ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

"Healthy" Food Products Based On Natural Plant Material.

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ABSTRACT

The article presents information on three-year studies of resource-saving technologies for processing food raw materials - the Chinese date of Unabi, enriched with biologically active substances of plant origin.
Keywords: unabi, bitter tincture, ascorbic acid, P-active compounds, free radicals, gallic acid.

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ISSN: 0975-8585

INTRODUCTION

The state policy of Russia is formed in the field of healthy nutrition of the population on the basis of expanding the healthy food industry and increasing the production of new functional foods.

To solve this problem, food industry technologists develop and offer new functional foods, which in their composition can contain various physiologically active ingredients that increase the nutritional and biological value of the product and reduce the risk of developing nutritional diseases. The main ways to improve the quality and expand the range of food products is to create new types of products based on natural raw materials, special purpose: children's, energy (for athletes), vitaminized, enriched with biologically active substances of vegetable and animal origin [3].

However, at the present time, little attention is paid to this issue in Russia and the production of functional food products is not developed enough.

In recent years, new types of sugar substitutes, dyes, fragrances, thickeners, emulsifiers and other additives from unconventional plant raw materials have been used in the production of food technology that can not only regulate the technological process, adjust properties, but also enrich the products with biologically active substances, and also increase their microbiological safety.

Research aimed at developing new types of products, improving quality, increasing the range of functional foods, are relevant. The promising direction of the development of the food industry is currently the production of products enriched with biologically active substances of vegetable origin [3].

In each region of our country, technologists in the food industry use the latest achievements of science and technology to expand the range of food products that fill the deficit of physiologically active components in the human body. These products are prepared on the basis of natural raw materials, growing in this area, in this region, for low-cost cultivation technologies. Recently, in the production of food products, such products are called "Healthy" [4,6].

In the modern world, the cult of healthy nutrition is gaining popularity. Demand grows on "healthy" vegetable and fruit crops, confectionery, beverages containing natural ingredients, with reduced sugar and color.

Using natural agricultural raw materials that contain ascorbic acid, vitamins, polyphenolic compounds, anthocyanins, bioflavonoids during processing, they become products that improve their organoleptic properties and enrich them with antioxidant properties that provide protection against lipid peroxidation involved in the formation of cell membranes in the human body.

Human health and longevity depend on a balanced, nutritious diet and this is an important issue put forward by the United Nations, as is the protection of the environment [3].

The Russian market for the production of functional food products using environmentally safe plant raw materials, and in particular beverage production, is fully provided by domestic producers.

To optimize the nutritional status of the population, constant improvement and development of new technologies for biologically full-value food products with an increased content of biologically active substances isolated from natural raw materials of plant origin, medicinal plants, fruits, and berries, as well as essential oil and spice-and-taste plants is necessary.

For the development of new food products from plant raw materials, the search for additional non-traditional sources - wild fruit and berry plants [9] is actual, which will increase the resistance of the organism to stressful situations and normalize the working capacity of a person. This is explained by the fact that vegetable, and in particular, unconventional raw materials, is one of the main sources of biologically active substances, which even in a minimum amount have a health, protective effect and stimulate the activation of enzyme systems, leading to increased energy supply to the body.

A characteristic feature of the territory of Russia is the diversity of wild plants, fruits and berries that are of national economic importance. The rich composition of plant raw materials provides ample opportunities for creating a diverse range of environmentally friendly food products.

In terms of nutritional value, wild plants in many indicators, including indicators of biologically active substances, increase the nutritional and healing properties of food. Fruits and berries of wild plants can serve as valuable raw materials for obtaining canned food, functional and therapeutic preventive food products, including alcoholic, low-alcohol and non-alcoholic beverages. This type of raw material is advantageous to use, because it does not require an economically high cost for growing raw materials and processing it.

Consequently, by systematically using food products containing biologically active substances, the negative consequences of unfavorable environmental factors decrease.

Analyzing the importance of including in the diet food products enriched with biologically active food substances to a level appropriate to the physiological needs of man, is the most effective and economically profitable way to improve the provision of the population with high-grade food products.

