

Some Aspects of Red Special Wines



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Abstract

Due to increasing environmental radionuclide background, the scientists and specialists constantly face the problem of developing technologies for producing plant-based, therapeutic-purpose foods and food supplements enriched with biologically active substances, which are characterized by high immunomodulating, radioprotective and antioxidant activity. From such therapeutic-purpose foods and food supplements, of particular importance are the beverages because their improved composition, sensory and liquid consistency provide high availability and increased therapeutic capacity.

Keywords: Radionuclide; Antioxidant Activity; Grapes; Food; Special Wine

Introduction

Natural and special wines form the great part of the export potential of Georgia. The fact that according to figures on exports of wine and alcoholic beverages only for the first nine months of 2017, Georgia exported 52.7 million bottles (0,75 l) of wine. According to the National Wine Agency, wine exports have grown up on 63% in comparison with corresponding period last year [1,2]. It is also noteworthy that since the 80s of the last centuries, poor-quality and expensive sprays and brought to our country have caused significant damage to the indigenous and alien grape varieties. Georgian farmers were forced to switch partly to growing of nontreated and hybrid grape varieties, because they do not require expensive and imported from outside sprays, and besides, hybrids and clones are easy to grow, and different types of fungi and other diseases are no big deal for them. Today, wineries cannot apply even industrial varieties of colored grapes such as Aladasturi, Dzelshavi, Mgaloblishvili and Black Pinoa [3,4].

In view of the foregoing, it reasonable and relevant to develop the innovative technologies for producing natural and special wines from common to western Georgia Therefore reasonable and relevant to western Georgia-known less marketable local raw materials of colored grape industrial varieties and nontreated grape clones enriched with from biologically active substance enriched with innovative technology of special wines, which are characterized by high sensor, radioprotective and antioxidant activity therapeutic

properties for preventing food-borne diseases [5-7]. The goal of the work is to develop special wine technology enriched with biologically active substances from the grape raw materials of grape varieties cultivated in the Imereti Viticulture and Winemaking Area, which is characterized by improved sensory indicators and increased therapeutic and preventive capacity. In addition, in this special wine technology, for the first time in Georgia, there will be used raw materials of the nontreated colored Zeibeli grape variety cultivated in the Baghdati Viticulture and Winemaking micro-zone, rosehip and grape-seed alcohol-wine extracts and small quantity of white honey for the purpose of increasing the flowers tonality.

Objectives and Methods

Object of Study

Raw materials of "Otskhanuri Sapere" grape variety from the Imereti Viticulture-Winemaking subzone, particularly from the Zestafoni district's village of Sviri and the Bagdati district's village of Obcha; raw materials of "Aladasturi" grape variety from the Middle and Lower Imereti Viticulture-Winemaking subzone, particularly from the Bagdati district's village of Rokhi and the Vani district's villages of Pereti and Kumuri, from the Patele Area's vineyards; raw materials of "Zeibeli 5455" ("Zeimberi") grape variety from the Lipnari vineyards; vacuum-must; grape-seed extract; wild-growing dog-rose from the Zekari and Sairme valleys and extracts

and concentrates obtained from their skins and fleshes; lime-tree flower honey from the Zekari and Sairme valleys; rectified ethyl alcohol [8].

Research Methods

When determining the physical-chemical indicators of grape raw materials, wine materials and finished special wine, we used the standard, universally accepted and modified organoleptic and physical-chemical methods, including chromatography-mass-spectrometry, high-performance liquid and gas chromatography, spectrophotometry and fluorometry.

Results and Analysis

To implement this goal, the following objectives should be attained [9-14]:

- a. To study the mechanical composition of selected raw materials;
- b. To provide uvological evaluation of raw materials;
- c. To study the chemical composition and sensory characteristics of raw materials;
- i). To justify theoretically and experimentally the optimal composition of grapes raw material required for special wine
- ii). To develop rational technology of colored grape raw materials processing, alcoholic fermentation and ageing;
- iii). To study the influence of thermal conditioning regimes of the seeds and skins on the extraction of phenolic and dye compounds;

- iv). To develop the optimal technological regimes and approaches for the production of ingredients required for special wine: semi-fermented wine, condensed grape vacuum-must, and grape-seed and dog-rose extracts;
- v). To provide quantitative and qualitative evaluation of biologically active substances of special wine;
- vi). To develop technological schemes for producing ingredients of special wine;
- vii). To develop technological schemes for special wine production;
- viii). To assess sensory characteristics and antioxidant activity of special wine.
- ix). At the initial stage we studied and evaluated the mechanical, physical, chemical and sensory characteristics of the selected grape raw materials.

