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THE STUDY OF PROTEIN IN THE COMPOSITION OF AMARANTH FLOUR FROM LOCAL ORIGIN

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Annotation
The present work is the development of the technology of bakery products for functional purposes using amaranth seed processing products from local raw materials.

Keywords: Amaranths, wheat flour, proteins, product of CO2 meal, chemical composition of amaranth seed.

Introduction

During the period of independence of the country, there have been profound shifts in socio-economic stability in the level and quality of life of the population, about the possibility of meeting human needs, which are based on a healthy diet. This work is about the development of functional products, practical research and experimental justification of the use of a new non-traditional type of raw materials - amaranth flour and its application on the example of the use in innovative recipes of bakery products for patients with celiac disease and food gluten allergy, today almost half of Uzbeks suffer from a form of allergy. In particular, there are no mechanisms for reducing allergic pathologies by improper nutrition, moreover, an increase in moderate and severe forms of allergies is predicted, which is associated with our lifestyle.

Within the framework of this topic, studies of functional products for patients with food gluten allergy and celiac disease are gaining relevance, implying a gluten-free composition and, as a rule, low organoleptic indicators, which are significant disadvantages for entering the market. Improving the quality of functional bakery products by solving the above problems is the main goal of this work.

To date, one of the most promising types of raw materials is squalene containing, which, with proper research, could be widely used for the production of functional products, however, due to the high cost and lack of information about interaction with other food components, manufacturers often refuse to use it. In this paper, a solution

to the above problems is proposed using the example of bread production for patients with celiac disease and food gluten allergy.

It is known from literary sources that flour from amaranth seeds, unlike flour from cereals, practically does not contain (0-0.29%) prolamins - an alcohol-soluble fraction of gluten (spare proteins of cereal seeds). It is prolamins that have a toxic effect on the mucous membrane of the small intestine and cause metabolic disorders, blood circulation, weakening of the immune system, celiac disease, food gluten allergy, allergic dermatitis, intestinal cancer, etc. in children and adults.

One of the priorities of the state policy in the field of healthy nutrition of the population of the Uzbek Republic is the creation of functional food products that could satisfy the physiological needs of the human body in nutrients and energy. A promising direction in solving this problem is the use of amaranth seed processing products that have a valuable chemical composition.

They contain high-grade proteins, essential amino acids, biologically active lipids (PUFA, tocopherols, squalene), non-created food ash, vitamins of group B and PP, minerals balanced in the content of macronutrients Ca and P, which creates prerequisites for the production of food with high nutritional and biological value, as well as dietary and therapeutic and prophylactic products. Sanchez-Marroquin, O. Paredez-Lopez, M.L. Arellano, J. Adexunle and others. However, taking into account the achievements of modern science, it is necessary to improve the methods and modes of obtaining functionally significant products for processing amaranth seeds. Information in the literature on the use of amaranth seed processing products of new varieties common in the food raw materials market.

Consequently, amaranth flour has good gluten properties. Research work has been carried out:

1. Amaranth (yellow) series (product of 2019, Republic of Uzbekistan, Tuitepinskaya).
2. Amaranth (black) series (2019 product of the Republic of Uzbekistan, Tuitepinskaya).
3. Amaranth (Russian) series (2019 product of the Russian Federation).

Table-1.

No	Name of indicators	Test results		
		yellow	black	black (russian)
1.	Mass fraction of protein, %	16.08	5.06	5.04
2.	Mass fraction of fat, %	6.47	3.88	3.56

We have studied that when adding amaranth flour to 5% of the total weight of flour, the amount of useful trace elements is insufficient and this additive loses its main function. With an increase in the content up to 10%, an unpleasant taste appears and the quality of the crumb decreases, since the baking properties of rye flour (taken as the basis of bakery products) are influenced by protein substances, the high content of

which negatively affects the indicators of the finished product: reduced volume, insufficiently developed and thick-walled porosity.

The proteinase of rye flour is maximally active in the pH range of 4.0-5.0, and the enzymatic disaggregation of rye dough proteins increases the degree of their peptization and transition to the state of a colloidal solution. Under the action of proteinase, amylases adsorptively bound to them are released from the protein substrate, so the starch attack increases, which negatively affects the rheological properties of the dough and quality.