A promising species of such plant raw materials is the new wild plant unabi - deciduous tree (shrub), which grows in many subtropical regions of the planet, including in the south of Russia, in the Krasnodar and Stavropol regions. Unabi has a large number of variants of the name: zizifus, Chinese date, jojoba (or zhuzuba), jujube, anab, chilion, choi-lon, jilanjid, zao, yanap, arnap, ilanjida and chest berry. This plant includes about 50 species growing in the tropics and subtropics, however, according to archaeological and paleontological excavations, it grew even in Greenland. Now wild unabis can be found in China, Manchuria, Turkmenistan, Mongolia, in Uzbekistan and partly in Tajikistan [10].

A distinctive feature of unabi is a high content of vitamin C and P-active compounds, which causes their therapeutic and prophylactic properties. In addition, unabi contains organic acids, sugars, tannins, protein substances, pectin, iron, iodine, etc. Fruits are diverse in shape: globular, pyriform, cylindrical, weighing from 6 to 45 g, from brown-red, brick, brown to chocolate in color, with a dense and mealy flesh, to taste - from sweet and sour to sweet with an original smell [13].

As a result of the analysis of scientific, technical and patent literature, we found that in the food industry, unabis is used in small quantities in the production of cream desserts [11]. In eastern countries, a popular drink is a tea made from unabi leaves, which is used for therapeutic and prophylactic purposes. In folk medicine, fruits, leaves, seeds, bark of shoots, roots and unabi wood are used.

Thus, the purpose of our research is the development of recipes and technologies for the production of functional foods based on unabi fruit. The finished products were analyzed in accordance with the requirements of regulatory documentation for organoleptic, physicochemical indicators, and also on safety indicators [11].

The innovation of research is that for the first time the recipes and technologies for the production of alcoholic beverages, functional drinks, tea drinks and confectionery products using unabi fruit have been scientifically developed and justified. The obtained food products will allow correcting the human food status due to the balanced ratio of the main nutrients and the presence of biologically active substances in their composition.

At present, employees of the department of production and processing of food products from plant raw materials Stavropol State Agrarian University proposed a recipe for tincture bitter, cooked using fresh fruits unabi; tea drink "Friendship of Peoples", combining medicinal herbs and dried fruits unabi, recipes of cupcakes using dried fruits unabi.

MATERIALS AND METHODS

The research was carried out by the staff of the department of production and processing of food products from plant raw materials on the basis Stavropol State Agrarian University of the educational and

scientific laboratory of the technology of winemaking and food products from plant raw materials during 2014-2017.

During the studies to determine the antioxidant activity of the unabi fruit, a liquid chromatograph with an amperometric detector "Color Yauza-01-AA" was used, which allows direct quantitative measurements of the total antioxidant activity of the samples under study, as well as the activity of individual classes of organic compounds. Gallic acid was used as the standard.

In Russia, alcoholic tinctures are popular [12]. Depending on the plant components included in the formulations, tinctures have different beneficial effects on the human body. They have a positive effect on immunity, improve the functioning of the cardiovascular system and respiratory organs, remove harmful substances from the body when consumed in small quantities. The therapeutic result of the action of the infusions depends on the correct dosage chosen.

The tasting assessment of tinctures was carried out on a 10-point scale.

Preparation of the infusion of plant raw materials I and II plums was carried out in two separate stages by infusion of fresh unabi fruits with a water-alcoholic liquid. Water-alcohol liquid (sorting) was prepared in such a way that its strength was 60% by volume. from ethyl rectified ethyl alcohol "Extra" or "Lux" in accordance with GOST R 51652 and drinking water with a hardness of up to 0.36 mol / m^3.

Fresh unabi fruit in the amount of 100.0-150.0 kg was crushed and poured with a water-alcohol liquid with a strength of 60% by volume in the ratio of raw materials: extractant - 1: 10 and insisted 8-10 days with daily mixing, the fruit was separated from the plum. Fruits were re-flooded with a water-alcoholic liquid with a strength of 40-45% by weight, insisted for 8-10 days, the Morse II plums were separated. Morse I and II plums were combined. The resulting beverage was decanted, decanted from the precipitate and brought to a strength of 35% by introducing an aqueous alcohol solution, filtered and spilled.

Six specific examples of the bitter tincture were prepared. They differed by the ratio of the feedstock and extractant, the strength of the water-alcohol solution for the preparation of the Morse II plum, and the duration of the infusion process (Table 1).

