

FUNCTIONAL JAM BASED ON THE GRAPES-SEEDLESS RAISINS

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ABSTRACT

One of main tasks of therapeutic and prophylactic treatment is an increasing a share of available functional food products that contribute the efficient provision of the human body by the required amount of macro- and micronutrients. As known, grapes and products of its processing contain more than 150 biologically active substances. For instance, fresh grapes contain up to 30 % of easily digestible sugars - glucose, fructose and a small amount of sucrose. In addition, they have a large set of organic acids, such as: tartaric, malic, citric, succinic, oxalic and formic. As well as a lot of kinds of vitamins: A, B₁, B₂, B₆, C and PP are accessible. Moreover, following useful macro- and microelements are available: potassium, sodium, phosphorus, silicon, iron, magnesium, aluminum, manganese, bromine, boron, iodine, fluorine, zinc et al. However, it could be noted various varieties of grape – seedless raisins that really without seeds, will maybe a priority raw material in the development of new functional food products. Medicinal dandelion (*Taraxacum Officinale* Wigg) consists in essential oils, carbohydrates, phenolic compounds, terpenoids, carotenoids, mineral components and vitamins, which have a wide range of biological activity. The technology for producing jam based on light seedless raisins (white or pink varieties) with addition of Medicinal dandelion flowers and other ingredients are considered in the presented work. The results of organoleptic and physico-chemical properties show that the developed jam fully meets the requirements of GOST (Interstate standard) and it can be recommended as a functional food product.

Key words: antioxidants, biologically active substances, dandelion, functional food product, grapes

INTRODUCTION

Nowadays, some food producers, instead of preserving nutritional value, mainly take into account the commercial goal of increasing profit levels, often by using cheap artificial raw materials.

However, it should be noted that in the diet of modern people, there is a deficiency of vital vitamins (group B up to 20-30%, vitamin A up to 30%, vitamin C up to 50%), dietary fiber (up to 40%), complete proteins (up to 25%) and other substances. In this regard, the functional activity of the immune system decreases, and risk factors for the spread of many common chronic diseases are formed [1].

One of the main tasks of prophylactic treatment is an increasing a share of produced functional food products that contribute to the efficient provision of the human body with the required amount of micro and macronutrients.

Therefore, in this situation, it is relevant and appropriate to create and to introduce new technologies and an assortment of consumer goods – fruit and berry, canning, confectionery

and other products enriched by nutrients for the covering a deficiency of essential components in the diet and the increasing an immunological resistance of the human organism [2].

Domestic plant raw materials: fruits, berries, vegetables and others, due to low cost, high nutritional and biological value (content of functional ingredients more than 20%) can be a strategic agricultural resource for the creation of confectionery and other functional foods [3].

Grapes are one of the most valuable food and diet products. Fresh grapes contain up to 30% easily digestible sugars - glucose, fructose and a small amount of sucrose. There are a large set of organic acids (tartaric, malic, citric, succinic, oxalic, formic), as well as vitamins (A, B₁, B₂, B₆, C, PP) and minerals (potassium, sodium, phosphorus, silicon, iron, magnesium, aluminum, manganese, bromine, boron, iodine, fluorine, zinc) in fresh grapes. Tartaric and malic acids together with sugars determine the refreshing and harmonious taste of grapes. They, intensively affecting the digestive organs, cause appetite, favor the breakdown of certain salts and prevent the formation of kidney stones [4].

Among the grape varieties, seedless (raisins) varieties are in great demand by the population for fresh consumption, in some countries they are partially used in winemaking. According to the study conducted in Kazakhstan, the largest accumulation of sugar in grapes was observed in the varieties "Sogdiana raisins" - 23.32%, "Batyra raisins" - 23.89% and "Pink raisins" - 24.90% [5].

Leaves and roots of medicinal dandelion contain many essential trace elements: copper, manganese, chromium, cobalt, phosphorus, boron and selenium. Some species include a record for plants the amount of ascorbic acid - from 300 to 650 mg. Dandelion flowers are useful due to the rich content of the following substances: carotenoids, triterpene alcohols, B vitamins, inulin, fatty oil, lutein. Dandelion preparations have a choleric, cleansing and hematopoietic effect, have a calming and mild sedative effect, reduce the amount of sugar in the blood and regulate the release of insulin. Medicinal dandelion juice is rich in potassium, so it is often used as a mild diuretic [6].

