioxidant activity and to distribute them in the highly humid subtropical zone of Gvara-Khutsubani [5].

MATERIALS AND METHODS

The aim of the study is to study the host and morphological characteristics of wine and table breeds and the potential of wines obtained from them in the demonstration farm Gvara-Khutsubani in the humid regions of the Black Sea in Western Georgia. The experiments began [6] in the second half of 2016 the general management of the Gvara-Khutsubani vine and in the laboratories of the Food Department of the Shota Rustaveli State University. On 23 species of vines, we carried out phenological studies and

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biometric measurements, after which we derived the arithmetic mean values. We also studied yield, technical indicators and physical and chemical indicators [7]. Also, the aim of the study to study the amount of phenolic compounds in wine materials and finished products. We had to determine the correlation relationship between their quality and the amount of phenolic compounds and understand the quantitative bordering indicator of phenolic compounds for wine materials, the use of which makes it possible to produce high quality wine from the obtained grape species. To study wine breeds, we used the following methods: determination of dry matter, determination of titration oxidation (total oxidation), quantitative determination of total phenols with Folin Ciocalteu reagent, method for determination of antioxidant activity of DPPH. Determination of dry matter - with a refractometer in juice. The method is based on the dependence of the transition index of the light beam with the concentration of the substance in the compounds [8].

Determination of moisture: $x = \frac{m - ml}{m} 100\%$ (1)

Where: X - Composition% of water in raw materials

m - initial weight of raw material for drying

Determination of titration oxidation (total oxidation) by using standard, potentiometer titration-GOST 14252-73. The method is based on potentiometer titration, on sodium alkali with a standard compound up to pH-7. Standard method (titration)-GOST 14252-73.

Quantification of common phenols by Folin-Ciocalteu reagent. Determination of common phenols is carried out using the Folin-Ciocalteu spectrophotometer method. The extraction of the sample for analysis was carried out with 80% ethanol, under conditions of 70-75 C temperature. 0.5 or 1 ml of the total volume of the extract is placed in a 25 ml flask, 5 ml of H_2O is added, 1 ml of Folin-Ciocalteu is placed for 8 minutes at room temperature, then 10 ml of 7% Na_2CO_3 is added, the flask is filled with H_2O and placed under a stream of 2 hours in the dark, at room temperature. The determination is carried out at 750 nm. To control the drills, 1 ml of the corresponding extractant and go through the same process. As a result of the determination, the calculation of the data is carried out on the caliber graph of the hali acid.

The composition of common phenols is calculated by the formula:

$$X = (DKVF) * \frac{1000}{m}$$

Where, X - composition of common phenols, in mg/kg

D - optical stability

K – Gali acid calculation factor

F – dilution factor

V – total volume of extracts, ml

m - mass of raw materials taken for extractions, g

DPPH method for determining antioxidant activity-one of the widely used DPPH methods is usually used to determine the total antioxidant activity. The free radical colorimeter is 50% radical with inhibitors. The DPPH method for determining antioxidant activity is a fast, simple and accurate test method. It is used to determine the ability to limit the free radicals of various compounds, as well as to measure antioxidant activities in foods and juices.

DPPH - ($C_{18}H_{12}N_5O_6$ M=394,33) is a stable free radical with a maximum absorption at 515-517 nm, the violet color of the methanol extract of which changes to light yellow as a result of renewal. Our goal was to study the amount of phenolic compounds of the Gvara-Khutsubani wine species in wine materials and finished products. To study the correlation dependence between their quality and the amount of phenolic compounds and to determine the quantitative boundary index of phenolic compounds for wine materials, the use of which will subsequently improve the quality of wines, to determine the possibility of control over them and the potential of these wines [9].

RESULTS

From the morphobiological characteristics in the species of the vine, such phenological phases were studied as: the beginning and end of the weeping of the vine, flowering of buds (beginning of growth), the beginning and end of flowering, counting grapes, the introduction of grapes into full maturity, the end of the growth of branches, the beginning and end of the fall of foliage (Table 1).