Table 1: Examples of specific preparation of a bitter tincture

Variant of preparation of tincture	Amount of unabi fruit, kg	Duration of infusion for the preparation of Fruit drink I plums, days.	Strength of water-alcohol solution for the preparation of Fruit drink II plum,% vol.	Duration of infusion for the preparation of Fruit drink II plums, days.	Tasting score, point
Option 1	85,0	10	40,0	10	9,0
Option 2	100,0	10	40,0	10	9,3
Option 3	115,0	9	45,0	9	9,5
Option 4	135,0	9	45,0	9	9,7
Option 5	150,0	8	45,0	8	9,4
Option 6	165,0	8	45,0	8	-

Tincture, variant 6, was removed from the tasting because it was characterized by the content of sugars, increased turbidity, as well as an increased amount of extractive substances, which does not correspond to the name "bitter tinctures".

According to the results of the physical and chemical analysis and the tasting assessment, the most optimal options are the preparation of the bitter tincture according to the examples 2, 3, 4, 5.

Tea drinks can compensate for the deficiency of biologically active substances in the body, maintain the normal functional activity of organs and systems [1]. For a variety of recipes for tea drinks of a functional

purpose, studies were carried out on the selection of formulations of compositions of medicinal species of plant raw materials.

The use of wild plants in tea beverages has several advantages:

1) high organoleptic parameters;
2) the diversity of their household use;
3) the presence of biologically active substances;
4) have antioxidant properties.

Taking into account the medicinal properties of the unabi fruit, having data on its antioxidant activity [4, 5, 6], we developed the recipe for the tea drink "Friendship of Peoples", which included: dried fruits unabi (Ziziphus jujube, Ziziphussinensis), green large leaf tea (Camélliasinénsis) peppermint leaves (Fol.Menthoiperiperitae), chamomile flowers (Flor.Chamomillae). The compositions of medicinal plants used are capable of complexing with ions of heavy metals, radionuclides and other substances harmful to the body.

Given the economic fluctuations in Russia, there is an imbalance in the diet of carbohydrates, proteins, vitamins, dietary fiber, mineral elements, and this is a serious factor in the deterioration of the health of the nation.

Scientific research on improving the nutritional value of confectionery products in order to give them functional properties has not been studied enough. Confectionery products enriched with biologically active and functional substances, variety, convenience to use, ease of transportation, the possibility of long-term storage, the simplicity of rationing and use most closely correspond to modern requirements for functional and therapeutic-preventive products. Unfortunately, for today the volumes and assortment of production of such products are extremely small.

Consumers in recent years have increased interest in food that contains ingredients that are healthy for human health. Such products are functional, which allows them to be consumed as normal foods while having a positive effect on the target functions of the body, as well as improving their well-being with regular consumption or reducing the risk of certain diseases.

The presence of certain food ingredients in food products provides their functional properties. The list of these ingredients can include many nutrients belonging to the main groups: bifidobacteria and other lactic acid bacteria, vitamins, oligosaccharides, dietary fiber, peptides, amino acids, polyunsaturated fatty acids, proteins, enzymes and organic acids.

The production of confectionery products of a new generation is possible due to the use of vegetable additives that have functional properties. As these additives, local vegetable raw materials and products of its processing are used.

Cupcakes are of great importance in human nutrition and are an integral part of Russian cuisine. Cupcakes are flour confectionery made from dough with a high content of eggs or egg products, sugar and fat, as well as flavorful fillers: raisins, candied fruits, berries, nuts, etc. They have a pleasant sweet taste and attractive appearance. An attractive kind of cupcakes is created thanks to the shape and small mass, a variety of exterior finishes. Therefore, they are a favorite treat for children and adults. However, high sweetness and calorie content (about 360 kcal, or 1506 kJ per 100 g) are now considered a "minus", as with its traditional composition, the cake cannot be positioned as a product for healthy eating. One of the methods is the replacement of sugar beet sugar with a sugar substitute. For example, muffins "Sweet Morning" contain natural sweetener "Stevia-VIT" on the basis of finely ground dried leaves of honey grass of stevia.

