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# COMPARATIVE ANALYSIS OF PHYSICAL-CHEMICAL PARAMETERS OF DOMESTIC TRITICALE GRAIN

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**Abstract:**
**Objective.** The article carried out a comparative analysis of the physicochemical parameters of triticale grains in comparison with grains of wheat and rye.
**Methods.** To analyze the physicochemical parameters of grain samples, the standards GOST 13586.5-85, 10840-64, 10842-89, 10987-76, 10847-74, 23586.1-68 were used. The purpose of the research is to compare the physicochemical parameters of local triticale grain and study its technological capabilities for obtaining flour.
**Results.** In the course of the study, the physicochemical parameters of local wheat grain "Sila", rye grain "Vakhsh-116" and triticale grain "Sardor" were comparatively studied.
**Conclusion.** It has been established that the vitreousness of local samples of rye and triticale grains is 25-27% higher than that of wheat grain samples, and that there are no grounds for making baking flour from them, and for this it is necessary to compare chemical composition of these grains.
**Keywords**: wheat, grain, rye, triticale, flour, physical and chemical index, baking, gluten, rheological properties.

At present, crops, including cereal products, are of great importance in the food ration of the population of the world. It is significant in order to optimize the structure of a healthy nutrition, including its essential amino acid composition, in meeting the physiological needs of the human body not only for energy, but also for nutrients.

Traditional cereal crops such as

wheat, rye, barley, sorghum, and corn were formed thousands of years ago as a result of evolutionary selection. Triticale grain as a cultivated crop was bred by humans from wheat and rye grains several decades ago [1-3].

Triticale grain has been widely used for several purposes over the years: it has been widely used in various fields of feed and food industry.

The triticale is grown in 18 countries of Europe. Half of it is grown in Poland. In addition, the rest part is grown in France, Germany, Hungary, Austria, Baltic countries, Czech Republic, Denmark, Sweden, and partly in Italy and Great Britain.

At present, triticale grain is grown as a raw material for the feed industry, and breeders are conducting extensive research on new varieties for food processing [4-6], in particular, in our Republic researches on local varieties are being conducted at the "Gallaorol Scientific-experimental station of the Scientific Research Institute of Cereals and Legumes" [7].

Triticale grain is widely used in the production of alcohol, beer and kvass, as well as in the bread and confectionery industry [8-10].

The mill enterprises are one of the most important branches of the developing industries in our republic, the improvement of technologies in which is based only on the processing of wheat grain. One of the main directions of the development of the industry is the development and improvement of new traditional technologies and the processing of various types of grain with certain composition and properties, as well as the creation of deeply processed products [11-12]. In addition, it has been studied that the direction of processing different grains based on one technology, such as wheat and triticale grains, would be promising.

Bread products prepared from the central part of triticale grain endosperm are characterized by increased nutritional value due to the high content of protein and essential amino acids lysine [13].

Physical-chemical parameters of any grain in flour weighing are important, and they have been found to affect the yield and quality of flour [14-17]. Physical-chemical parameters of grain are determined by geometrical description (size, shape, size, outer surface area), largeness and smoothness of grain mass, nature of grain, weight of 1000 grains and vitreousness.

In our country, to conduct profound research on the expansion of flour assortments and the processing of spiked and leguminous grains rich in biologically active substances is urgent. Moreover, in recent years, increasing the composition of protein products by processing raw materials of plant nature is one of the urgent tasks in order to prevent the decrease of the baking properties of wheat grain and the reduction of protein products in the diet of the population of our Republic.

**Purpose of research** is comparative studying the physical-chemical parameters of local triticale grain with those of local wheat and rye grain varieties, and researching the technological possibilities for obtaining flour from them.

In order to achieve this goal, it is important to analyze the physical-chemical parameters of wheat, rye and triticale grains grown in our Republic. In this case, it is necessary to study the methods of determining the physical-chemical parameters of wheat grain of "Sila", rye grain of "Vakhsh-116" and triticale grain "Sardor" varieties selected for research.

**Research methods.** Available standard tools have been used to perform the technological analysis of the studied wheat grains.

The obtained samples were analyzed according to the following standards: according to GOCT 13586.5-85 [18], wheat moisture was determined by drying in a CESH-3M (Russia) drying cabinet at a temperature of 130 ºC for 40 minutes.

According to GOCT 10840-64 [19], the nature of wheat grain was determined on laboratory equipment PX-1M (Russia).

According to GOCT 10842-89 [20], the weight of 1000 grains was determined.