The grapes are the main raw material for wine production, and we have identified the mechanical composition of the bunch in compliance with the requirements suggested by Prostoserdov. (Table 1) We have carried out studies and evaluation of the chemical composition and variety flavor of selected grape raw materials (Table 2). Studies show that the value of sugar-acid ratio affects numerous characteristics of wine, in particular the higher is this ratio, the better is the quality of special wine. Along with the selection of high-quality raw materials in the production of red special wines, the fermenting and fermentation processes have the main function in the formation of a sensory bunch [15,16].

Table 1: The uvological characteristics of grape varieties from Imereti.

A bunch of grapes, %	Separate Parts of A Bunch and Their Compositions	Grape varieties		
		Otskhanuri	Zeibeli	Aladasturi
	Stalk	3,67	3,27	4,21
	Grapelet skins	8,63	9,55	9,87
	Grape seed	3,23	3,67	3,97
	Juice and flesh	82,98	83,98	81,58
	Skeleton (stalk and skins)	12,29	12,65	14,08
	Solid waste	15,53	19,22	18,05
	Grapelet-content	94,6	109,0	93,17
	Structural indicator	5,48	4,37	4,52
	Dates of sampling	30.10.2016	03.10.2016	30.10.2016

Table 2: Physical-chemical characteristics of the selected grape raw materials.

Grape variety	The yield of Must (juice), %	Mass Content of Dry Substances, %	Mass Concentration of Sugars g/100cm ³	Mass Concentration of Titrating Acids g/100 cm ³	Active Acidity, pH	Sugar-acid Ratio
Otskhanuri	72,5	22,9	22,3	0,74	3,4	30,14
Zeibeli	70,4	23,9	23,7	0,68	3,7	34,85
Aladasturi	71,1	22,7	22,2	0,64	3,7	34,68

The List of the Proposed Innovations is as Follows:

- I. Adding of pectolytic (with activity 2000-2200 unit/g) enzyme (Rapides CR) to the seeds and skins during the process of pressing in a grape stalk separator, increases the yield of the must by 5-7% and the content of biologically active substances for 1-2 ml/100 kg.
- II. Adding of potassium metabisulfite within 54-63 mg/dm³ significantly increases extraction of anthocyanins, increases to 1.2 - 4.3 g/dm³ the reduced extract and the content of dyes, contributes to purification, the growth in terpenic compounds by 2,1-2,7%, and the growth in a stable fraction of a phenolic complex (within 20-25%) in wine.
- III. We added 1-2% of Aspergillus fungus of the dry active yeast in a grape stalk separator (C-R-9001 or C-RB-9001- fungus works at the temperature of 12 - 28°C, pH=3.0-5.4 and increases alcohol content up to 24%, and significantly increases the content of terpens and esters in wine).
- IV. Adding of the condensed concentrate with the content of dry substances up to 54-63 % through the dog-rose lyophilic drying to the seeds and skins within 50-75 mg/dm³, in the presence of or cadifite (40-70 mg/dm³) either SO₂ (90±10 mg/dm³) increases by 1.5-1.8 the development of variety flavor in a special wine.
- V. During the fermentation of the seeds and skins, we raised the sugar content up to 27% by adding the vacuum-must and honey, due to which terpenic compounds were increased by 0.7-1.2 %, and esters by 24-27%.
- VI. We have established that after tye 6-day extraction-fermentation at a temperature of 27°C, the seeds and skins are subject to heat treatment at a temperature of 54°C, and hot pressing, which significantly increases separation of phenolic and dye compounds.
- VII. Adding of the grape-seed and dog-rose concentrates and heat-treated grape-seed (5 g/dal) and oak shavings (5 g/dal) significantly improves the rancio tones and sensory bunch.
- VIII. In 16-18 months, adding of dry dog-rose pulp and peel (20 g/dal) increases the flavor-forming complexes.
- IX. Adding of the grape-seed and dog-rose concentrates and heat-treated grape-seed during the ageing process, under conditions of periodic pasteurization and stirring within 2-3 months, increases the total amount of phenols by 0.3 - 0.4 g/dm³, and improves the rancio tones and sensory bunch.
- X. Prohibition of using gelatin and bentonite clays, because for processing wine materials, bentonite clays reduced the anthocyanins by 27-36% on 2-3 kg/t, while the use of gelatin reduced the compounds of phenolic compounds by 6-9% on 2-3 g/t.

XI. Creating a new technology by using new varieties and honey flower tones.

XII. We have studied the impact of the temperature of the fermentation of the seeds and skins on the extraction process anthocyanins from the skins in the fermenting mass. Studies were carried out at four temperature intervals 34-36°C, 27-30°C, 21-25°C and 16-18°C.

Table 3: Physical and chemical characteristics of pomace fermentation.

Fermentation Temperature	Time of the Maximum Concentration of Anthocyanins, hr.	The Density of the Fermented mass during the Maximum Concentration of Anthocyanins
16-180C	36-42	1,033-1,035
21-250C	18-24	1,042-1,045
27-300C	12-16	1,051-1,055
34-360C	6-10	1,060-1,062

Table 4: Special wine characteristics after the 18-month ageing.

