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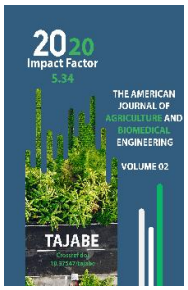

Jerusalem Artichoke Is A Promising Raw Material For The Production Of Dietary Dishes And Flour Confectionery

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ABSTRACT

The use of Jerusalem artichoke in food will expand the range of dishes, culinary and confectionery products, promotes the use of local and non-traditional types of raw materials, which make it possible to reduce the mass fraction of sugar and fat in sweet dishes and confectionery products, and create new types of food products with low energy value.

KEYWORDS

Jerusalem artichoke, Dietary Dishes, materials and semi-finished products, Flour Confectionery

INTRODUCTION

Currently, one of the progressive directions is resource-saving technology.

On the basis of this, one of the main tasks is the need to carefully use raw materials and materials, reduce waste, eliminate losses, which will help increase production, rational use of capital investments, and save the labor of millions of people. At the same time, along with the use of secondary resources, using non-traditional local raw materials, it is also important to improve the quality indicators of food products, enrich them with nutrients necessary for human nutrition and expand the range.

Simply increasing food intake cannot solve all nutritional problems. It should be rational, consistent with the main provisions of nutritional science, the requirements of which

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should be taken into account when developing a strategy for the development of the food industry. Proper nutrition plays an important role in the life of a healthy person; it acquires particular importance for a sick person. Currently, it is necessary to significantly expand the range of medicinal dishes.

Studies conducted in all Western countries show that the main reason for the so-called "Epidemics of the 21st century" is the use of high-calorie refined foods, reduced physical labor, which have led to diseases such as obesity, cancer, diabetes mellitus, atherosclerosis, hypertensive illness, heart attacks, strokes and other diseases of civilization. Thanks to this, the basic food product - dietary fiber (fiber, etc.) - disappeared from human nutrition.

The study and dissemination of the accumulated experience makes it possible to significantly improve the range and quality of produced dishes, culinary and confectionery products, to increase the output of products that are in predominant demand of the population, and to intensify technological processes.

In the light of modern ideas about balanced nutrition, the expansion of the range of dishes and products should go along the path of creating new types of products with reduced energy value.

The solution to this problem is facilitated by the use of local and non-traditional raw materials.

New types of fruit and vegetable raw materials are of great importance for expanding the raw material base for the production of dishes and flour confectionery.

THE LITERATURE REVIEW

The literature contains detailed information about the nutritional value and medicinal properties of vegetables, especially Jerusalem artichoke - an earthen pear. Today, as the properties of Jerusalem artichoke are actively studied in many countries of the world (Russia, Japan, USA, Canada, Holland, Belgium, Germany, Hungary, etc.), physicians are showing great interest in it as an effective therapeutic agent and a unique dietary food product.

Jerusalem artichoke is recommended to be regularly consumed by people who live in cities with a poor ecological environment, because it helps to remove salts of heavy metals, toxins, radionuclides and excess cholesterol from the body. This antitoxic effect of Jerusalem artichoke is due to the combined actions of inulin and fiber that make up it.

Jerusalem artichoke contains dietary fiber (fiber) and a rich set of minerals. It surpasses potatoes, carrots and beets in iron, silicon and zinc content. Jerusalem artichoke tubers also contain proteins, pectin, amino acids, organic and fatty acids. By the content of vitamins B1, B2, C, Jerusalem artichoke is richer than potatoes, carrots and beets by more than 3 times. A significant difference between Jerusalem artichoke and other vegetables is manifested in the high content of 8 essential amino acids in its tubers (up to 3.2% on dry matter).

It contains inulin, which contributes to the enrichment of the human body with fructose, which is necessary for patients with diabetes mellitus.

