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ANALYSIS OF GRAIN QUALITY INDICATORS OF SPRING SOFT WHEAT VARIETIES IN THE CONDITIONS OF THE REPUBLIC OF KARAKALPAKSTAN

КАРАКАЛПАКСТАН РЕСПУБЛИКАСЫНЫН ШАРТЫНДА ЖАЗГЫ ЖУМШАК БУУДАЙ СОРТТОРУНУН ДАНЫНЫН САПАТТЫК КӨРСӨТКҮЧТӨРҮН ТАЛДОО

АНАЛИЗ ПОКАЗАТЕЛЕЙ КАЧЕСТВА ЗЕРНА ЯРОВЫХ МЯГКИХ СОРТОВ ПШЕНИЦЫ В УСЛОВИЯХ РЕСПУБЛИКИ КАРАКАЛПАКСТАН

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ANALYSIS OF GRAIN QUALITY INDICATORS OF SPRING SOFT WHEAT VARIETIES IN THE CONDITIONS OF THE REPUBLIC OF KARAKALPAKSTAN

Abstract

Wheat is the most important and main type of agricultural crops that ensure food safety on Earth. In recent years, the yield of autumn wheat varieties grown in the The Aral shore region has been declining from year to year due to warm weather. High-quality grain wheat varieties have been introduced in the Aral shore region, and there is an opportunity to further improve the quality of cereals through breeding programs when creating new varieties. For this purpose, varieties with high protein and gluten content are involved in the study in this article, the main indicators of grain quality are such important indicators as grain size, grain flatness, vitreous, color, protein and gluten quality and quantity and bread quality.

Keywords: The Aral shore, wheat-Triticum aestivum, food safety, grain and protein quality, gluten content, stress factors, statistical analysis.

КАРАКАЛПАКСТАН РЕСПУБЛИКАСЫНЫН ШАРТЫНДА ЖАЗГЫ ЖУМШАК БУУДАЙ ДАНЫНЫН САПАТТЫК КӨРСӨТКҮЧТӨРҮН ТАЛДОО

Аннотация

Буудай жер жүзүндөгү азык-түлүк коопсуздугун камсыз кылган айыл чарба өсүмдүктөрүнүн эң маанилүү жана негизги түрү. Акыркы жылдарда Арал районунда өстүрүлгөн күзгү буудай сортторунун түшүмү аба ырайынын жылуу болушуна байланыштуу жылдан-жылга азайып баратат. Арал районуна буудайдын сапаттуу дан сорттору киргизилип, жаңы сортторду түзүүдө селекциялык программалар аркылуу дандын сапатын мындан ары жакшыртууга мүмкүнчүлүк бар. Бул максатта, бул макалада жогорку белок жана глютен менен сортторун изилдөөгө тартылган дан сапатынын негизги көрсөткүчтөрү, мисалы, дан өлчөмү, дандын тегиздиги, айнектүүлүгү, түсү, сапаты жана белок жана клейковина менен саны; сапаты..

Ачкыч сөздөр: Арал жээги, буудай-Triticum aestivum, азык-түлүк коопсуздугу, дан жана белоктун сапаты, глютендин мазмуну, стресс факторлору, статистикалык анализ.

АНАЛИЗ ПОКАЗАТЕЛЕЙ КАЧЕСТВА ЗЕРНА МЯГКИХ СОРТОВ ПШЕНИЦЫ В УСЛОВИЯХ РЕСПУБЛИКИ КАРАКАЛПАКСТАН

Аннотация

Пшеница – важнейший и основной вид сельскохозяйственной культуры, обеспечивающий продовольственную безопасность на Земле. В последние годы урожайность осенних сортов пшеницы, выращиваемых в Приаралье, из года в год снижается из-за теплой погоды. В Приаралье внедрены высококачественные зерновые сорта пшеницы, и имеется возможность дальнейшего улучшения качества зерновых за счет селекционных программ при создании новых сортов. С этой целью к исследованию в данной статье привлечены сорта с высоким содержанием белка и клейковины, основными показателями качества зерна являются такие важные показатели, как крупность зерна, плоскостность зерна, стекловидность, цвет, качество и количество белка и клейковины и качество хлеба.

