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BREATHING OF GRAIN DURING STORAGE AND FACTORS AFFECTING THE INTENSITY OF RESPIRATION

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ABSTRACT

The Food Program emphasizes that accelerated and sustained increases in grain production are a key issue in agriculture. The task is to meet the growing needs of the country in high-quality food and feed grain, to have the necessary state reserves of grain and its resources for export. Grain storage is a dynamic process during which it can change its properties. Maintaining the quality of the grain mass is the main goal of grain storage technology. The technology is chosen depending on the condition of the raw materials and the type of grain storage.Compliance with it allows you to reduce the amount of natural product losses and keep it in a healthy environment.

KEYWORDS: *Grain, Storage, Quality Indicators, Biochemical Processes, Energy, Respiration Of Grain, Sugar, Process Ssy Of Vital Activity.*

INTRODUCTION

Grain is the most important strategic product that determines the stable functioning of the agricultural market and food security of the country.

Grain production is the main and decisive basis for the development of all branches of agriculture, as well as many processing industries.

The national economic importance of grain increases enormously due to such exceptional qualities of grain products as the ability under certain conditions to long-term storage without significant changes in their properties and nutritional value, as well as high transportability. Grain and food products obtained from it are the cheapest in comparison with other food products. All this has historically determined the significance and place of grain and its processed products in the diet - they have become products of mass and daily human consumption.

Wheat in our country is the main food crop. At one time, the Institute of Nutrition of the Academy of Medical Sciences of the Republic of Uzbekistan.developed scientifically based consumption rates. According to these standards, in the total volume of grain production allocated for food purposes, wheat should occupy about 75%, rye - 14, cereals (rice, buckwheat, peas, beans, lentils) - 9%. The remaining 2% is accounted for by oats, barley, corn.

The enormous importance of grain crops is determined by the fact that products obtained from grain (bread, cereals, pasta) are the basis of human nutrition.

Directly at the expense of processed grain products (bread, flour, cereals) provides about 40% of the total caloric intake, almost 50% of the need for proteins, 60% of the need for carbohydrates. If we also take into account the share of grain fodder used for the production of livestock products consumed by the population, then the share of grain and products of its processing in the caloric content of food increases to 56%, and in consumed protein - up to 90%, in carbohydrates - up to 62%. Bread takes the first place among the food products obtained from grain. Bread is such an essential part of the diet that it is almost impossible to do without it. He is the main food of the vast majority of people.

Increasing grain production is of decisive importance for the development of all branches of agriculture. Grain farming is the basis of crop production and all agricultural production. This is determined by the multilateral ties of grain production with other sectors of agriculture and industry. Without developed grain production, it is impossible to specialize the production of livestock products, to develop the production of industrial crops and other branches of agriculture. Grain is not only a food product for the population, but also an irreplaceable feed for livestock and poultry, it serves as an important source of raw materials for the brewing, alcohol, feed industry,

By increasing grain production, it is possible to successfully solve the grain problem, provide the population with diversified food, increase the productivity of animal husbandry, create the necessary state reserve of grain and ensure the food security of the country.

Grain as an agricultural product in economic terms has a number of advantages. It is well stored dry, easily transported over long distances, and has a high degree of flowability. All these features are taken into account in the construction of elevators, granaries, as well as in the

transportation and creation of state supplies of food and feed. Due to the high level of mechanization and low costs of living labor, grain production is less dependent on the availability of labor resources and thus compares favorably with other crops.Cereals blend well in rotation with most crops, and by-products (straw) are widely used as feed, bedding and as an important source of humus.

This year the country has gathered a high harvest of grain crops. In the context of import substitution, this will make it possible to better take into account the market conditions. The ban on the supply of agricultural products in the context of a global pandemic opens up wide opportunities for domestic producers and we need to take full advantage of them.

If we manage competently, with a scientific, economically sound approach, then the task of saturating our market with domestic products is quite solvable. In terms of quality, they are in many ways not inferior to imported ones, and in some respects they are superior. Our grain grown in natural conditions is appreciated both in the country and abroad, and can serve as quality raw materials for food production, to the table of our compatriots.

It is also extremely important to ensure the high-quality preservation of the harvest losses during storage of grain, it is necessary to create conditions that ensure its safety for a certain period. The duration of safe storage primarily depends on the weediness, moisture and temperature of the grain.

