UDC 663.8.031 DOI: http://doi.org/10.31617/k.knute.2020-06-01.52

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FUNCTIONAL PRODUCTS USING SECONDARY RAW MATERIALS OF JUICE PRODUCTION AND ITS NUTRITIONAL VALUE

The article investigated the nutritional value of new varieties of Jerusalem artichoke. This type of sirya is often used in the country's food industry as a technical raw material. The country pays a lot of attention to the development of agriculture. Create new varieties of vegetables and fruits. The article presents a study of the chemical composition of new Jerusalem artichoke varieties "Moise", "Fayz Baraka".

With an increase in juice production, the amount of secondary raw materials increases in parallel. This type of raw material also represents nutritional value. Many useful substances are stored in it such as vitamins, carbohydrates, mineral compounds. Currently, this type of raw material is used for nutritional and technical (feed) products. During the years of independence, in our republic, special attention was paid to the development of agriculture, since it is the main source of food for the population of the country. New fertile varieties of vegetables and fruits were created; among these studies, mention can be made of the creation of new varieties of Jerusalem artichoke «Mojiza», «Fayz Baraka». The created new varieties of Jerusalem artichoke have the following chemical composition. (Table 1) compared with potato [1].

Table 1

The nutritional value of Jerusalem artichoke compared to potato

Indicators	Jerusalem artichoke (Mojiza)	Potato
Proteins	3%	2%
Carbohydrates	16–18% inulin	16% starch consisting of glucose
Vitamins B_1B_2C	3 times more	3 times less
Fe,Si,Zn	Much	Much
Calorie content	57.3 kcal	89 kcal
Poisonous substance in the peel (corned beef)	No	Yes
Fiber	Much	Relatively little

As the table of Jerusalem artichoke data shows, in many aspects it surpasses potato three times more. In our Republic, Jerusalem artichoke is used for getting juice and concentrates, but pomace practically is not used and it is formed in huge quantities. Studying and analyzing the literature devoted to the processing of secondary raw materials of juice extracts including Jerusalem artichoke it can be seen that it is rich in fiber, minerals, and vitamins. The main part of inulin during the process of obtaining juice remains in the Jerusalem artichoke millcake [2].

The unique chemical composition of Jerusalem artichoke has a beneficial effect on absolutely all links and mechanisms of the digestive system.

Jerusalem artichoke is an excellent tool for the prevention of chronic diseases of the digestive system in traditionally critical seasons (autumn and spring), in stressful situations, in diseases of other organs or viral infections, in relapses of the peptic ulcer, pancreatitis or gastritis [3, 4].

When consuming Jerusalem artichoke, the main thing is the system of the unique ability of fructose to penetrate into the cells of all organs without the participation of insulin and to fully replace glucose in metabolic processes. With this, cell hunger is significantly reduced. Moreover, short fragments of inulin molecules, integrating into the cell wall, facilitate the passage of glucose itself into the cell, albeit in relatively small, compared to normal, all this leads to a significant and persistent decrease in blood sugar concentration, which is not accompanied by sharp fluctuations in this indicator during the day. This is precisely the primary task in the treatment of insulin-dependent diabetes mellitus [5, 6].

Considering the above, we decided to develop the technology of various products from the juice extracts of Jerusalem artichoke.

Materials and research methods

During the experimental work, the following raw materials were used: juice of Jerusalem artichoke, rice flour, raspberry juice, Na-carboxymethyl cellulose, granulated sugar, lemon, beetroot, pectin powder, fruit essence. All raw materials met the requirements of the standards. For the experiments, samples of new products were

prepared and samples were obtained for analysis. Samples were taken according to GOST (7), organoleptic evaluation was performed according to GOST (8), dry matter content was determined by the refractometric method according to GOST (9), sugar content according to GOST (10), acidity according to GOST (11), pectin content according to GOST (12), a method for determining plant impurities according to GOST (13).

Research results and discussion

We have studied the content of pectin by the staff of the Department of Food Technology, as the indicators of pomace have been studied by many scientists, and it indicates that the bulk of inulin remains in pomace. We investigated the content of pectin in pomace. The results are given in table 2.

Table 2

The content of pectin in juice squeezes and beets (boiled)

Product name	Pectin Content in the Product (in% on dry matter)
Beet	0,46–1,4 г
Juice extracts of Jerusalem artichoke	1,20–1,59 г

As can be seen from the table, the pectin content in beets and juice of Jerusalem artichoke in terms of dry matter is 0.46–1.42% in beets and from 1.20–1.59% in juice extracts (in terms of dry matter).

Considering squeezes formed in huge quantities and nutritional value, we have developed technologies for the preparation of dietary and sugar-containing products from this raw material.

To prepare a dessert with a low sugar content from Jerusalem artichoke juice squeezes, the squeezes are sorted, inspected, cleaned, washed, passed until cooked, rubbed together with rice flour and inspected, sieved, crushed to produce rice flour and boiled with citric acid for 50–60 minutes at temperature of 1000C in a ratio of 1: 4, the resulting porridge is wiped, and methylcellulose is poured with raspberry juice in a ratio of 1:10 and boiled for 2–3 minutes and left to swell for 15–20 minutes. The solution of methyl cellulose is combined with mashed rice porridge, squeezed Jerusalem artichoke, chilled juice, sugar, all the ingredients are mixed until complete dissolution of methyl cellulose, then the mixture is cooled to a temperature of 70C and milled [14].