As can be seen from the table N = 1, plants of wine and table vine species go through a period of phenological phases in different periods and the difference between them is large. Certain vines start crying from February 28 to March 10 and finish from March 20 to April 2. The difference between the breeds is 12 days. First of all, we start and end the breed of prima vines (28.02 - 20.03) and cardinal (29.02-25.03), and later of all Chkhaveri (10.03-2.04) and Ojaleshi (8.03-2.04). The opening and growth of the buds begins first of all by the Cardinal (27.03), later by Chkhaveri (10.04) and Ojaleshi (8.04). Also, flowering early begins and ends with Cardinal (25.05 - 06.06), Prima (27.05 - 08.06), and late Chkhaveri (8.06 - 20.06) and Ojaleshi (07.06 - 18.06). The duration of flowering for different breeds lasts from 11 to 15 days, the difference is 4 days, which does not matter. In terms of ripeness and full ripeness of grapes, table varieties of vines differ from each other, which comes from their biological indicators. For example: the breeds of the Sabas Perli (margalit) and Cardinal vine begin to ripen in the 1st decade of July and become ripe in the 3rd decade of July, Prima and Georgian Saadreo, respectively, in the 2nd decade of July and the 1st decade of August. In August (3rd decade) Alfonso Lavale also ripens, as for other breeds, Sultanin ripens in the 1st decade of September, Aledo and Datieri in the 2nd decade of September, Italy and Crimson Sidles ripen in the 3rd decade of September. So, table breeds of the above vines fully ripen from the 3rd decade of July to the end of September (Table 2).

Of the wine species, vines, before full maturity, begin and end before everyone else black muscat (1st decade of September), white muscat (2nd decade of September) and Tetra Tsulukidze (3rd decade of September). The latest is Chkhaveri (3rd decade of November) and Ojaleshi (1st decade of November). As for the rest of the breeds (Krakhuna, Tsolikouri, Tsitska, Klardzhula, Kakutura, Aleksandrouli, Usakhelouri), until full maturity, they enter from the 1st decade of October to the end of October. First of all, the growth of buds is completed by Margalit Saba (1st decade of September), Georgian Saadreo (2nd decade of September), Prima (3rd decade of September) and Cardinal (3rd decade of September), later Chkhaveri (3rd decade of November), Klarjuli (1st decade of November), Usakhelouri (1st decade of November) and Aleksandrouli (1st decade of November), the rest of the breeds finish growing in October. As for the fall of foliage, Chkhaveri (2nd decade of December) and Ojaleshi (1st decade of December) finish the latest, the rest of the breeds finish this process in November.

As can be seen from the table, the average growth of the four-year-

old vine breeds varies from 1.9 meters to 2.4 meters, the diameter of the trunk from 2.9 centimeters to 4.3 centimeters. The strongest growth is distinguished by Alfonso Lavale and Datieri, the weakest are Usakhelouri Cardinali and Sabas Perli (margalite), other breeds stand in the middle between the weak and strong breeds, Datieri and Alfonso Lavale are also distinguished with a mature thickness (2.2 cm, 2, 1 cm) and sheet size (18.22 cm; 17+21 cm).

The breed of Italy and Aledo is distinguished by the size of the branch and the average weight, the average weight of the branch is 364 and 352 grams, respectively. The average weight of branches of other species changes from 120 grams to 345 grams. The best yield indicator is in Tsolikauri, Italy and Cardinal, whose yield per 1 vine, respectively, 4.0, 3.8, 3.0 kg, per 1 hectare counts 10.7; 10.1 and 8.0 tons, the yield of grapes of other species per hectare changes from 5.6 tons to 7.5 tons. Vine maturation is directly related to the development of vine growth and quality yield. A short-ripened vine produces a sweeter taste than a tall one. When making white wine, shape, workload, place, atmosphere, nutrition and breed are critical. On this side, the unique demonstration farm Gvara-Khutsubani vines.

Phenolic compounds of grapes are actively involved in wine production. Its preparation at all stages directly affects the taste, color, transparency, stability. If a larger amount of phenolic compounds is necessary for the production of taste characteristics, their added amount negatively affects the quality of table and wine breeds, oxidizes them, and worsens the taste. Oxidation of wine materials depends on the amount of easily oxidized forms-leucoanthocyals of phenolic compounds. In the study examples, the amount of leucoanthocyanins of common phenols and monomeric phenols was considered. The study showed that when comparing

Table 1: Process of phenological phases of table and wine species of vines.