With an increase in the content of amaranth flour to 10-90%, the gluten content increases sharply, which is unacceptable for the use of this bread in dietary and therapeutic and preventive nutrition (see Table 2).

Comparison of the chemical composition of amaranth and wheat flour (proteins)

Table 2

№	proportion, % to the total protein content of flour	proportion, % to the total content			
		of amaranth flour (yellow)	amaranth flour (black)	amaranth flour (black) Russian	wheat
1	Albumins	35,8-40,9	27,8-35,5	23,7-29,5	20,0-22,0
2	Globulins	12,9-23,07	9,10-19,3	8,5-13,2	5,0-6,0
3	Gluten	5,0-10,6	4,1-8,5	3,1-6,5	34,0-42,0
4	Prolamines	0-4,2	0-3,1	0-2,3	40.0-50.0

Everyone knows that today the secondary product of CO2 extraction of amaranth seeds has no practical application - CO2 meal, which has a high nutritional and biological value, in which, thanks to extraction in mild thermal conditions and preliminary removal of oxygen, almost all water-soluble vitamins, minerals and proteins of amaranth seeds are preserved. In this regard, the development of new technologies for the production of functional bakery products using amaranth seed processing products is relevant, having important theoretical and practical significance.

Investigation of the chemical composition of amaranth seed processing products. Analysis of the chemical composition of amaranth seed processing products (Table 1) showed that they contain proteins 1.3-1.9 times more than wheat and rye flour

№	Name of indicators	times
1	lipids	1.4-6
2	mono- and disaccharides	2.2-6.5 times
3	dextrins	1.6-9.7 times,
4	fiber	2.2-6.4 times
5	minerals	3.7-4.4 times
6	vitamin	1.4-1.7 times
7	vitamin B	1.5-2.5 times
8	vitamin PP - s	1.6-1.7 time

Amaranth flour has the greatest nutritional value and, accordingly, functionality. Amaranth bran also has functional significance. Compared with wheat dietary bran, they contain 1.3 times more fiber and 1.2 times more minerals.

When studying the biochemical properties, it was found that the proteins of amaranth seed processing products differ from the proteins of baking flour by a high content of nitrogenous substances, represented by 26.2-47.5% albumins that do not form gluten, which does not allow these products to completely replace baking flour in the production of bread. The highest activity of lipase and lipoxygenase among the products of amaranth seed processing is characterized by amaranth flour due to the content of more than 50% polyunsaturated fatty acids in its lipids.

Flour obtained from amaranth seed meal does not differ in the high activity of lipolytic enzymes, since, apparently, its cell pores contain carbon dioxide remaining after extraction , which prevents the oxidation of lipids. The activity of lipolytic enzymes in fried amaranth flour and flour obtained from fried amaranth seeds is insignificant, obviously due to their inactivation during the heat treatment of raw materials.

The study of the carbohydrate-amylase complex showed that the products of amaranth seed processing are characterized, in comparison with baking flour, by a high content of reducing sugars, high starch attack, but lower total activity of amylolytic enzymes.

Nutritional and biological value of processed products of amaranth seed. Amaranth seed processing products have a higher nutritional value compared to traditional bakery raw materials. the value due to their chemical composition and the biological value of the proteins included in them. Amaranth seed processing products, especially amaranth flour, are characterized by a protein attack by digestive enzymes compared to baking flour. Amaranth bran protein is least digested, but its digestibility is still 5-7% higher than wheat bran protein.

The relative biological value of proteins of amaranth seed processing products ranges from 40 to 80%, which is 1.5-2 times higher, than the protein content of wheat and rye flour.

Foreign and Russian researchers - L.I. Puchkova, I.V. Matveeva, U.N. Lutsenko, L.P. Pashchenko, I.M. Zharkova, E.A. Nazintseva, A.I. Puchkova, I.V. Matveeva, U.N. Lutsenko, L.P. Pashchenko, I.M. Zharkova, A.A. Nazintseva - made a great contribution to the development of theoretical and practical foundations for the use of amaranth seed processing products in bakery production.

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