Inulin is the only natural polysaccharide that is 95% fructose. The short fructose chains absorbed in the intestine and in the blood continue to perform an antitoxic, cleansing function, binding, neutralizing and facilitating the excretion of harmful metabolic products and chemical compounds from the external environment.

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Jerusalem artichoke will help with diseases of the gastrointestinal tract, protect against viral infections, relieve headaches at high pressure, remove toxins from the body, and increase hemoglobin in the blood.

Jerusalem artichoke helps with gout, urolithiasis, salt deposition, obesity, lowers blood sugar, lowers blood pressure, neutralizes the negative effects of environmental influences, and removes salts of heavy metals from the body. These properties of Jerusalem artichoke are due to the combined actions of inulin and fiber that make up it.

In the republics of Central Asia, Jerusalem artichoke as an unconventional raw material is of certain interest. Jerusalem artichoke has a very thin and easily damaged skin, because of which it cannot be stored for a long time, dries quickly and rots. At home, it can be stored in the refrigerator in food paper bags for 1 month. In any form, Jerusalem artichoke pleasantly diversifies the menu and is a truly useful product for a healthy diet.

Jerusalem artichoke can be used in powder and puree form. To prepare the powder, wash the tubers well, cut into thin slices. Dry them in the oven at a temperature no higher than 60-650C so that vitamins are not lost. Grind the dried slices in a coffee grinder. Put the powder in jars. Jerusalem artichoke puree is best cooked in a double boiler for 25 minutes until soft, peeled and passed through a pulverizing machine. Jerusalem artichoke (Heliantnus tuberosus) is a perennial tuberous plant of the Aster family. In Russia it is better known as "earthen pear", in Europe it is called "Jerusalem artichoke". Jerusalem artichoke is native to the territory of modern Brazil. The name Jerusalem artichoke comes from the Brazilian Tupinambas Indians who once existed in Chile.

It can serve as an excellent alternative to potatoes. It is very easy to grow and can grow on any soil. He is afraid of pests, he is not picky about the level of humidity and lighting. Even if not cared for, it can grow and yield up to 30 years or more. In the nest there are 1-3 stems, up to 30 tubers on short stolons, compactly collected. The above average yield of tubers is 40-50 t / ha, tops - 30 t / ha. Jerusalem artichoke can be dug out as needed, since it is stored better in the ground, and during snowy winters, they tolerate frosts at -40C. For long-term storage, Jerusalem artichoke was buried in the ground and in the spring, when the tubers were dug up, they were fresh and nutritious. According to the literature data, during storage of Jerusalem artichoke, part of the inulin is converted into fructose as a result of hydrolysis. By the amount of carbohydrates, Jerusalem artichoke surpasses sugar beets and sugar cane. From 100 kg of Jerusalem artichoke tubers, up to 10 kg of fructose are obtained. We have studied the commodity-technological properties and the possibility of preparing culinary products from Jerusalem artichoke. For this purpose, the botanical variety of Jerusalem artichoke "Etirof" was used. Jerusalem artichoke tubers have an elongated pear-shaped shape with numerous convex eyes. The mass of tubers, depending on the size, ranges from 20 to 150 g. The color of the skin of the tubers is light brown, the pulp is white. The consistency of raw tubers on the cut is juicy, crispy and non-starchy, the aroma is specific, pronounced.

In the process of cooking, the tubers retain their shape well, their flesh acquires a grayish tint, a sweetish taste and a weak aroma, they do not fall apart when cut into pieces. The amount of waste during primary and thermal (cooking) treatments was studied. The results of the experiments showed that during the primary treatment (washing, soaking and cleaning), the waste is 25.0% on average. However, during cooking, the thin skin on the surface of the tubers becomes rough, while acquiring a hard consistency, which is the

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main source of inulin and its weight is 16.0-17.0%. The duration of heat treatment, depending on the size of the tubers, is 17-28 minutes when boiling in water, 15-20 minutes for steam. The yield of finished products when boiled in water is 91.0%, for steam - 93.0%. We have developed and tested in laboratory conditions scientifically grounded recipes and technology for cooking dishes "Jarkop with Jerusalem artichoke" and "Dimlama with Jerusalem artichoke" (table 1). The finished products with Jerusalem artichoke were subjected to a wide organoleptic assessment with the involvement of scientists of the relevant profile and production specialists. Its results confirmed the full compliance of their quality with the historically established taste characteristics of the population. Below is the recipe and technology for preparing dishes with Jerusalem artichoke.