Ключевые слова: Берег Арала, пшеница-Triticum aestivum, безопасность пищевых продуктов, качество зерна и белка, содержание клейковины, стрессовые факторы, статистический анализ.

Introduction

In recent years, global climate change has created water shortages on Earth. In these cases, ensuring the food safety of the population requires expanding the cultivation of high-calorie and drought-resistant crop species. Wheat is the most important and main crop that ensures food safety. In recent years, the yield of autumn wheat varieties grown in the Aral shore region has been declining from year to year due to warm weather. Such climate change requires the creation and introduction of wheat varieties that are resistant to abiotic and biotic stress factors, with high yields and grain quality. Despite the fact that wheat varieties grown in the Aral shore region are mainly of biological origin and cannot fully adapt to the climatic conditions of the Republic, despite having high-yielding biological autumn intensive varieties, their indicators of cooking and grain quality cannot meet the demand for strong wheat. To meet the food needs of the population, it is necessary to introduce spring wheat varieties capable of maintaining yield and quality in hot climates, resistant to drought and dehydration, with a high protein and gluten content

It is also necessary to select varieties that are resistant to water shortages, resistant to diseases and pests, and include them in the region, taking into account the ever-decreasing water resources in the Aral shore region and the irrigated lands of our Republic.

As a result of research, varieties of wheat resistant to salinity and water scarcity are allocated for the arable land of the Aral Sea region, and seed breeding works will be done in the following years.

One of the main factors affecting the growth and development of spring wheat in low-water areas is fertile soil and moisture reserves. The quantitative indicators of these reserves depend on the amount of precipitation. An important period of water consumption by spring wheat is the flowering stage. In addition, during waxy ripening, the plant's need for moisture is high. The lack of moisture at these stages significantly affects the decrease in crop yields. A specific indicator of the moisture supply of the soil is the provision of effective moisture in the meter layer. According to general estimates, if the humidity in this layer exceeds 160 mm, the reserves are described as "excellent", 160-130 mm as "good", 130-90 mm as "satisfactory" and 90-60 as "bad", less than 60 mm as "very bad" [1].

A better understanding of the Morpho-anatomical and physico-biochemical properties of changes in plant drought tolerance can be used to increase or create new crop varieties to increase yields in water scarcity conditions [4; 5; 11].

The amount of grain or protein in it is one of the most important indicators of the final useful quality of wheat, determined by the genotype and environmental impact. Soft white wheat has a lower protein concentration than hard white and hard red wheat. It depends on the distribution of protein particles in it, the vitreous of the grain, the air space inside the grain and other factors [2; 3]. The presence of moisture among environmental factors greatly affects the amount of protein in the grain, and the stress of drought during grain burns usually increases the amount of protein in the grain [4]. With the ripening of grain, drought accelerates the aging of plants and the transition of nitrogen from vegetative organs to grain [6]. Drought stress reduces the rate of photosynthesis and grain yield, disrupts the balance between carbon assimilation and nitrogen accumulation in the grain, which leads to a greater accumulation of nitrogen in the grain [8; 7].

Uniformity of yield can be achieved by using biotic stress-resistant and abiotic stress-resistant varieties.

Materials and Methods

In the spring, with traditional methods of planting wheat, it was carried out using the technique of planting cereals in open ground to a depth of 3-4 cm and a row interval of 15 cm.before planting, agrotechnical activities are held that are suitable for saline lands, including plowing, planning, washing with salt, planting in damp areas.

In our research work, we used Qayiroqtosh, Oqmarvarid, Ezoz, Ilgor and Paxlavon varieties from a facultative type of soft spring wheat. These varieties were bred in the experimental area of the Center for innovative development, located near the city of Moynok of the Aral shore region and in the fields of farms in several districts of the Republic of Karakalpakstan. In the first year of the experiment, the Oqmarvarid soft wheat variety was grown by hand planting and sprinkling on an area of 0.3 hectares. In the second year of the experiment, grain planting was carried out by a planter. Before planting, all fields are watered with salt water and planted in wet fields. The analysis was carried out to determine the fertility of different varieties, the number of clusters, spike and bloom, determine the processes of full ripening, the quality of cultured wheat grain, including raw gluten and IDK indicators, total yield, plant height, spike length, and analyzed the number of grains in the spike, mass of 1000 grains, biometric indicators. The productivity of plants was photographed by using an Android phone camera and calculated using the multipoint collection function of the ImageJ application.

