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# **Research and improvement of technology for obtaining high-quality flour varieties from local wheat grain by improving their biological properties**

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**ABSTRACT:** The purpose of the work is to research and improve the technology for obtaining high-quality flour varieties from local wheat grain by improving their biological properties. The paper presents the results of experimental studies of the technology for obtaining high-quality varieties of flour from grain with reduced biological properties.

During grain germination, starch cleavage and a significant increase in sugar content occurs. Of particular importance is an increase in the activity of  $\alpha$  - amylase, which is the main reason for a sharp deterioration in the baking qualities of flour obtained from sprouted grain. It is as a result of the fact that the activity of amylases in the grain increases rapidly during germination that the flour obtained from the germinated grain gives poor-quality bread with a tasteless, inelastic and insufficiently porous crumb.

As a result of research in flour dough obtained from sprouted grain, the enzyme begins to work actively, breaking down gluten proteins. As a result, the gluten breaks down and the dough becomes very weak. With the hydrothermal treatment of such grain, the activity of  $\alpha$  - and  $\beta$  - amylases is sharply reduced, and the baking quality is significantly improved.

**KEYWORDS:** Cleavage, amylase, proteins, gluten, amylolytic, starch and sugar, sprouted grain.

## **I. INTRODUCTION**

The grain processing industry is one of the most important branches of the agro-industrial complex in providing the population with food.

The grain independence policy of the Republic of Uzbekistan is designed to solve the problems of further increasing the volume of grain production - the basis for the creation of food and fodder funds of the state, as well as its use with maximum efficiency and expediency.

It is important to provide agriculture with varieties of grain crops most adapted to local conditions. The selection institutions of Uzbekistan are doing a wide range of work on the selection of new varieties of wheat. Local varieties of wheat are of great value for breeding work in terms of such indicators as early maturity, drought resistance, adaptability to vegetation under conditions of short daylight hours. All this contributes to a decrease in grain imports and allows saving foreign exchange resources of the state.

The technological properties of grain are derived from physicochemical, biochemical, structural and mechanical and other properties. Of particular importance is the fact that grain is a living organism, and therefore all processes in grain are controlled by its biological system. The reaction of grain to external chemical, mechanical and other influences: causes a response to ensure the safety of the grain as a living organism. Controlling the properties of grain is possible and feasible only if the nature of this response is known. This task is the main one in terms of technology and forms the basis for managing the properties of grain during processing.

The electromagnetic field has a complex effect on the mass of grain - these are chemical, biological, organoleptic and physical properties.

An important role for assessing the baking advantages of grain is played by the activity of its enzymes, primarily amylolytic ones that hydrolyze starch and sugars, as a result of which carbon dioxide is produced in the dough during fermentation.[1]

When strong and weak wheat are mixed, the mixture often becomes highly baking. Unfortunately, the theory and practice of mixing strong and weak wheat is not well developed. It has not been established exactly what factors

control this phenomenon and ensure the manifestation of such an effect. The question needs careful research. It is now generally accepted that not only hydrogen, but also disulfide bonds are actively involved in the formation of the gluten structure. It has been established that various substances influence the action of enzymes. Those of them that enhance the action of enzymes are called activators. Among them, sulfhydryl compounds -SH should be especially noted.

Their role is due to the interaction of sulfhydryl groups -SH of some amino acids and polypeptides with the formation of a -S-S- bond, which entails an increase in the rigidity of the gluten structure [2]

S.A. Gorshkova [4] showed that when the grain is exposed to temperature (for example, during hydrothermal treatment or drying), the number of disulfide bonds increases, which leads to the strengthening of gluten.

## II. PURPOSE OF THE STUDY

Research and improvement of technology for obtaining high-quality varieties of flour from local wheat grain, improving their biological properties.

## III. MATERIALS AND METHODS

The objects of research were varieties of common wheat grown in the natural and climatic conditions of Uzbekistan, which were with reduced biological properties.

The technological properties of grain during its cultivation, harvesting, post-harvest processing and subsequent storage are influenced by many heterogeneous directed factors. All this determines the situation that the batches arriving at the mills differ significantly in almost all indicators.

The research results showed that flour milled from a batch of grain with reduced biological properties (infected with field pests, sprouted grain, etc.) has low baking properties. Dough pieces made from flour, ground from grain with reduced biological properties when baking flatbread in national traditional ovens (tandoor), spread out, since the enzyme contained in it will break down proteins.

Methods for recognizing flour from sprouted grain are based on the fact that such flour has an increased activity of  $\alpha$  - amylase. Of these methods, the most common are round baked goods and autolytic tests.

The "falling number" used in a number of foreign countries is the time, measured in seconds, for the viscometer stirrer to descend from a certain height into the gelatinized flour suspension. The more active  $\alpha$ -amylase in grain or flour, the lower the viscosity of the flour mash and the faster the viscometer mixer will go down. To determine the "falling number" use a special Hagberg device.

To improve the baking qualities of the sprouted grain and the flour obtained from it, we applied a new hydrothermal treatment. The moistened grain was warmed up at an elevated temperature (75-80°C) and the grain mass was treated with an electromagnetic field. As a result,  $\alpha$  - amylase is partially destroyed and protein properties are improved.

**Table 1**  
**Influence of the electromagnetic field on the properties of gluten**

Processing options	Content, MK-Eq/g protein		IDK
	-SH groups	S-S connections	
Original grain	2,6	120	120
Magnetic field processing (Microwave -10 <sup>8</sup> )	2.2	178	112

The table shows that during the hydrothermal treatment of the grain mass with a magnetic field, the number of disulfide bonds increased, which led to the strengthening of gluten.

## IV. CONCLUSION

According to the research results, high-quality flour varieties were obtained from local wheat grain by improving their biological properties: to improve the baking qualities of the sprouted grain and the flour of good quality



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