When preparing sugar-containing products from juice extracts of Jerusalem artichoke, the extracts are inspected, washed, cooked and ground. At the same time, the beets are cooked, peeled and wiped twice on the machine for effective grinding of

cooked products to obtain beetroots. The resulting masses are combined, transferred, boiled with the addition of granulated sugar and lemon juice, pectin solution is introduced 10–15 minutes before the end of cooking. 2–3 minutes before the end add fruit essence. [15]

These cooked foods are rich in dietary fiber, pectin, fiber and can be attributed to functional foods. During the tasting, experts and consumers highly appreciated the organoleptic and quality indicators of these products. The organoleptic characteristics of the dessert from the juice extracts of Jerusalem artichoke with a low sugar content and vegetable jam are shown in Table 3.

Table 3

Organoleptic characteristics of a dessert with a low sugar content from juice extracts of Jerusalem artichoke and vegetable jam

Samples name	Characteristic organoleptic indicators				
	Taste	Odor	Appearance	Consistency	Color
Dessert with low sugar content from Jerusalem artichoke juice squeezes	Intrinsic of manufactured raw materials. Sweet without extraneous taste.	Intrinsic to manufactured raw materials. Pleasant, odorless	Creamy mass	Uniform throughout the mass, without perceptible ice crystals	Uniform, typical for this type of dish
Vegetable jam	Peculiar to manufactured raw materials and materials, pleasant sweet or sour-sweet without persistent taste	Peculiar to manufactured raw materials pleasant, without persistent odor	Smearing mass	Not spreading on a horizontal surface	Uniform corresponds to the color of the raw materials and materials from which jam is made

As we can see from the data in table 3, products prepared from juice extracts of Jerusalem artichoke had high organoleptic characteristics and met the requirements of standards. The physicochemical parameters of desserts with a low sugar content and jam from Jerusalem artichoke juice were also investigated (Table 4).

Table 4

The main physico-chemical characteristics of desserts with low sugar and jam from artichoke juice extracts

Name of indicators	Name of studied samples
	Desert with low sugar content
Mass fraction of solids, %	17,0
Mass fraction of sugar, %	6,0
Calories	71
Indicators	Vegetable jam
Mass fraction of soluble solids, %	68
Mass fraction of titratable acids %	0,2
Mass fraction of impurities of plant origin, % not more than 0. 02	0,02
Foreign body	Not allowed

As we can see from the data in table 4 the solids content in the dessert is 17%, jam is 68%, the mass fraction of sugar is 6%, and this is several times lower than in ordinary desserts and the calorific value is 71 kcal / 100 g. In vegetable jam, titratable acidity is 0.2%, and the content of vegetable impurities is 0.02%, and these indicators meet the requirements of the standards for desserts and jams prepared from the main types of raw materials.

Conclusions Studies have shown that the developed products are rich in fiber, minerals, dietary fiber. This indicates the feasibility of using recycled juice extracts in the production of functional products. By organoleptic and physico-chemical indicators, they are not inferior to products prepared from the main types of raw materials.

REFERENCES

1. Kasimov M. Khusamutdinov R. Yernoki-sog'lomovaqt lanish garovi. Ernoki dan parheztaom larta yor lashret septuralariva tehnologiya lari. – T. : Iqtisodiyot. 2014–48 bet.

2. Kozhukhova M. A., Barkhatova G. V., Altunyan M. V., Khripko I. A., Rylskaya L. A. The development of the technology of functional food products based on Jerusalem artichoke. // News of universities. Food technology. № 2–3. 2005 s. 21–23. UDC 635. 24. 6417.002.2

3. Dudenko N. V., Pavlotskaya L. F., Gorban V. G., Zhogla V. I. New flour confectionery products of high biological value using Jerusalem artichoke powder // University News Food Technology. – 2011. – P. 35–37.

4. Pavlova G. N., Erashova L. D. Dietary products for patients with diabetes and cardiovascular diseases // Food ingredients, raw materials and additives. – 2005. № 1. – P. 25–28.

5. Perkovets M. V. The effect of inulin and oligo fructose on reducing the risk of some diseases of civilization. // Food industry. 2007. № 5. – P. 22–23.

6. Kochnev N. K. Therapeutic and dietary properties of Jerusalem artichoke // N. K. Kochnev, L. A. Reshetnik. – Irkutsk. 1997. – P. 6–11.

7. GOST. 26313. Sampling methods.

8. GOST. 8756. Methods for the determination of organoleptic indicators.

9. GOST. ISO 2173: Determination of mass soluble solids.

10. GOST 8756. 13. Methods for the determination of sugars.

11. GOST ISO 750. Definitions of titratable acidity.

12. GOST 29059. Methods for the determination of pectin substances.

13. GOST 26323. Method for the determination of plant impurities

14. Patent IAP 05865. Sabzavot lipresstayy orlashusuli Atakhanov Sh. N., Dodaev K. O., Akramboev R. A., Atamirzaeva S. T., Dadamirzaev M. Kh., Mallaboev O. T., RakhimovU. Yu.

15. Patent IAP 06063. Qandmiq dorikambo’l gan dessert sharbatio ling an topinambur dantayy orlashusuli. Atakhanov Sh. N., Khozhiev R. M., Dodaev Қ. O., Akramboev R. A., Mallaboev O. T., Rakhimov U. Yu. 11.29.2019th.