Table-1
Recipes for dishes with Jerusalem artichoke

Product name	Jarkop with with Jerusalem artichoke		Dimlama with Jerusalem artichoke	
	Gross	Net	Gross	Net
Mutton	150	107	200	143
or beef	162	119	-	-
Vegetable oil	13	13	-	-
Jerusalem artichoke	300	225	133	100
Onion	30	25	30	25
Carrot	50	40	38	30
Tomatoes	33	28	59	50
or tomato paste	6	6		
Sweet pepper			40	30
Butter			10	10
Garlic			8	6
Dill (greens)			14	10
Broth or water			20	20

Jarkop with Jerusalem artichoke. The meat is cut into pieces weighing 25-30 g, fried in vegetable oil with chopped onions and sliced carrots, then add fresh tomatoes or tomato paste, salt, pepper, pour a small amount of broth or water and bring to a boil, lay Jerusalem artichoke, chopped slices, stew until tender. Sprinkle with herbs when serving.

Dimlama with Jerusalem artichoke. Meat, chopped from the loin (1-2 pieces) per serving, beat off, sprinkle with salt, put in a portioned clay pot, put Jerusalem artichoke, carrots, tomatoes, garlic, cut into rings, onions, sweet peppers (Bulgarian), herbs, pour broth or water, add creamy meat and put in an oven. Serve in the same dish.

For a more in-depth assessment of the quality of products, it is necessary to know their nutritional value. To determine the influence of Jerusalem artichoke, instead of potatoes, on the nutritional value of dishes, using the example of the dish "Jarkop", along with an

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organoleptic assessment, we determined the chemical composition of the dish "Jarkop with Jerusalem artichoke" and "Jarkop with potatoes". When comparing the data (Table 2), it was found that replacing potatoes with Jerusalem artichoke leads to an increase in proteins, carbohydrates, especially fructose, dietary fiber (fiber). According to the literature, Jerusalem artichoke also contains such amino acids that are not synthesized in the human body: valine, isoleucine, leucine, lysine, methionine, tryptophan, phenylalanine, arginine, histidine.

Table-2
The chemical composition of the dish "Jarkop" (g •%)

Samples	Dry matter	Protein	Fats		Carbohydrates		Cellulose	Organic matter	Ash	Energy value, kkal
					Monosaccharide	Starch				
1. Jarkop with Jerusalem artichoke	89	25,6	31,2		44,4	0,15	10,4	0,23	13,9	522
2. Jarkop with potatoes	100	22,9	29,8		8,4	36,2	3,13	0,48	3,33	543

In terms of iron content, Jerusalem artichoke is much superior to other tubers (carrots, potatoes, turnips, beets, etc.). In addition, Jerusalem artichoke contains potassium, calcium, silicon, magnesium, sodium, fluorine, chromium and other minerals.
When determining the content of minerals and vitamins (Table

Table 3
Content of minerals and vitamins in the dish "Jarkop", (mg •%)

Samples	Minerals						Vitamins				
	Na	K	Ca	Mg	P	Fe	β-carotene	B_1	B_2	PP	C
1. Jarkop with Jerusalem artichoke	157	3636	217	123	217	25,6	48,9	2,8	0,45	5,6	20,5
2. Jarkop with potatoes	181	1804	63,4	103,3	348	4,4	3,95	0,4	0,38	8,33	56,5

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One of the ways to improve the structure of consumption and production of sugary substances is to increase the production of fructose.