Salads, medicinal tinctures, decoctions, first courses and coffee substitute are prepared from dandelion. Dandelion is characterized by a wide range of biologically active substances. Medicinal dandelion contains: carbohydrates, fats, ash substances, proteins, dietary fiber; zinc, potassium, selenium, phosphorus, calcium, manganese, copper, iron, magnesium, thiamine, vitamin K, C, PP, beta-carotene, riboflavin, pantothenic acid, folic acid, pyridoxine, choline, tocopherol. Microelements, biologically active substances and vitamins that make up the plant, fruitfully affect the human body, saturate it with the necessary elements, and help cope with diseases, have a positive effect on metabolic processes [6].

Fig. 1 shows the Medicinal dandelion composition by weight per 100 g [7].

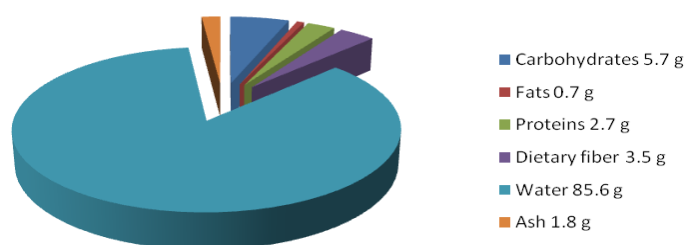


Fig. 1. Medicinal dandelion composition

Pectin has sorbing properties in relation to heavy metals and the ability to remove them from the body. Using it for therapeutic and prophylactic purposes as an additive in various products is based on this. It has a wide range of functional properties, acting favorably on the

gastrointestinal tract. Pectin is widely used as stabilizers, detoxifiers, gelatiners in the production of food products for mass consumption, as well as dietary, therapeutic and prophylactic purposes. Pectins from various sources exhibit antioxidant properties, which allow them to create a wide range of functional food products [8].

Pectins in the large intestine are low-calorie carbohydrates and readily soluble ballast substances that also considered a good source of energy and for normal intestinal microflora. Pectins due to the formation of the viscosity of the intestinal contents delay the emptying of the stomach, increase the transit time through the gastrointestinal tract, reduce the absorption of cholesterol and bile acids, decrease the level of serum cholesterol, insulin secretion and glucose concentration in it. Pectins also increase the secretion of a number of enzymes and hormones and are a powerful antioxidant [9].

A widespread use of affordable local natural raw materials will significantly expand the range of functional foods.

The aim of the study is to develop recipes and technologies of functional jam based on seedless raisins with the addition of Medicinal dandelion flowers and other ingredients.

MATERIALS AND METHODS

Seedless raisins, medicinal dandelion and pectin were selected as sources of biologically active substances and nutrients with therapeutic properties.

As the main raw material for the study, "Pink seedless raisins" was used that purchased on the local market in Shymkent city.

"Pink seedless raisins". Flower is androgynous. Bunch is large (25×15 cm), cylindrical. Dense or medium density. Berry is small (13×8 mm), oval or slightly ovoid, pink. Average mass of the bunch is 220 g. The beginning of ripening is the first or second decade of July; full physiological maturity - the end of August [10].

In the recipe for the developed jam, medicinal dandelion flowers were used that collected in the mountain village "Birkolik" of the Turkestan region, the manufacturer - Zerde-Fito LLP.

Medicinal dandelion (*Taraxacum Officinale* Wigg) - a perennial herbaceous plant of the Asteraceae family. Dandelion leaves are lanceolate, numerous and cirrus. The inflorescence has a golden yellow color, a single basket. The fruit is a gray - brown achene, with a tuft of thin hairs. It blooms in April-May, it bears fruit in June-July. It occurs in meadows, forest glades, in parks and in settlements [6].

Additional ingredients in the recipe were: apple pectin, lemon juice, sugar and water.

The quality of a new developed product is determined by the totality of properties that specify its suitability to satisfy certain human needs. The organoleptic compatibility of all ingredients, specifically plant components was determined by sensory analysis by using a 5-point rating scale for the following indicators: appearance, texture, color, smell and taste [11].

RESULTS AND DISCUSSION

The initial experiments for the obtaining of the functional jam based on grapes – raisins were provided in laboratory (Fig. 2).



Fig. 2. Photos of laboratory experiments

The pulp of seedless raisins was boiled over medium heat to a boil, and then a dandelion decoction was added (yellow dandelion flowers were poured with cold water and brought to a boil, boiled for 7-10 minutes. The flower decoction was cooled and filtered), lemon juice and sugar were added, stirred and cooked until tender 20-30 min. Pectin solution was added 5-10 minutes before the end of cooking. The readiness of the jam is determined by the appearance and consistency. Thus, four samples were prepared with different contents of dandelion decoction (0%, 10%, 20%, 30%).