Characteristic	Value
Ethyl alcohol volume content, %	14,5
Sugars mass concentration, g/dm ³	45-48
Titrating acidity mass concentration, g/dm ³	8,7-8,9
Reduced extract mass concentration, g/dm ³	32,87
Volatile acids mass concentration equivalent to vinegar acid, g/dm ³	0,48
Dye substances, mg. l	749,89
Phenolic compounds, mass concentration, g/dm ³	3420
Including:	
Monomeric forms	2270
Polymeric forms	1150
Tasting evaluation, scores	9,3

Table 3 shows the main fermentation temperature, the duration of maximum extraction of anthocyanins and the density of the fermented mass. Table 4 contains the physical, chemical and sensory characteristics of the special wine after the 18-month aging. In all five samples, the content of raw materials of Zeibeli grape variety varied between 10-20%, while the amount of raw materials Aladasturi and Otskhanuri Sapere grape varieties - between 20-50%. Aladasturi and Otskhanuri Sapere grape varieties were blended in the proportion 36:48:16 (percentage ratio). As shown from the table, the wine produced has a high sensitivity rate (9,7 cents), which is the result of the composite effects of the selected raw materials of the selected raw materials, the use of ingredients and the technological processes of individual technologies.

Conclusion

- A. It has been experimentally determined that the grape picking should be done when the concentration of the sugar content in the grapes is not less than 23-24g/100 cm³ and titrated acidity is 6-8 g/dm³. And pressing of grapes in a rolling grape

stalk separator enriches the seeds and skins with the phenolic complexes of stalk.

- B.** It has been established that colored grape raw materials blended with an optimal ratio of "Aladasturi", "Otskhanuri Sapere" and "Zeibeli 5455" grape varieties is promising for the production of high-quality special red wines with a distinctive variety flavor, and rich technological reserves of phenolic (3765-4314 mg/kg) and dye (976-1432 mg/kg) compounds.
- C.** The optimal version of blending for producing a special dessert wine with the best sensory bunch has been determined experimentally: ("Otttsanuri Sapere"): ("Aladasturi"): ("Ziebeli 5455") = (27-36%): (42-54%): (16-18%).
- D.** It has been investigated that in the process of pressing in a grape stalk separator, in the composition with the enzyme preparation Rapidase CR the kernel gap in the 1-2 mL / 100 kg of enzyme preparation in potassium metabisulphite with 54-63 mg/dm³ and special (dry active yeast) Aspergillus fungus 1- 2% Composition (CR-9001 or C-RB-9001-fungus works at temperature of 12-28°C, pH = 3,0-5,4 and stands alcohol up to 24%), increases the the yield of must, sensory characteristics, the content of extractive (increases the reduced extract up to 1,2- 4,3 g/dm³) and dye substances in wine and contributes to its rapid purification.
- E.** It has been established that sulphiting of the seeds and skins with potassium metabisulphite with 54-63 mg/dm³, contributes to the emergence of the variety flavor (increase of terpenic compounds by 2,1-2,7%) and the increase in phenolic complex (within 20-25 in wine).
- F.** There has been determined the relationship between the creation of the flavor-forming complexes and the sugar mass concentration in grapes raw materials, in particular the content of terpenic compounds is increasing by 0,7-1,2%, and the content of esters-by 16-27% when the sugar content in grapes raw materials is 22-27 g/100 cm³, then when sugar content in the grapes is less than 18.6%.
- G.** It has been studied that through the dog-rose lyophilic drying until 54-63%, adding of the condensed concentrate to the seeds and skins within 50-75 mg/dm³, in the presence of or cadifite (40-70 mg/dm³) either SO₂ (90±10 mg/dm³) increases by 1.5-1.8 the development of variety flavor in a special wine
- H.** It has been experimentally determined that during the aging process of wine material, adding of:
- i). dehydrated dog-rose pulp and peel at 20 g/dal,
 - ii). thermally-treated oak crumb at 5 g/dal,
 - iii). thermally-treated grape-seed at 5 g/dal

- I.** Under conditions of periodic pasteurization and stirring within 2-3 months, increases the total number of phenols by 0.3-0.4 g/dm³, improves the rancio tones and sensory bunch.
- J.** It has been established that after completion of ripening (16-18 months), adding of dog-rose condensed extract to wine material within 50-70 mg/dm³, slows down the phenolic-quinone transformations and increases the flavor-forming complexes.

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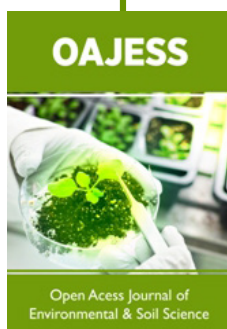
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