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ENRICHMENT OF FLOUR MIXTURES WITH FUNCTIONAL VEGETABLE ADDITIVES FOR PREPARATION OF BAKERY PRODUCTS

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Abstract. *To enrich bread and bakery products, composite mixtures based on barley, buckwheat, oatmeal, amaranth and wheat germ flour are offered.*

The vitamin composition was assessed and the organoleptic properties of flour mixtures were determined, as well as their physicochemical parameters. The use of various ingredients not only enriches the products with useful substances, but also helps to increase the shelf life of the products.

Key words: *bakery products, enrichment, nutrients, flour mixtures, physicochemical indicators.*

INTRODUCTION.

It is known that bakery products are an integral part of the daily diet of the population, regardless of age and social status. The human body receives most of the necessary biologically active substances through the consumption of bread, including essential amino acids, B vitamins, PP, proteins, carbohydrates, mineral elements and dietary fiber.

To date, the Russian Research Institute of the Baking Industry (FGBNU NIIHP) has developed a wide range of bakery products for functional, special and dietary directions [1].

Increasing the nutritional value and functional characteristics of bakery products is achieved by enriching them with natural ingredients and biologically active additives. The use of functional types of bread benefits not only sick people, but also healthy people. Japan is the world leader in functional foods, followed by the USA, Germany and some European countries [2]. In our republic, the demand for functional products has not yet been established. We believe that this is due to insufficient awareness of the population, the high cost of functional bakery products and the lack of government support in the production of such products.

International experience shows that many countries have achieved success in correcting diets and improving public health through the use of functional foods. The inclusion of fortified foods in government programs related to nutrition and public health is vital [3,4].

Bakery products prepared in accordance with traditional recipes satisfy human needs for proteins by 25-30%, carbohydrates by 30-40%, as well as vitamins, minerals and dietary fiber by 20-25%. Therefore, it is important to pay special attention to the nutritional and biological value of these products.

Bread is one of the most common food products among the population. Therefore, adding components with functional properties to its composition can effectively solve the problem of preventing and treating various diseases associated with a deficiency of certain substances.

After analyzing the available scientific literature, we developed methods for preparing flour mixtures for the production of functional food products [5].

METHODS.

To enrich bread and bakery products, composite mixtures are based on the flour of barley, buckwheat, oatmeal, amarantic and germinate flakes of wheat. By analyzing the available scientific literature, we developed methods of cooking flour mixtures for the manufacture of functional food products. Methods for the manufacture of flour mixtures for functional nutritions include the following steps: soaking, scaling, grinding and drying of vegetable raw materials, and then its mixing with the formulating components before achieving a homogeneous consistency.

Methods for the production of flour mixtures for functional food products include the following stages: first, the plant material is soaked in water until completely swollen for at least 12 hours, then germination occurs until sprouts appear at least 1 cm long. After this, the plant material is crushed and dried, and then it is mixed with the prescription components until a homogeneous mass is obtained. The process of soaking and germination of plant materials is carried out at a temperature of 25°C. The swollen mass of plant material is separated from the remaining water, and drying is carried out

using infrared rays with a radiant energy supply of 70 kW/m² and a radiation power of 12 kW.

The plant raw materials used are wheat grains, chickpeas, corn grains, sunflower seeds, oat grains, barley grains, walnuts and sesame seeds.

RESULTS.

Currently, the development of recipes for functional food products through the use of non-traditional sources of raw materials is extremely relevant. In this regard, we used various flours from wheat, rye and amaranth as the main components. The ingredients of the specified flour mixture are selected in accordance with Table 1.

Table 1

Qualitative and quantitative composition of flour mixtures

No.	Component name	Component consumption for preparing samples of flour mixtures		
		No. 1	No. 2	No. 3
1	First grade wheat baking flour, kg	64	28	70
2	Rye flour, kg	8	16	30
3	Amaranth flour, kg	2	18	25
4	Sprouted wheat grains, kg	8	28	32
5	Sprouted chickpeas, kg	4	11	18
6	Sprouted corn grains, kg	2	16	26
7	Sprouted sunflower seeds, kg	4	8	14
8	Sprouted oat grains, kg	2	15	30
9	Sprouted barley grains, kg	2	20	40
10	Sprouted walnuts, kg	2	7	14
11	Sprouted sesame seeds, kg	2	11	22

Individual variations of the functional mixture may also contain cereal flours: sorghum flour, wheat flour, buckwheat, quinoa flour and rice flour.

The variety of flour mixture compositions allows you to create a wide range of products for functional nutrition, including bread, bakery products, pasta, flour confectionery and other culinary delicacies.

The results of analyzes to determine the quantitative and qualitative content of vitamins in the composition of the declared functional flour (No. 1 - No. 3), produced according to the described method, were examined in the Department of Sanitary and Epidemiological Surveillance of the Main Medical Directorate under the Administration of the President of the Republic of Uzbekistan. The obtained data are presented in Table 2.

Table 2

Quantitative and qualitative assessment of the vitamin composition of flour mixture based on samples

No.	The name of indicators	According to ND (GOST 32042-2012)	Prototype (RU 2154945)	Actually		
				sample No. 1	sample No. 2	sample No. 3
1	Vitamin B1 (thiamine), mg/kg, no more	1.3-4.1	1,309	1,410	1.4 9 0	1,568
2	Vitamin B2 (riboflavin), mg/kg, no more	1.8-5.2	1,790	1,904	1,976	2.152
3	Vitamin B3 (nicotinic acid), mg/kg, no more	9.9-29.0	8.87	9.97	10, 190	10,658
4	Vitamin B9 (folic acid), mg/kg, no more	0.6-1.9	0.578	0.678	0.623	0.728
5	Vitamin B12 (cyanocobalamin), mg/kg, no more	0.002-0.006	0.089	0.00 2	0.00 2	0.003

The organoleptic properties of the resulting flour mixtures (samples No. 1 – 3) turned out to be the same and corresponded to GOST 26574-85.

The physicochemical parameters of the resulting flour mixtures also met established standards. Neutron activation analysis did not reveal the presence of heavy metals in the composition of flour mixtures.

CONCLUSION.

The research results allow us to conclude that the proposed method for the production of flour mixtures and products of improved nutritional value allows us to obtain products of increased nutritional value by enriching them with protein and mineral substances, dietary fiber, B vitamins, and improve the quality of products in terms of organoleptic and physicochemical indicators, increase the shelf life of fresh products and expand the range.

The use of various types of grains and other crops can significantly increase the nutritional value of the final product by achieving the maximum concentration of nutrients.

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