

The Effect Of Drinking And Activated Water On Field Scales Of Wheat Grains Grown In Arid Climatic Conditions

Ravshanov Suvankul Saparovich¹, Rakhmonov Kakhramon Sanokulovich², Ergasheva Husnirabo Bobonazarovna³, Yuldasheva Shabon Jumayevna⁴

¹*Associate Professor, Candidate of Technical Sciences, Tashkent chemical technological institute*

²*Associate Professor, Candidate of Technical Sciences. Bukhara Engineering Technological Institute*

³*Associate Professor, Candidate of Technical Sciences. Bukhara Engineering Technological Institute*

⁴*teacher trainee of the Bukhara Engineering Technological Institute*

e-mail: ¹suvanbex@mail.ru

Abstract

The article discusses the problems of accelerating hydrothermal treatment in the preparation of wheat grains grown in dry climates for varietal grinding. In it, the effect of activated water on the natural mass of wheat grain was studied experimentally. The differences in changes in the natural mass of wheat grain under the influence of activated and drinking water are theoretically explained.

Keywords: *wheat, hydrothermal processing, natural weight, arid climatic.*

The processing of agricultural products, especially grain, is becoming increasingly important in the development of the republic's economy and in meeting the needs of the population for food products.

1. INTRODUCTION

Improvement of grain storage and processing technology should be based on a consistent study of the technological properties of grain. These properties are determined by the moisture content of the grain, which is determined in several ways due to the fact that grain content is related differently to dry matter in different cases.

For grain as a raw material in a mill, its geometric characteristics (size, shape, volume, surface area), the size and flatness of the grain mass, the nature of the grain, the mass of 1000 grains, and glassiness are the main indicators of technological significance. But in some EU countries, wheat grains are classified according to the mass fraction of protein or gluten. For example, in France, according to MIProspect [1], wheat grains are classified into four classes: E, 1, 2 and 3. They are based on the mass fraction of protein, the "number of droplets" and the deformation energy (W) of the dough. According to this publication, wheat grains in Germany are classified into 6 classes: E, A, V, EU, S and Unknown, and they include the following indicators: mass fraction of protein, precipitation and natural weight.

In the UK, wheat grains have been classified based on vinegar and vinegar for several years. In other words, the export of wheat flour varieties provides foreign buyers with detailed information about flour varieties intended for the production of bread or flour confectionery

[2]. According to this classification, the division is made according to the following parameters: grain mass in hectoliters, moisture, mass fraction of protein.

According to the Institute of Agriculture of the Hungarian Academy of Sciences [3], wheat grains include natural weight and mass fraction of protein in the classification, as well as broken and rusty grains.

In the United States, the classification of wheat grains is mainly based on physical properties and suitability for grinding: natural weight, damaged grains, foreign matter [4].

In the CIS countries, including Uzbekistan, the moisture content of wheat grain, natural weight, gluten, mass fraction of protein, quality of gluten, the number of drops, the amount of impurities and impurities of grain [5,6,7]. In connection with the above, it is advisable to study the change in natural mass during hydrothermal treatment.

The properties of grain batches entering the mill for processing will be different. When these grains are hydrothermally treated, their properties also change in different ways. To select the appropriate hydrothermal treatment regime for each batch of grain, it is necessary to determine the physicochemical changes that occur in the grain, depending on the processing regime. This allows you to apply the optimal mode of hydrothermal treatment for each batch of grain.

During hydrothermal treatment, physical and chemical changes in grain occur irreversibly. At the same moisture and temperature values, the properties of grain (depending on how the batch of grain was originally processed) can differ significantly. With cyclic processing, the rate of change in grain properties decreases with each new cycle, but the sum of the effects is higher than the one-time effect. The irreversibility of the properties of a transparent grain disappears after three processing cycles, and for non-Simon grain - after two processing cycles. In particular, it was found that the natural weight of wheat grain during hydrothermal treatment first sharply decreases and then slightly increases [8]. This is due not only to the swelling of the grain, but also to a change in the moisture content of the husk, which also affects the coefficient of internal friction of the grain mass.

The physicochemical and technological properties of hydrophilic substances in wheat grains change significantly depending on their moisture saturation, which is manifested in their wetting or dehydration.

The use of drinking water and water activated by ultrasound has been experimentally studied in the preparation of wheat grains grown in arid climates for grinding flour, hydrothermal treatment and its effect on natural weight. The experiment was carried out in accordance with the "Rules for the organization and conduct of technological processes in mills" [9].

According to the results of scientific research, it was analyzed that the use of activated water in the process of hydrothermal treatment in the preparation of wheat grains for grinding flour significantly affects its natural weight compared to drinking water [10, 11, 12].

As part of the study, the improvement of the technology for preparing grains of local wheat grown in an arid climate for grinding varietal flour was studied by studying the effect on the natural weight of wheat grains during hydrothermal treatment using water activated by ultrasound.