The grain is a living organism with its inherent biochemical processes, which continue after harvest. Breathing is a normal life process that occurs during storage.

Breathing of grain masses during storage and processing is essential. The solid components of the grain mass are represented mainly by living organisms.Even dry grain is in a state of incomplete suspended animation. The grain mass is breathing a little. In the process of breathing, oxygen is absorbed, carbon dioxide, water and heat are released. If the grain is dry, then this process proceeds gradually, the released heat and moisture are dispersed in the environment and the quality of the grain mass practically does not change. When storing grain in a large layer in the central and lower layers of the grain mass, carbon dioxide can slowly accumulate and the oxygen content decreases.

During respiration, dry substances are oxidized and converted into gaseous substances. Therefore, the grain mass decreases. An increase in respiration intensity signals the activation of physiological processes in the grain.

At a grain moisture content of up to 12%, the respiration rate of the grain mass is close to zero. As the humidity rises, the respiration rate gradually increases. When the moisture content of the grain reaches 14.5-15.5%, the respiration rate increases sharply. The humidity value at which the respiration rate in the grain mass increases sharply is called critical humidity. The value of the critical moisture content is the lower, the more lipids are contained.

The intensity of respiration largely depends on the state of the grain. Unripe, frosty and dry grain breathes very actively.

The intensity of respiration also depends on the type and amount of impurities. Weed seeds usually have a higher moisture content than the main grain, they are more heavily seeded with microorganisms. Mineral dust, lumps of earth also contain many microorganisms, and

microorganisms with grain moisture, which slightly exceeds the critical value, breathe very actively. Broken grains have an increased respiration rate.

If the grain is soaked at the stage of harvesting or transportation, this leads to the beginning of its germination and an increase in the number of microorganisms. The germination of grain very strongly activates respiration.

At high respiration rate, the released heat and moisture do not have time to dissipate into the environment, they accumulate in the grain mass and lead to an increase in temperature and humidity. This causes an even greater intensification of respiration and can cause self-heating.

The carbon dioxide that is released can accumulate in the grain mass and inhibit respiration. In this case, oppression and even death of pests and aerobic microflora occurs. The grain itself switches to anaerobic respiration. The grain mass acquires the smell of a barn, ethyl alcohol accumulates in the grain, which can cause loss of germination.

If external air is supplied to such a grain mass, the respiration rate will increase sharply, the amount of heat and moisture will increase.If there is not enough air to cool the grain mass, then this will lead to the rapid development of self-heating. Grain, which is heated for this reason, should not be shovel.

Freshly harvested grain has an increased content of low molecular weight substances, high enzyme activity, respiration rate, and low germination. During storage, there is a gradual decrease in the activity of enzymes and the intensity of respiration, the synthesis of high-molecular substances due to low-molecular ones, an increase in germination and germination energy. This process is called post-harvest maturation and takes one and a half to two months.

Post-harvest maturation can be slowed down or accelerated. This process absolutely does not take place in grain with high moisture content; it is greatly slowed down when freshly harvested grain is cooled. In this case, irreversible processes take place in the grain. To accelerate post-harvest ripening, it is recommended to dry the grain at a drying agent temperature of 45 ° C or subject it to active ventilation with dry air.

Having reached full physiological maturity, the respiration rate decreases, and the germination rate increases to the maximum value. Such grain is well stored.

Therefore, freshly harvested seed grain that has not passed post-harvest maturation should not be strongly cooled.

The grain receives energy by breaking down stored nutrients contained in the endosperm.

The result oxidation of fats or hydrolysis of starch become sugars, mainly glucose. As a result of its dissimilation, the necessary energy is released.

All work with grain is aimed at reducing the intensity of this process.It should be kept dormant with no signs of germination. This contributes to the preservation of seed germination, and also reduces production losses. At the same time, valuable nutritional indicators - the amount of proteins, vitamins, fats and carbohydrates - are not lost.

