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STUDYING THE INFLUENCE OF SORGH FLOUR ON THE QUALITY INDICATORS OF GLUTEN-FREE BREAD

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Annotation
Using of non-traditional vegetable raw materials allow not only to improve the quality, nutritional value and expand the range of food products, but also to rationally use local resources. The article describes the characteristics of baking wheat bread from untraditional raw materials, with the addition of sorghum flour, in proportions of 25, 30, 35%. The research was carried out on the basis of the Food Technology department of the Tashkent chemical-technological institute. As a result of the study, the best performance was observed in wheat bread with the addition of 25% sorghum flour.

Keywords: gluten, protein, fortification, gluten-free diet, calorie, protein, celiac disease, nutritional value.

INTRODUCTION

Among the many environmental factors that constantly affects on person, and nutrition is one of the most important. A rational, balanced diet, built on modern scientific foundations, ensures the normal growth and development of the body, the preservation of human health and ability to work, and prevents the development and exacerbation of diseases.

Modern medicine has made tremendous strides in the prevention and treatment of disease. However, no matter how perfect the methods of providing medical care, the effectiveness of treatment largely depends on the resistance of the patients's body, on their vitality. So, these properties of the human body to a large extent provides appropriate nutrition. [1,2]

Unfortunately, not every human body is able to perceive this natural element without negative consequences. With individual violations of the digestive functions of the intestine, gluten intolerance is formed. Its penetration into the body causes the destruction of the villi that cover the walls of the small intestine. Due to damage to the

villi, the process of absorption of nutrients is disrupted, the general condition worsens, malfunctions in the stomach occur. Doctors call gluten intolerance celiac disease or gluten disease. Patients need to know the rules of nutrition for such a violation and adhere to a gluten-free diet. This will completely get rid of negative feelings and symptoms.

For making production of gluten-free bakery products, used numerous types of grain raw materials. Gluten-free starch-containing raw materials include flour and starch from some cereal crops (buckwheat, rice, corn, barley, sorghum, oats, etc.), triticale flour, stale deformed bread. Some of them simultaneously contribute to increasing the biological and nutritional value of products. These types of additives also provide savings on the main raw materials and contribute to its more efficient in use.

At the same time, it should be noted that, it is expedient to produce bread products consisting entirely of gluten-free raw materials, mainly in order to expand the range of food products for children with acute renal failure and other diseases that require a protein-free or gluten-free diet.

Thus, using of new types of raw materials in the manufacture of enriched bread products is an urgent task, the solution of which will increase the efficiency of the use of the main raw materials and improve the technology for the production of bread and bakery products.

Gluten is an organic complex protein. This element is a component of many plants of the cereal family. Due to its ability to retain carbon dioxide produced during the work of yeast fungi, it provides the dough with rise. This quality of gluten has provided it with a wide range of applications in the production of various products. It not only gives the structure of the product tenderness, but also adds a pleasant aroma.

Gluten is widely used in the production of:

- Bakery products and pastries of various types;
- Pasta;
- All types of sausages;
- Confectionery;
- Semi-finished products - dumplings, cabbage rolls, dumplings, meatballs, etc.;
- Milk curds and yoghurts, condensed milk, ice cream, infant formulas;
- Broths in powders and cubes;
- Industrial soups;
- French fries;
- Canned fish and meat;
- Soy products;
- All types of baking;
- Sauce, mayonnaise and ketchup;
- Mineral and vitamin supplements.

In order to expand the range, increase the nutritional value and improve the quality of bread products, technologies for the production of bread products were developed with the addition of various food additives from non-traditional raw materials used in production. [3,4]

As gluten-free and non-traditional raw materials for the production of bread products can be used:

- Vegetable powders;
- Milk whey, carrots and pumpkins in the form of finely ground puree;
- Sea buckthorn meal;
- Amaranth;
- Calcium supplements;
- Seaweed;
- Extracts of CO2 from the seeds of carrots, coriander, dill, cumin, celery, allspice and black hot pepper.
- Jerusalem artichoke powder;
- Protein sources: legume flour, yeast;
- Oat flour;
- Buckwheat flour;
- Rice flour;
- Corn flour;
- Barley flour
- Sorghum flour.