Agrotechnical measures:

The melioration importance of planning irrigated lands is that on well-leveled lands, water is retained, the salinity of the soil is washed evenly, crops are supplied with water at the same level during the growing season, and as a result, the yield of the crop increases. When planning saline lands, a longitudinal and transverse slope is formed (transverse 0.0012-0.0018; longitudinal 0.002-0.003).

There are 3 types of alignment:

1. The main procedure is that the total slope of the field changes completely, and very large-scale (300-700 m^3/ha) earthworks are carried out.

2. Partial planning-small-scale work is carried out on the leveling of some heights on Earth.

3. The current procedure is carried out every year before planting crops, smoothing out ridges and furrows formed mainly by plowing. Land planning is mainly carried out using bulldozers, scrapers, graders, long-supported graders, tractor grouting machines.

Results and Discussion

The results obtained as a result of our studies showed that local soft wheat varieties: when planted as spring wheat in the soil-climatic conditions of the Aral shore region, spring wheat varieties adapted to this region are selected. The optimal time and norms for planting selected varieties are determined.

As research materials, the varieties Paxlavon, Oqmarvarid, Qayroqtosh, Ezoz and Ilgor of soft wheat, created at the Institute of genetics and experimental plant biology, and the varieties Baxmal-97 and Grekkum-40 were used at the Gallaorol Institute of rainy farming. The growing regions of these varieties have been selected and approved.

Depending on the duration of the growing season, breeding materials (varieties and specimens) are divided into 3 groups: early, middle and late. When analyzing the growing season of the varieties in the experiment, it was found that the Oqmarvarid and Paxlavon varieties ripen completely in 81 days, and the Ezoz varieties in 83 days.

In spring soft wheat specimens, the number of grains in the spike in the second and third decade of May is greatly influenced by a sharp rise in temperature. Among the varieties in the experiment, the largest grain appearance in one spike was 41 grains in the Ezoz variety, 39 in the Paxlavon variety, and the lowest result was determined in the Oqmarvarid variety, 37 grains were formed (fig 1).

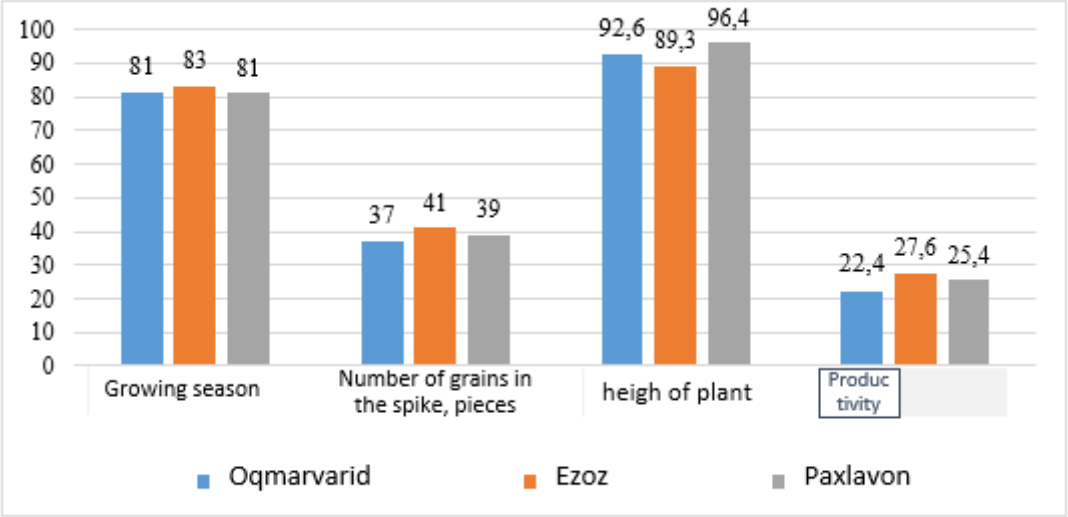

Figure 1. Features of phenological observations and yield of spring wheat varieties.