We have studied the effect of respiration on the quality of grain masses. In this case, different types of process have different effects on the state of the stored batches:

1. Aerobic respiration is the oxidation of glucose with the release of carbon dioxide and water in the presence of oxygen. It proceeds under normal storage conditions:

2. Anaerobic respiration is the oxidation of sugars by the type of alcoholic fermentation without the presence of oxygen. This produces ethyl alcohol. This type of breathing is adaptive. It occurs during storage under unfavorable conditions with a lack or absence of O2 in the intergranular space.

If there is a sufficient supply of air to the stored batches, then respiration proceeds predominantly according to the aerobic type.

Aerobic respiration in the grain leads to the following consequences:

- loss of dry matter;
- increase in humidity;
- self-heating;
- change in the air composition between grains.

As a result, the oxygen in the stored batch between the grains is replaced by carbon dioxide. this leads to a transition to anaerobic respiration, which is accompanied by the release of ethanol. At the beginning of the process, it inhibits the physiological processes in cells. With a gradual increase in the concentration of ethyl alcohol, the embryos die, the grain loses its germination. Thus, in order to preserve the germination of consumer qualities of grain, it is necessary to store it in conditions under which only aerobic respiration is possible.

For grain intended for processing, it is not so much the type of respiration that is important as its intensity. The higher it is, the more difficult it is to preserve the grain. Breathing intensity depends on the following main factors:

- humidity;
- temperature;
- degree of aeration.

The more moist the grain, the more actively it breathes. With a wheat moisture content of 11-12% (very dry), respiration is practically absent. There is no loss in mass. Grains of medium dryness breathe 2-4 times more intensively, wet up to 8 times more active, wet 20-30 times more intense than dry. Raw grain with a moisture content of 25-35% with air access and in an uncooled state loses up to 0.2% of dry matter daily.

During active respiration, the grain not only loses mass, but also self-warms0 as heat is released. This is accompanied by a loss of consumer qualities in part or in full. To prevent this, the grain is stored with a moisture content below critical. This is the indicator at which free moisture is found in the grain. With its increase, the intensity of respiration increases significantly.

Critical moisture content of grain of various crops:

- cereals - 14.5-15.5%;
- oilseeds - 7-8%;

Legumes - 15, 5-16.5%;

The respiration of grain masses increases with increasing temperature. With a rise for every 10 C, the grain breathes more actively 2-3 times. The maximum appears at 45 C, then the process stops due to the onset of denaturation of proteins. Therefore, to reduce the intensity of respiration, storage should be carried out at low temperatures.

For long-term and proper storage, grain lots are blown with air and periodically moved. This prevents self-heating of the grain and maintains moisture at an optimal level.

REFERENCES:

1. Nazirova R. M., Sulaymonov O. N., Usmonov N. B.//Qishloq xo‘jalik mahsulotlarini saqlash omborlari va texnologiyalari// 0‘quv qo‘llanma. PremierPublishings.r.o. Vienna - 2020. 128 bet.

2. Nazirova, R., Xamrakulova, M., Usmonov, N. (2021). Moyliekinurug‘larinisaqlashvaqaytaishlashtexnologiyasi. O’quvqo’llanma. https://doi.org/10.36074/naz-xam-usm.monograph

3. НазироваР.М., УсмоновН.Б., ТухташевФ.Э., СулаймоновР.И// Влияниетемпературыхранениянасохранностьихимическийсоставплодоовощного сырья// “Проблемы современной науки и образования” научно-методический журнал. Издательство «Проблемы науки». Москва,2019. № 11 (144). Часть 2 стр 10-12. URL: https://cyberleninka.ru/article/n/vliyanie-temperatury-hraneniya-na-sohrannost-i-himicheskiy-sostav-plodoovoschnogo-syrya

4. Назирова Р.М., Курбанова У.С.,Усмонов Н.Б.//Особенности обработки озоном некоторых видов плодов и овощей для их долгосрочного хранения// Universum: химия и биология: научный журнал. – № 6(72). М., Изд. «МЦНО», 2020. стр 6-9. URL: – https://cyberleninka.ru/article/n/osobennosti-obrabotki-ozonom-nekotoryh-vidov-plodov-i-ovoschey-dlya-ih-dolgosrochnogo-hraneniya