2. MATERIALS AND RESEARCH METHODS

Wheat grain samples grown in the arid climate of the country in accordance with GOST 13586.5-85, the quantity and quality of gluten in accordance with GOST 23586.1-68 and the natural weight of wheat in accordance with GOST 10840-64 in the "Infratec™ NOVA" apparatus, gluten content "Pertin Inframatic" 95 (Denmark, Sweden) have been found in laboratory equipment.

Wheat grain samples with physicochemical quality parameters were prepared for hydrothermal treatment from foreign mixtures and fine grain in a set of laboratory sieves

"PND" (Russia). Purified from metal-magnetic impurities using laboratory equipment PVF-M (Russia).

2.1. To enhance the effect of the hydrothermal treatment regime under laboratory conditions, water activated by ultrasound at 80, 100, 150 and 200 GHz was used. In laboratory conditions, a simple method of hydrothermal treatment of wheat grain was used, initially the grain moisture was determined and the amount of water was determined to increase the required moisture according to G.A. Calculated by the Egorov method. Hydrothermal treatment was carried out at the enterprises of the republic in three stages. The amount of water was calculated using the following formula.

$$W = G \cdot \left(\frac{100 - w_1}{100 - w_2} - 1 \right) \quad (1)$$

where: G is the mass of the obtained grain sample; w1 - moisture content of the original wheat sample,%; w2 - increasing the grain sample to the required moisture content,%

2.2. A purified wheat grain sample was weighed twice on a PX-1M device, and in special containers shown in Fig. 1, beverage and ultrasound were exposed and moistened with a calculated amount of water using a spray bottle. The initial grain moisture was 9.4%, then increased to 14.6%, and the natural weight was measured every hour in accordance with GOST 10840-64.

1 – расм. Гидротермик ишлов берилган буғдой донини димлаш учун махсус идиш.



2 – расм. Буғдой донини натурал оғирлигини ўлчаш учун қурилма. (ПХ-1М)



3. RESULTS AND DISCUSSION

The initial moisture content and natural weight of a wheat grain sample obtained for the study are shown in Table 1. The samples were measured twice on a PX-1M device to determine the natural weight of wheat grain for hydrothermal treatment. The measurements were placed in special containers for hydrothermal treatment, shown in Figure 1, and the arithmetic mean of the natural weight measurements is given in Table 1. During hydrothermal treatment, the water temperature for all samples was 22 ± 1 °C. When comparing the arithmetic mean values of natural weight, no significant difference was observed. At the initial wetting, 101 ml of water was calculated using a nebulizer calculated according to formula (1) for wetting to 14.6%. The effect of drinking water and activated water used in hydrothermal treatment on the natural weight of wheat grain grown in arid climates, depending on the boiling time, is presented in Table 1.

Change in natural weight of wheat grain depending on the quenching time with drinking and activated water for feeding GTI, g / l

Water sample	Initial moisture content of wheat grain, %	Initial natural weight, g / l	After 1 hour	After 2 hours	After 3 hours	After 4 hours	After 5 hours	After 6 hours	After 20 hours
Drinking water	9,4	831	751	763	787	789	789	794	780
80 Gts	9,4	831	742	780	786	789	792	792	779
100 Gts	9,4	832	750	780	785	789	790	791	779
150 Gts	9,4	831	750	775	784	786	786	788	779
200 Gts	9,4	830	749	774	783	785	788	788	779

The experimental results show that after soaking the soaked wheat grains for 1 hour, there was a significant decrease in the natural weight of the samples impregnated with ultrasound activated water, compared to the samples impregnated with drinking water. It was found that the difference in height also changed significantly after 2 hours of blackout. This can be explained by the fact that the diffusion of water in a wet grain increases as a result of the transition of activated water from a polymolecular state to a monomolecular state under the influence of ultrasound. This action lasts 1-2 hours, and as a result, the activity disappears, the water returns to its original state. After soaking the soaked wheat grain for 3 hours, a significant change in natural weight was observed. After 19 hours, when these samples were increased to 1% moisture, as in the above hydrothermal treatment, and immersed for an additional 1 hour, it could be observed that the process was accelerated in the samples soaked in activated water. From this it can be concluded that when preparing wheat grains grown in arid climates for grinding high-quality flour, hydrothermal treatment is accelerated by using water activated by ultrasound.

The change in the natural weight of the soaked wheat grain depending on the steaming time can be explained by the difference in the density of its anatomical parts. This is also due to changes in the moisture content of the husk, which also affects the coefficient of internal friction of the grain mass. The anatomical parts of a wheat grain vary greatly not only in density, but also in chemical composition and structure. In other words, the average grain density of soft wheat is 1336 g / cm³, its endosperm is 1471 g / cm³, husk is 1290 g / cm³, husk is 1066 g / cm³, and their natural weight changes accordingly [13-20].

The results of the experiment show that the preparation of wheat grain for grinding high-quality flour in modern mills should be based on the difference in these parameters in the technological process.

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