When processing all types of gluten-free raw materials, using of technological methods or additives is required to ensure dough with sufficient strength and products with traditional properties.

In the bread industry, it is of interest to use gluten-free (gluten-free) starch-containing raw materials for the production of dietary bread products.

Some of them simultaneously contribute to increasing the biological and nutritional value of products. These types of additives also provide savings on the main raw materials and contribute to its more efficient in use.

Sorghum is a valuable food product that is not inferior in protein, fat and carbohydrate content to rice, millet and corn, which means that it should take its rightful place in human nutrition. Using of sorghum in the food industry will make it possible to obtain products with a reduced calorie content, an increased content of dietary fiber, macro- and microelements (magnesium, phosphorus, iron, zinc, copper, manganese, boron, silicon, cobalt, etc.) and vitamins (B1, B2 , B3, B6, E, H, PP). Sorghum grain does not contain gluten, so products from it can be introduced into the diet of people with celiac disease.

Sorghum flour is an important source for trace elements, substances necessary for normal human life. It contains the highest amount of iron. This flour is also rich in

manganese - 24.8mg/kg, copper - 2.94 and molybdenum - 0.6mg/kg. Sorghum flour provides a person with almost all nutrients - proteins and amino acids, fats and fatty acids, carbohydrates, vitamins, mineral salts, microelements.

Sugar varieties of sorghum are rich in carbohydrates, proteins, fats, vitamins and provitamins, minerals and tannins.

Sorghum flour provides the human body with protein, the properties of which compare favorably with proteins of animal origin. Sorghum protein reduces the level of cholesterol in the blood and normalizes the load of the human digestive apparatus. Sorghum fat contains in its composition majority of (83-88%) essential unsaturated fatty acids, including linoleic - 38-42mg and linolenic - 3-4mg per 100g of cereals.

These unsaturated fatty acids are important source of prevention of atherosclerosis, heart and vascular diseases. In addition, a significant content of vitamin E in sorghum fat suggests in use of such cereals in the human diet is necessary.

The purpose of our research was to study the effect of sorghum flour on the quality of the ready bread. To do this, we carried out trial baking of bread with the addition of sorghum flour, in proportion to 25, 30, 35%.

Sorghum flour was used as object of research. When conducting research, we used: wheat flour of the first grade, pressed baker's yeast, salt, meeting the requirements of the relevant regulatory documents for raw materials.

Recipe and cooking mode for gluten-free bread

Table 1

Process indicators	control	with sorghum flour, %		
Wheat flour, 1/s, kg	100	75	70	65
Sorghum flour, kg	-	25	30	35
Baker's yeast, kg	1	1	1	1
Salt, kg	1,5	1,5	1,5	1,5
Fermentation time, min.	40	45	45	50

The surface of the appearance is rough with a convex upper crust; the shape corresponds to the bread-correct. The color of the test baking is light brown. The crumb was observed baked, soft, not hesitating. Without lumps and traces of non-message. The porosity of the bread is medium developed, without voids, with seals, uniform, thin-walled. Taste and smell without deviations from the norm, light yellow color.

Physical and chemical indicators of the quality of wheat bakery products with the addition of sorghum flour are presented in Table 2. It can be seen that from the data in the table, when sorghum flour was added in an amount of 25% to 35%, it had a positive effect on the quality of finished products. The acidity of the crumb with an

increase in the dosage of sorghum flour increased, which is associated with the presence of fatty acids in the latter, but the indicator is normal.

Table 2

Indicator	control	With sorghum flour, %		
		25	30	35
Specific volume, sm3/g	2,43	2,40	2,32	2,23
Dimensional stability, shaped bread	0,25	0,27	0,27	0,29
Acidity, deg.	1,1	1,2	1,4	1,5
Crumb deformation, after 3 hours	70,0	69,0	68,0	65,0
Crumbness, %, after 3 hours	0,6	0,7	1,2	1,8

Made products with sorghum flour had a pleasant, more pronounced taste and aroma compared to the control sample, but the porosity structure deteriorated and the crumb stiffness increased, the crumbiness index increased. Especially these indicators deteriorated in the sample containing of 35% sorghum flour. A certain role in this is played by large flour particles, which are included in the walls of the pores of the crumb and worsen their strength.

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