5. Nazirova R.M., Usmonov N.B., Askarov H.H.// Technology of storing grain in a cooled state// Do desenvolvimentomundialcomoresultado de realizacoesemciencia e investigacaocientifica: Colecao de trabalhoscientificos «ΛΌΓΟΣ» com materiais da conferenciacientifico-praticainternacional. vol 1, page 93-95 URL: https://ojs.ukrlogos.in.ua/index.php/logos/article/view/4923

6. Nazirova R.M., Usmonov N.B., Bakhtiyorova D// Innovative technologies for grain storage of different crops// Academicia an international multidisciplionary research journal. 2020. vol 10.issue 6, june, pages 222-228. URL: https://saarj.com/academicia-past-issue-2020/

7. НазироваР.М., Усмонов Н.Б., Тухташев Ф.Э., Тожиев Б// Значение процесса предварительного охлаждения сырья в повышении сохраняемости плодоовощной продукции// Научно-методический журнал “Вестник науки и образования”. Издательство «Проблемы науки». Москва, №20 (74), часть 1, 2019, с 35-38. URL: https://cyberleninka.ru/article/n/znachenie-protsessa-predvaritelnogo-ohlazhdeniya-syrya-v-povyshenii-sohranyaemosti-plodoovoschnoy-produktsii

8. Назирова Р.М., Усмонов Н.Б., Зокиров А.//“Изучение влияния обработки на сохранность плодоовощного сырья ингибиторами образования этилена”//, научно-теоретический журнал “Вопросы науки и образования” №7 (53), Москва, 2019, стр 13-19. URL: https://cyberleninka.ru/article/n/izuchenie-vliyaniya-obrabotki-na-sohrannost-plodoovoschnogo-syrya-ingibitorami-obrazovaniya-etilena/

9. Назирова Р.М., Усмонов Н.Б., Сулаймонов Р.И.//Изменениехимического состава клубней картофеля впроцессехранения// “Проблемы современной науки и образования” научно-методический журнал. Издательство «Проблемы науки». Москва, 2020. № 6 (151). стр 19-22. URL: https://cyberleninka.ru/article/n/izmenenie-himicheskogo-sostava-klubney-kartofelya-v-protsesse-hraneniya

10. NazirovaRakhnamohonMukhtarovna, MamajonovGaybulloGayratjonugli, and AsqarovHasanboyKholdoraliyevich, “Technology of long-term storage of some types of fruits and vegetables using sorbents”, *IEJRD - International Multidisciplinary Journal*, vol. 5, no. 5, p. 4, Aug. 2020.http://www.iejrd.com/index.php/%20/article/view/1109

11. AbdurakhimovAkramjonSamiyevich**,** UsmonovNodirjonBotiraliyevich.Effectiveness of co-planting crops in sandy soils./Plant cell biotechnology and molecular biology., 2020 volume 21, issue 61-65.https://www.ikppress.org/index.php/PCBMB/article/view/5688

12. Abdurahimov A.C., Usmonov N.B. Effective agrotechnology for extreme conditions. “Биология ва экология журнали”. 2019 йил. Тошкент.2-сон.37-40

13. Nazirova R.M., Maksudova G.U., Usmonov N.B.//Modern technologies for processing soy and the use of Processing by-products// Novateur publications JournalNX-A Multidisciplinary Peer Reviewed Journal ISSN No: 2581 – 4230, volume 7, issue 1, Jan. - 2021. page 172-175.https://www.neliti.com/publications/336289/modern-technologies-for-processing-soy-and-the-use-of-processing-by-products

14. Nazirova R.M., Akhmadjonova M.M., Usmonov N.B.// Analysis of the state of vine growing and wine making in the republic of uzbekistan// Novateur publications JournalNX- A Multidisciplinary Peer Reviewed Journal ISSN No: 2581 – 4230, volume 7, issue 1, Jan. - 2021. page 168-171.https://www.neliti.com/publications/336288/analysis-of-the-state-of-vine-growing-and-wine-making-in-the-republic-of-uzbekis

15. NazirovaRahnamokhonMukhtarovna, AkhmadjonovaMarhaboMakhmudjonovna, &UsmonovNodirjonBotiraliyevich. (2021). Analysis of factors determining the export potential of vine and wine growing in the republic of Uzbekistan. Euro-Asia Conferences, 1(1), 313–315. http://papers.euroasiaconference.com/index.php/eac/article/view/99