The process of the preparation of functional jam based on raisins in industrial conditions consists of the following main technological stages (Fig. 3).

In general the technological process of production of the jam or confiture consists of: reception and sorting of initial products, cleaning, washing, grinding and mixing, filling, packing, sterilization and storage.

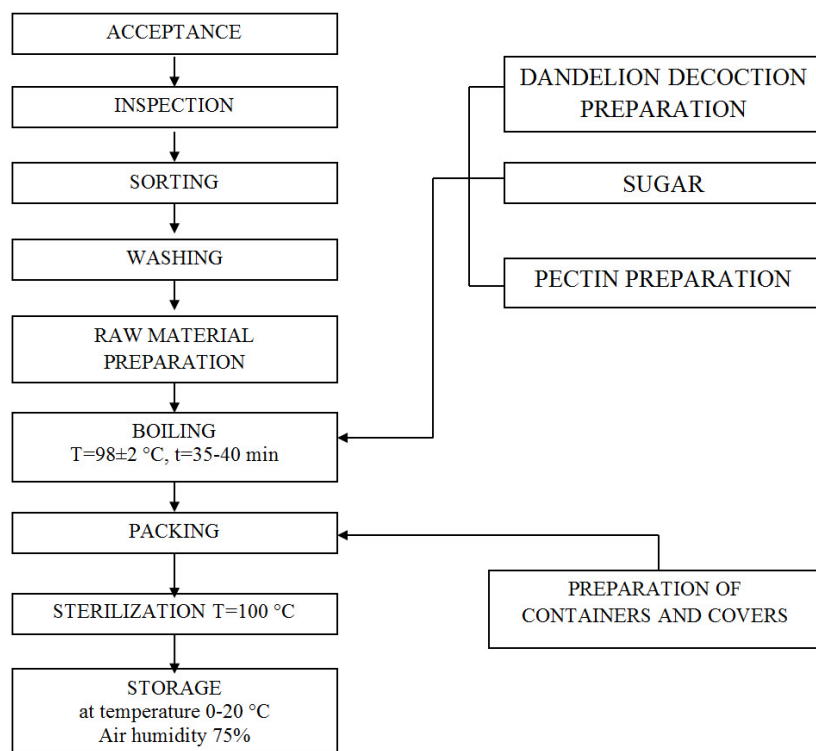


Fig. 3. Technological layout for the preparation of functional jam based on seedless raisins

Particularly by proposed approach, at the beginning, acceptance, inspection, sorting, washing and preparation of each type of basic raw material are carried out, including grinding and mixing with the ingredients. Next, it is necessary to carry out the cooking process in a digester at a temperature $T = 98 \pm 20$ °C, for $t = 35-40$ minutes. After receiving the required mass, ready jam is sent to the bottling line in glass containers or PET packaging, where corking and further sterilization in the sterilizer are provided. At the final stage, the finished packaging is stored in a warehouse at a temperature of from 0°C to 20 °C, with a relative humidity of not more than 75%.

Table 1 – Organoleptic characteristics of the obtained samples

Indicators	GOST 31712-2012 (Interstate standard) requirements	The samples with addition of the dandelion decoction			
		0%	10%	20%	30%
Appearance	Spreading mass with a jelly consistency with fruits and / or vegetables or their parts evenly distributed in it. Allowed: - mass slowly spreading on a horizontal surface; - the presence of single seeds of berries in the jam, which includes strawberries (strawberries), blackberries, raspberries and black currants, blueberries, blueberries. Sugaring is not allowed.	Dense mass, having a consistency with particles of grape varieties of seedless raisins	Dense mass, like of jam, having a consistency with particles of grape varieties of seedless raisins and dandelion decoction.	Thick mass, like of jam, having a consistency with particles of grape varieties of seedless raisins and dandelion decoction.	Thick, spreading mass, characteristic of jam, having a jelly consistency with particles of grape varieties of seedless raisins and dandelion decoction of evenly distributed in it.
Taste and smell	Taste and smell are pronounced. The taste is sweet - sour-sweet, pleasant, characteristic of the fruits (vegetables) of which jam is made. Smell - corresponding to the fruits (vegetables) of which jam is made. Allowed: - taste and smell are mild. Foreign taste and smell are not allowed.	Pleasant sweet taste and smell typical of grapes.	Pleasant sweet taste and smell typical of grapes and dandelion.	Pleasant, sweet taste typical of grapes and dandelion. Smell corresponds to the used ingredients, grapes and dandelion.	Pleasant, sweet taste typical of grapes and dandelion. Specific smell that matches the used ingredients, grapes and dandelion.

Table 1 continuation.