S.no	Breed names	The beginning and end of the ripening of the vine	Opening of buds (beginning of growth)	The beginning and end of flowering	Flowering duration (days)	Breed names	Ripening of grapes	Full maturation	End of bud growth
1	Kardinal	29.02-25.03	27.03-6.04	25.05-6.06	13	Kardinal	1st decade of July	The end of 3rd decade of July	3rd decade of September
2	Krimson Sidles	2.03-24.03	1.04-10.04	28.05-10.06	14	Krimson Sidles	1st decade of September	3rd decade of September	3rd decade of October
3	Don Mariano	5.03-29.03	4.04	-	-	Don Mariano	-	-	2nd decade of October
4	Alphonso Lavale	3.03-28.03	27.03-3.04	29.05-11.06	14	Alphonso Lavale	1st decade of August	3rd decade of August	2nd decade of October
5	Prima	28.02-20.03	30.03-10.04	27.05-8.06	13	Prima	2nd decade of July	1st decade of August	3rd decade of September
6	Italia	1.03-27.03	31.03-7.04	29.05-9.06	12	Italia	1st decade of September	3rd decade of September	1st decade of October
7	Datieri	4.03-29.03	4.04-11.04	31.05-11.06	12	Datieri	3rd decade of August	2nd decade of September	3rd decade of October
8	Aledo	2.03-28.03	3.04-10.04	30.05-10.06	12	Aledo	1st decade of August	2nd decade of September	3rd decade of October
9	Georgian Sadreo	3.03-27.03	2.04-8.04	30.05-11.06	13	Georgian Sadreo	2nd decade of July	1st decade of August	2nd decade of September
10	Sabas Pearl (Pearl)	5.03-28.03	3.04-10.04	31.05-11.06	12	Sabas Pearl (Pearl)	1st decade of July	3nd decade of July	1st decade of September

Table 2: Biometric indicators, technical characteristics and productivity of different types of vines.

S.no	Breed names	Average vine height m.	Stem height sm	Stem diameter sm.	Ripening stem thickness sm.	Leaf length sm.	Leaf width	Branch length sm.	Branch width sm.
1	Kardinal	2.2	36	3.1	1.4	14	18	23	12.5
2	Chkhaveri	2	40	3.4	1.5	17	21	14	9
3	Ojaleshi	2.1	37	3.1	1.3	16	20	14	10.33
4	Krakhuna	2	41	3.6	1.5	16	21	15.5	12
5	Tsolikauri	2.2	43	3.5	1.6	17	19	22	18
6	Tsitska	2.1	46	3.8	1.7	17	20	16.8	10
7	Klarjuli	2	39	3.4	1.5	15	18	17	12
8	Kakatura	2.1	37	3.1	1.4	14	18	15	9
9	Tsulukidze Tetra	2	38	3.2	1.4	13	19	15.8	10.2
10	Usakhelouri	2.5	34	2.9	1.2	14	16	12.4	7.9

Table 3: Physicochemical indicators of grapes of different types of vines.

S.no	Sample name	Dry Matter	Oxidation	pH	Common pologenols mg/%	Antioxidant
1	Tsulukidze Tetra	16	1.26	3.8	162	218
2	Chkhaveri	20	1.13	3.65	207	290
3	Ojaleshi	20	1.13	3.65	207	290
4	Krakhuna	15,0	1.22	3.7	162	205
5	Tsolikauri	16.4	1.05	3.8	167	220
6	Titska	18	0.82	3.6	123	175
7	Klarjuli	18	1.12	3.65	138	200
8	Usakhelouri	18	1.09	3.95	180	130
9	Aleksandruli	20	1.29	3.8	175	190

the amount of phenolic compounds of examples of wine materials and tasting indicators, a correlation dependence between them was clearly revealed. The increase in total phenols and the amount of leucoanthocyals causes a deterioration in the quality of the examples of wine materials. Resveratrol is found in large quantities only in the skin of colored grapes. During the alcoholic boil, it comes out of the skin into the wine material. Chkhaveri, Ojaleshi, Krakhuna, Usakhelouri, Aleksandrouli enhances the antioxidant characteristics of wine. The resulting wine from these grapes in the territories of Gvara-Khutsubani is distinguished by a greater amount of resveratrol than in the wines of the Eastern climate of Georgia. The results of chemical studies of vines of wine species are given in Table 3.

As can be seen from the table, the Gvara-Khutsubani wine breeds are distinguished by the composition of sugar content, total piliphenols and antioxidant activity. By their biochemical index, these grape varieties are much larger than the breed in the West. In addition to the well-known European rule in the world of wine making, there are two Georgian rules for making table white. This is due to the fact that during the preparation of these wines, more natural compounds than during the European production of white wine. It should also be noted that during the production of wine from this raw material, both the boiling mass and the finished product itself, the wine is more rich in various natural compounds, of which phenolic compounds are the most important.

CONCLUSION

We studied the morphological and household characteristics of wine and table breeds in the territories of Gvara-Khutsubani, their biometric indicators, technical indicators and yield. Studied the process of phenological phases of table and wine species of vines. It was determined that of these breeds, the production of an antioxidant wine with a rich polyphenol represents a particular potential for wine, both for the development of viticulture and for the population of Georgia. In the demonstration estate of Gvara-Khutsubani, specific characteristics for wine from the grapevine species: light yellow, color transition to dark yellow, round, persistent aroma and bouquet, quality improves during aging, high stability.

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