Fructose is a promising sugar. Its use can almost halve the total consumption of sugar and the calorie content of dietary products. Any sugar solution with a high fructose content can serve as a raw material for the production of fructose. In all countries of the world, the production of glucose-fructose syrups is considered a revolutionary achievement in food technology.

Glucose - fructose syrups are produced from starch-containing raw materials. At the same time, there are other potential sources for obtaining high-fructose syrups, inulin-bearing plants. Inulin is a heteropolysaccharide, which is a linear polymer of fructose with a bond and the remainder of the sucrose molecule at the end of the chain.

A significant amount of inulin (16 to 20% wet weight) is contained in Jerusalem artichoke tubers. Inulin is a polysaccharide, the hydrolysis of which leads to the production of fructose sugar, harmless for diabetics. We have improved the recipe and technologies for the preparation of a flour confectionery product using Jerusalem artichoke instead of part of the flour, sugar, eggs used, enriching them with inulin, fructose, dietary fiber and other food substances necessary for humans, determined their organoleptic characteristics and chemical composition. When developing the recommended recipe for flour confectionery, the basis was taken as a basis for the biscuit cake with butter cream (sliced) No. 42a, from the collection of recipes for flour confectionery and bakery products for public catering enterprises. Control samples were prepared without the addition of Jerusalem artichoke (table 4). Biscuit cake with butter cream was prepared according to traditional technology. Add mashed potatoes from steamed Jerusalem artichoke to the biscuit semi-finished product before the end of beating the dough. We prepared the biscuit cake with the replacement of 10% (sample No. 1), 15% (sample No. 2), 20% (sample No. 3) flour and 10% each sugar and melange with Jerusalem artichoke puree. As a result of the organoleptic assessment carried out with the participation of specialists from the public catering system, it was revealed that the biscuit cake (sample No. 1) prepared with the addition of 10% Jerusalem artichoke puree instead of 10% flour, 10% instead of sugar and 10% instead of melange did not differ in its taste. from the control sample and was highly rated. The tasters noted that the cake prepared with the addition of Jerusalem artichoke was fluffy, juicy and tender compared to the control.

Table 4
Biscuit cake with butter cream and Jerusalem artichoke (sliced)

Name of raw materials and semi-finished products	Raw material consumption for semi-finished products, g					Raw material consumption per 100 pcs. finished products in kind	
	control	experience	syrup for lotion №56	fruit filling №70	creamy cream №30	control	experience
Wheat flour of the highest grade	583	525				583	525
Potato starch	144	144				144	144

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Sugar sand	720	648	402	86,5		1209	1137
Melange	1199	1080				1199	1080
Butter					885	885	885
Jerusalem artichoke (puree)		250					250
Apple puree				57,6		57,6	57,6
Vanilla powder					8,7	8,7	8,7
Refined powder					472	472	472
Cognac or dessert wine			37,6		2,9	40,5	40,5
Молоко цельное сгущенное с сахаром					354	354	354
Essence	7,2	7,2				7,2	7,2
Essence of rum			1,5			1,5	1,5
Total raw materials for semi-finished products	2653,2	2653,2	141,1		1722,6		
Output of semi-finished products	2073	2073	784		1694		
Fruit filling						117	117
Total raw materials						4933,9	4933,9
Output of semi-finished products and finished products	1998	1998	756		1633		
Output of finished products						4500	4500

We also determined the content of proteins, fats, carbohydrates, fiber, organic matter, dry matter and energy value, as well as the content of minerals and vitamins in the experimental and control samples of the biscuit cake with butter cream (Table 5).