For the production of cake products introduction of new fillers into the formulation, for example, instead of traditional raisins, we propose to use the fruit of a withered chick [7, 8]. The use of dried unabi in the recipes of cupcakes is investigated. Unabi - the Chinese date (the fruit of the subtropical plant Ziziphus) is one of the few products that has no contraindications for diabetes. Natural insulin, which is part of unabi, helps to lower blood sugar levels and has a number of valuable properties, for example, antioxidant activity [4, 5, 6]. For ripe fruits of japus (unabi) is characterized by a pleasant sweet-sour taste, which intensifies with the drying process, acquiring a particularly delicate aromatic note. They can be stored in dried form throughout

the year without deterioration in quality. The chemical composition of dried fruits of unabi and raisins is given in Table 2.

Table 2: Chemical composition of unabi fruit and raisins

Mass fraction,%	Unabi (driedfruits)	Raisins
Dry matter	80,3	84,57
Protein	3,7	3,1
Carbohydrates	73,6	72,0
Fats	1,1	0,5
Mineral substances (ash)	1,90	1,85
Energy value, kcal 100g	287	299

RESULTS

Studies of the antioxidant properties of unabi fruit

The most important indicators characterizing the antioxidant properties of fruits and their products are the content of vitamin C and P-active substances.

Vitamin C combines two related compounds that have biological activity - L-dehydroascorbic (dehydroascorbic) and L-ascorbic (ascorbic) acid. This important antioxidant in the human body is not synthesized but comes with food products (mainly vegetables and fruits) in the form of an oxidized form of L-dehydroascorbic acid (DAC).

The most important role of ascorbic acid in maintaining the stabilization of antioxidant protection of the human body, as well as the lack of data on hypervitaminosis C, even with the use of large doses make this vitamin a valuable drug in the treatment and prevention of various diseases characterized by the intensification of free radical processes and the depletion of natural antioxidant defense of the body.

Based on our studies, we found that the fruits of unabi are characterized by high C-vitamin status. The content of ascorbic acid in the studied samples of this culture growing under the conditions of the Stavropol Territory was 78.6 mg / 100 g, which corresponds to the available literature data.

P-active compounds include a group of substances of phenolic origin, including anthocyanins, catechins, flavone glycosides, leucoanthocyanidins, chlorogenic acid, etc., which affect the elasticity and permeability of capillary vessels, promote the removal of harmful substances from the human body and have antimicrobial and antiviral properties.

The studied fresh fruits of unabi were characterized by a relatively high level of concentration of P-active substances. The content of this group of substances was 530 mg per 100 g of product. The total content of antioxidants (OCA) in fetahunabi was 160 mg / 100 g [2, 12, 13].

To determine these parameters, the preparation of samples of unabi samples was carried out as follows: fresh fruits were crushed, an extract was obtained in 70% aqueous alcohol solution, and filtered. The extract was analyzed for each of three parallel samples of three consecutive measurements of the output signal. The peak area of the differential curves for each sample had the following values: 3260 nA * s, 3279 nA * s, 3300 nA * s, which resulted in the following OCA values: 159 mg / 100 g, 160 mg / 100 g, 161 mg / 100 g. [6].

The differential curves of the first sample are shown in Figure 1.

ISSN: 0975-8585

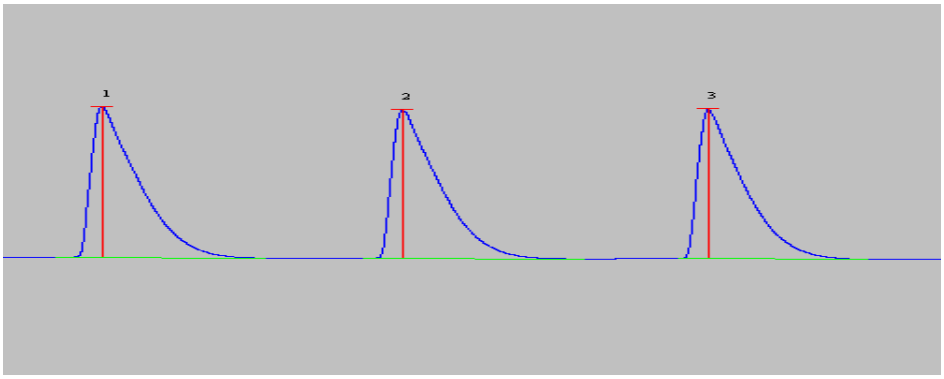

Figure 1: Unabi chromatogram

The total content of antioxidants was determined from the calibration curve of the dependence of the output signal on the concentration of gallic acid (Figure 2).