Colour	Characteristic of the color of the fruit or vegetables of which the jam is made. Allowed: light brown shades - for jam from light-colored fruits; brownish tint - for jam from dark-colored fruits and dried fruits.	Specific reddish-yellow colour, depending on the used light grape variety of seedless raisins.	Pleasant reddish yellow colour, depending on the used light grape variety of seedless raisins .	Pleasant shade from golden yellow to reddish yellow, depending on the used light grape variety of seedless raisins.	Pleasant shade from golden yellow to reddish yellow, depending on the used light grape variety of seedless raisins (white or pink).
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The obtained jam samples by applying the described technology fully meet GOST 31712-2012 (Interstate standard) [12] requirements by the organoleptic and physicochemical characteristics with pleasant appearance that characteristic of jam, pleasant sweet smell, specific taste, colour depending on the used light grape variety of seedless raisins et al. (Table 1 and Table 2).

Table 2 – Physicochemical indicators of the obtained samples

Indicators	GOST 31712-2012 (Interstate standard) requirements	The samples with addition of the dandelion decoction			
		0%	10%	20%	30%
Mass fraction of soluble solids,%, not less than, in homemade jam	55	58	58	60	60
Mass fraction of titratable acids,%, for other jams (calculated on malic acid)	0.3	0.28	0.28	0.3	0.4
Mass fraction of mineral impurities,%, no more, for other jams	0.01	0.01	0.01	0.01	0.01

As can be seen from the Table 1 and Table 2, the results of organoleptic and physicochemical indicators of the obtained samples fully comply with the requirements of GOST 31712-2012 (Interstate standard) [12].

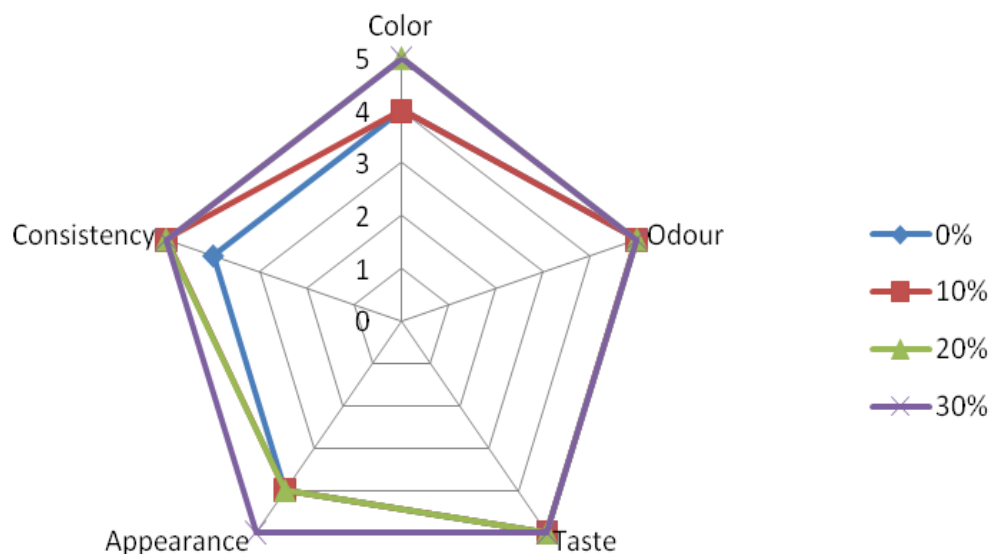


Fig. 4. Organoleptic indicators of the obtained samples

Specifically, as can be seen from Figure 4, the highest assessment has a sample of jam containing 30% of medicinal dandelion by mass, particularly: dense mass with a spreading texture, pleasant sweet taste and pleasant smell, pleasant yellow color. In addition, in this proportion the concentration of medicinal dandelion will be higher and the therapeutic properties of the final product will be useful by increasing of its biological and nutritional values.

CONCLUSION

Thus, The obtained jam samples by applying the described technology fully meet GOST 31712-2012 (Interstate standard) requirements on the organoleptic and physicochemical characteristics with pleasant appearance that characteristic of jam, pleasant sweet smell, specific taste, colour depending on the used light grape variety of seedless raisins et al. The optimal composition of functional jam with 30% dandelion was determined. The obtained functional jam based on seedless raisins allows expanding of new food products with functional purposes and increased biological value including multifunctional properties, as it is enriched by vitamins, dietary fiber, macro- and microelements. In addition, high sugar content in seedless raisins can reduce the amount of additional sugar; also pectin in the proposed jam has a beneficial effect on the therapeutic and prophylactic properties for the metabolism.

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