Table 5
The chemical composition of the biscuit cake with butter cream (sliced) (g •%)

Samples	Dry matter	Protein	Fats	Carbohydrates		Cellulose	Organic matter	Energy value, kkal
				Mono-saccharides	Starch			
Experienced	29,2	2,7	9,1	13,3	4,7	0,13	0,063	175
Control	30,3	2,6	9,2	14,1	5,1	0,01	0,063	180

The data in Table 5 shows that the content of the above mentioned nutrients between the experimental and control samples did not show significant differences. However, there

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is an increase in the amount of dietary fiber (fiber) in the Jerusalem artichoke cake compared to the control. In the prototype, a decrease in energy value by 2.78% is observed.

Table 6
The content of minerals and vitamins in the biscuit cake with butter cream (sliced) (mg •%)

Samples	Minerals						Vitamins					
	Na	K	Ca	Mg	P	Fe	A	β- carotene	B_1	B_2	PP	C
Experienced	29,5	83,8	29,2	6,7	45,0	0,71	0,580	0,059	0,279	0,285	0,152	0,270
Control	30,8	51,9	28,0	6,3	48,2	0,5	0,080	0,060	0,030	0,066	0,162	0,140

When determining the content of minerals and vitamins, it was revealed that an increase in K, Ca, Mg Fe is observed in the test samples. The amount of phosphorus is reduced by 6.6% (table 6). A sharp increase in vitamins A, B1, B2 and vitamin C is also observed in a cake with Jerusalem artichoke. There were no significant differences between the experimental and control samples in terms of the content of vitamins PP and β-carotene. However, it should be noted that the content of Jerusalem artichoke is from 16 to 20% inulin, up to 4.2% fiber, the content of carbohydrates in the form of fructose, along with the enrichment of ready-made food with useful nutrients, is of great importance as a preventive nutrition in the treatment of patients with diabetes mellitus and other diseases of civilization.

Conclusion. Based on the above, it can be concluded that the use of Jerusalem artichoke in nutrition will expand the range of dishes, culinary and confectionery products, promote the use of local and non-traditional types of raw materials, which allow to reduce the mass fraction of sugar and fat in sweet dishes and confectionery products, and create new types of food products reduced energy value.

REFERENCES

1. Collection of recipes for national dishes and culinary products of the peoples of Uzbekistan. Tashkent: "Mekhnat" - 1987.
2. Collection of recipes for flour confectionery and bakery products for catering establishments. - M .: Economics, 1986 .-- 295 p.
3. Dergacheva NV, Kazydub NG Tuberous crops (potatoes, Jerusalem artichoke, sweet potato, cassava, taro, yams): a textbook. - Omsk: OmGAU, 2011 .-- 208 p. - ISBN 978-5-89764-332-5.
4. Zelenkov V.N., Romanova N.G. Jerusalem artichoke: agrobiological portrait and prospects for innovative application. Moscow: RGAU-MSKHA, 2012.161 p.
5. Koroleva Yu.S. Fertilization of Jerusalem artichoke with long-term use of plantations: Dis ... candidate of agricultural sciences. Tver, 2009.294 p.
6. Poskrebysheva G.I. Jerusalem artichoke 100 golden recipes. OLMA-PRESS. 2000, 32 p.
7. Jerusalem artichoke in Belarus / VV Titok et al. National Academy of Sciences of Belarus, Central Botanical Garden. - Minsk:

Published: November 28, 2020 | **Pages:** 33-41
Doi: https://doi.org/10.37547/tajabe/Volume02Issue11-07

Belaruskaya Navuka, 2018 - 263, [1] p .: ill. - ISBN 978-985-08-2380-9.

Internet materials:

1. http://www.agro.uz/uz/services/useful/Topinamburnoyob ўsimlik
2. https://cyberleninka.ru/article/n/topinambur-kultura-mnogotselevogo-ispolzovaniya
3. https: //cyberleninka.ru/article/n/topinambur - kultura – mnogofunktsionalnogo - naznacheniya
4. www.darvin-market.ru ›encyclopedia› ovoshchi Jerusalem artichoke vegetables gardener's encyclopedia: description ...
5. https: //www.untehdon.ru/node/252 ... Jerusalem artichoke - Biotechnological potential