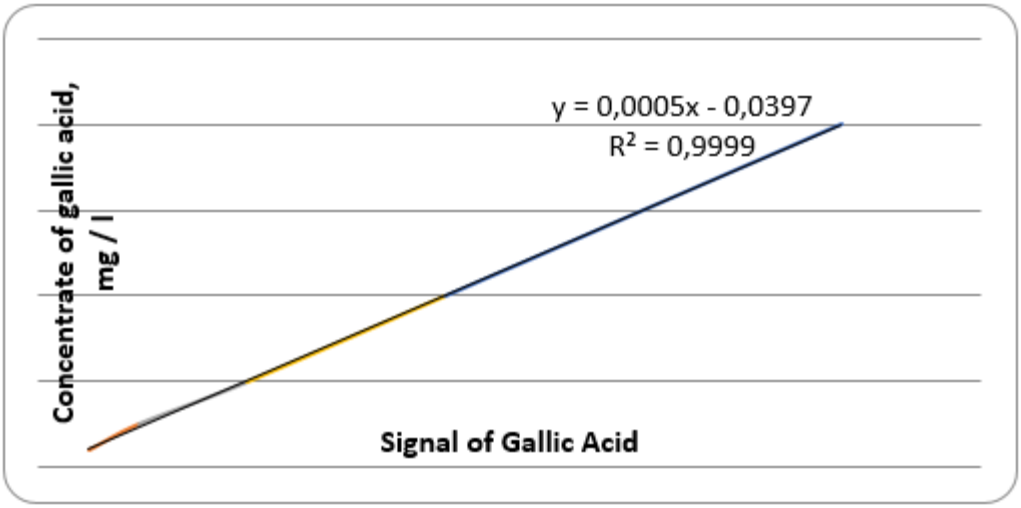

Figure 2: Grading graph of gallic acid

Indicators of tincture bitter

The bitter tincture obtained is an alcoholic beverage with a strength of 35% by volume, an amber color, a soft, slightly burning taste, a complex aroma with a light tone of apples.

The vegetable material used improves the quality of the finished products and expands the range of bitter infusions, updates the aromatic and flavoring parameters of the tincture, contains tannins and pectins.

The finished product has organoleptic characteristics that correspond to the bitter tincture and are presented in Table 3.

Table 3: Organoleptic parameters of bitter tincture using unabi fruit

Index	Value
Coloring	amber
Aroma	complex with a light tone of apples
Taste	full, soft, slightly burning, harmonious with a pleasant aftertaste

The physicochemical parameters of the finished product also correspond to the bitter tincture and are presented in Table 4.

Table 4: Physicochemical parameters of tincture of bitter

Index	Value
Fortress,% vol.	35,0
Mass concentration, g / 100 cm3	0-3
Total extract	-
Sahara	0-0,5

In comparison with other known analogs, the developed bitter tincture has a number of advantages. First, the proposed tincture is enriched with a complex of biologically active substances and is characterized by an increased nutritional value. Secondly, due to the original taste of unabi fruit, the tincture has high organoleptic characteristics. In addition, the proposed recipe and technology allows you to reduce the cost of the finished product by using a small number of ingredients in the tincture, which simplifies the technological process of production.

Preparation of cupcakes using wilted unabi fruit

On the composition and content of basic nutrients, unabi slightly differs from raisins, so its introduction to the cake formulation is an almost adequate substitute (Table 5).

Table 5: Product recipe, g per 100 g of finished product net

Product (semi-finishedproduct)	Cupcakewithunabi	Cupcakewithraisins
Wheatflour	31,2	31,2
Sugar-sand	13,4	13,4
Butter	23,4	23,4
Melange	18,7	18,7
Cookingsalt	0,1	0,1
Raisins	–	23,4
Unabisun-dried	23,4	–
Essenceoffruit	0,1	0,1
Bakingsoda	0,1	0,1
Total	110,5	110,5

It should be emphasized that in the recipe, in comparison with the traditional, the sugar content is reduced by 1.5 times. Organoleptically, the decrease in sweetness is practically not felt, because the lack of sweet taste is compensated by the introduction of sweet fillers: raisins (traditional recipes) or unabi (innovative recipe) [14].

Ready-made products - cupcakes, both in appearance, consistency, and taste completely meet the requirements that are required for this group of flour confectionery products (Table 6).