According to GOCT 10987-76 [21], wheat grain vitreousness was determined on "Yantar" diaphonoscope device (Russia).

According to GOCT 10847-74 [22], the ash content of wheat grain was determined by burning in a muffle furnace at a temperature of 600-900 °C.

According to GOCT 23586.1-68 [23], the amount and quality of gluten in wheat was determined; according to GOCT 20239-74 [24], the presence of metal-magnetic compounds in wheat was determined.

**Results and discussion.** The physical-chemical parameters of wheat grain of "Sila", rye grain of "Vakhsh-116" and triticale grain of "Sardor" varieties grown in our republic were comparatively studied.

The samples selected for the study were cleaned and sifted through a sieve with a hole size of 1.7x20 mm. The physical-chemical indicators of the large fractions from which the fine fraction was separated were determined. The results obtained from the experiment are presented in Table 1.

Table 1

**Physical-chemical characteristics of wheat, rye and triticale grain varieties**

| Name and unit of the indicator | Name of variety | | |
|---|---|---|---|
| | Sila | Vakhsh -116 | Sardor |
| Moisture, % | 9 | 11.9 | 10.0 |
| Vitreousness, % | 45 | 70 | 72 |
| Natural weight, g/l | 760 | 720 | 711 |
| Weight of 1000 grains, g | 37 | 27 | 28 |
| Ash content, % | 1.74 | 1.63 | 1.98 |
| Amount of gluten, % | 27 | - | - |
| Gluten viscosity, IDK conditional unit indicator | 86 | - | - |
| Grain size, $mm^3$ | 25.09 | 20.9 | 16.35 |
| The outer surface of the grain, $mm^2$ | 58.60 | 65.1 | 51.98 |

The results presented in the Table 1 show that the moisture content is in accordance with standard standards, and the vitreousness of rye and triticale grain samples is 25-27% higher than that of wheat grain sample, respectively. That is why this is considered the main physical indicator in baking flour, and it has a significant effect on the yield and quality of flour. According to that, it was recommended to weigh the graded baker's flour when the vitreousness was 50% higher than the soft type of wheat grain. The vitreousness of this "Sila" variety wheat grain sample is not recommended for weighing bakery flour.

The natural weight, 1000-grain weight, size and outer surface of these grain samples are in accordance with the standard norms. However, if the ash content of rye grain sample is lower than that of wheat grain sample, it means that the color unit index and endosperm content of the flour extracted from it is higher, but it is the opposite in triticale grain.

Considering that gluten content and its viscosity index are important for the functional properties of bakery flours weighed from these grain samples, this indicator showed superiority in the wheat grain sample.

**Conclusion**. The analysis of the experimental results gave a ground to establish that physical parameters such as vitreousness, ashiness and nature weight can be used as a basis for recommending baking flour from rye and triticale grains. Nevertheless, chemical and

physical parameters such as gluten content, as well as its viscosity, showed that it was not appropriate to weigh the flour of the baker's grade. Moreover, it was found that it is not enough to study their physical-chemical indicators in order to expand their range, to form flour mixes to increase their functional properties, and to improve their nutritional content. The necessity of comparative analysis of the chemical composition of these grains was established.

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## CLEANING NATURAL AND ASSOCIATED GASES FROM SULFUR COMPOUNDS

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**Abstract:**

**Purpose:** To develop innovative methods of cleaning natural and associated gas from sulfur compounds.

**Methods:** Studying the positive and negative aspects of using physical, chemical and combined methods in cleaning natural and associated gases and developing new innovative methods.

**Results:** Today, physical, chemical, combined methods are used to purify gases from sulfur compounds. Sorbents are imported from abroad. When sorbents are developed in local conditions, their price can be 3-5 times cheaper.

**Conclusion:** Localizing the production of sorbents will benefit the economy of our country.

**Keywords:** chemosorption, physical absorption, combined method, catalytic method.

**Introduction.** Natural gas is cleaned from sulfur compounds and carbon dioxide before sending it to the consumer. That's because, these gases cause corrosion of main pipelines and production equipment. Currently, the following methods are used to purify gases from $H_2S$ and $CO_2$:

Chemosorption method. This method is based on the chemical interaction of $H_2S$ and $CO_2$ with the active part of the absorbent.

Physical absorption. This method is based on the dissolution of $H_2S$ and $CO_2$ in organic solvents.

In the combined method, physical and chemical absorption are used together.

In the oxidation method, $H_2S$ is oxidized and converted into sulfur.

Gas purification methods are selected according to the composition of the gas and the field of use of the purified gas.

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