Table 6: Physicochemical and organoleptic characteristics of a cake with addition of unabi fruit

Indicator name	Quality requirement for marking	Characteristics of the sample	Conclusion
Taste and smell	Native to this product name without foreign taste and smell	Without foreign taste with a slight aromatic odor.	Complies with
The form	Native to this product name	Well cut, keeps the shape. Crumbly.	Complies with
View of the fracture	Baked product without hardening and traces of impurities	Baked product without hardening and traces of impurities	Complies with
Humidity,%	35,3	36,8	Complies with
Mass fraction of sugar,%	42,7	41,2	Complies with
Mass fraction of	18,7	18,5	Complies

fat,%			with
Alkalinity, degree, no more than	2,0	1,7	Complies with

The mass fraction of sugar and fat in the test product is 3.5 and 1.1% lower, respectively than the labeling requirements.

The results of the safety indicators obtained were in full compliance with the requirements.

Thus, conducted studies have shown that the faded unabi fruit is not only a source of physiologically functional ingredients, the introduction of which into confectionery products will increase their nutritional value and provide functional properties, but also has pronounced positive technological properties. The use of vegetable raw materials, in particular unabi, will allow expanding the assortment of bakery products of preventive purpose with improved consumer properties and will improve the structure of the population's nutrition. Confectionery products - cupcakes, can be recommended to categories of the population with harmful working conditions and unfavorable ecology [8].

The composition of a tea drink using unabi fruit

In China, unabi fruits are used for the treatment of digestive tract diseases, cardiovascular system, hypertension, anemia, bronchitis, liver and kidney disease, diabetes mellitus. Many doctors in China, Japan, and Korea use various mixtures of unabi with other herbal components to treat various diseases.

Taking into account the medicinal properties of the unabi fruit, having data on its antioxidant activity [4, 6], we developed the recipe for the tea drink "Friendship of Peoples", which consisted of dried fruits unabi (Ziziphus jujube, Ziziphussinensis), green large leaf tea (Camélliasinénsis), peppermint leaves (Fol.Menthoiperiperitae), chamomile flowers (Flor.Chamomillae).

Tea drink "Friendship of Peoples" with the use of fruits is unibased for 10-15 minutes. On the organoleptic properties, it has a greenish-yellow color, a honey-almond bouquet, slightly astringent properties, moderate astringency.

DISCUSSION

Thus, on the basis of the studies carried out, the content of some biologically active substances and the general antioxidant activity of fresh unabi fruit, faded unabi fruit, dried unabi fruit growing under unstable moistening conditions of the Stavropol Territory were determined. Significant interest in the use of unabi in the processing industry and agricultural production for the production of food products of increased nutritional value, including functional purpose, represents the results obtained.

The developed tincture bitter in comparison with other known analogs has a number of advantages. First, the proposed tincture is characterized by increased nutritional value and enriched with a complex of biologically active substances. Secondly, tincture due to the original taste of fruits is unaffected by high organoleptic indices. In addition, the proposed technology and formulation due to the use of a small number of ingredients in the tincture, which simplifies the technological process of production, allows you to reduce the cost of the finished product.

Tea drink "Friendship of Peoples" in the tea collection can become a novelty. It has strengthening properties, tonic, does not contain artificial additives, and it develops tea offers that are most popular among Russian tea lovers.

Cupcakes are flour confectionery products made from dough with a high content of eggs or egg products, sugar and fat, as well as flavorful fillers such as raisins, candied fruits, berries, nuts, etc. The possibility of adequate replacement of raisins with a dried exotic fruit unabi is considered - Chinese date in the recipes of cakes.

Uniabi fruit is not only a source of physiologically functional ingredients, the introduction of which into confectionery products will increase their nutritional value and provide functional properties, but also has pronounced positive technological properties.

CONCLUSION

The use of developed products will help to ensure the human body with biologically active substances and vitamins, as well as reduce the risk of developing a number of diseases, preserve and improve health. The development of food will expand the range of products using unabi fruit, produced with natural plant raw materials, and increase their organoleptic parameters, nutritional value, and medicinal properties. [E. N. Sharafutdinova, 2011].

Given the availability of raw materials in the South of Russia and the high concentration in the region of processing industries [15], the goal of scientific research is relevant.

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