It is known from studies that the height of plants below 60 cm negatively affects productivity. Especially for spring wheat varieties, it should grow quickly and be in the range of 75-80 sm. The experiment observed a difference in the plant height of the varieties under study and found that the height of the plants ranged from 89.3 sm to 96.4 sm.

Varieties Oqmarvarid, Ezoz, Paxlavon were planted for testing on an area of 10 m2 on the experimental territory of the International Innovation Center "Aral Sea" under the President of the Republic of Uzbekistan. The harvest of the varieties was on July 10 with a yield of 15 c/hec. At the experimental field of the Scientific and Production Association of Grain and Rice Growing, located in the Nukus district, the varieties Oqmarvarid, Ezoz, Paxlavon and Qayroqtosh are sown as spring wheat, the varieties Oqmarvarid and Paxlavon - 25 c/hec. Qayroqtosh 23 c/hec, Ezoz 30 c/hec was harvested, and samples were taken for grain analysis.

The cooking properties of wheat flour are mainly assessed by the amount and quality of gluten. The amount and quality of gluten is understood to be a hydrated jelly-like rubber mass of water-washed wheat dough composed mainly of water-soluble protein [9].

Depending on the amount of gluten, wheat grains are divided into the following classes:

Grade 1-wheat grain with a gluten content of at least 28% and a quality of no less than Group II;

Grade 2-gluten content at least 25%;

Grade 3-gluten content at least 22%. If the gluten content is less than 22% and the quality is lower than Group II, such wheat is considered "bad".

Gluten quality of soft wheat varieties and samples according to the state standard IDK: 45-75 1st grade (excellent); 2nd grade (good) up to 90-100; 105-120 divided into 3rd grade groups (not fulfilled). In eastern Europe, the IDK value is widely used to characterize wet gluten stretching: values below 75 are strong gluten, from 75 to 90 — medium (preferably) and above 90 — soft. Quoted by Carl F. Tifenbacher [10].

Gluten content, wet gluten and total protein ratio. The amount of gluten ensures the ripeness of the wheat. According to GOST 9353-90, high-quality cereals should contain 36% gluten, Grade 1 - 32%, Grade 2-28%, Grade 3 - 23%, grade 4-18%. The amount of gluten in wheat grain has been observed to increase as wheat fields move from the northern regions to south and from the west to the east. In dry and hot weather, its amount increases significantly. There was a rapid change in rainy and dry weather, as well as a decrease in the amount of gluten with the drying of wet wheat grain at high temperatures. Contamination with various diseases and pests repeatedly reduces the amount of gluten. Fungicides applied against diseases, insecticides applied against harmful turtles and other pests, herbicides applied against weeds cause plant stress, which in turn negatively affects plant development and protein synthesis. As a result, a high yield is obtained, but the quality is low. To prevent such cases, measures must be taken to reduce the use of these chemicals, that is, the use of resistant varieties and the planting of genotypically high-quality varieties.

When studying the amount of gluten and IDK units in wheat varieties planted in the spring season, it was found that the White Pearl Variety has 29.8% gluten, 78.9 IDK, the ilgor variety 29.3% gluten, 75.4 IDK, the ezoz variety 27.4. In the Kairaktash Variety, the amount of gluten was found to be 30.2%, 76.6 IDK, in the paklavon variety, gluten was found to be 28.7%, 93.6 IDK (table. 1).

Table 1. Grain quality indicators of wheat varieties grown on the Aral shore in 2022.

The name of varieties	Gluten		Bakery
	%	IDK	
Oqmarvarid	29,8	78,9	good
Ilgor	29,3	75,4	good
Ezoz	27,4	82,4	good
Qayroqtosh	30,2	76,6	good
Paxlavon	28,7	93,6	satisfactory, weak

The wheat variety is characterized by glassyness, brightness or rigidity, which determines the quality of the grain. Nevertheless, these signs change depending on the growing conditions of the wheat plant. Under conditions of excessive moisture and nitrogen deficiency, the brightness of the grain decreases. It is known that timely and adequate feeding of the plant not only increases productivity, but also has a positive effect on the quality of cereals. The vitreous property is directly related to the amount of protein in the grain content, and the rich grain protein also has a high vitreous level (fig. 2).

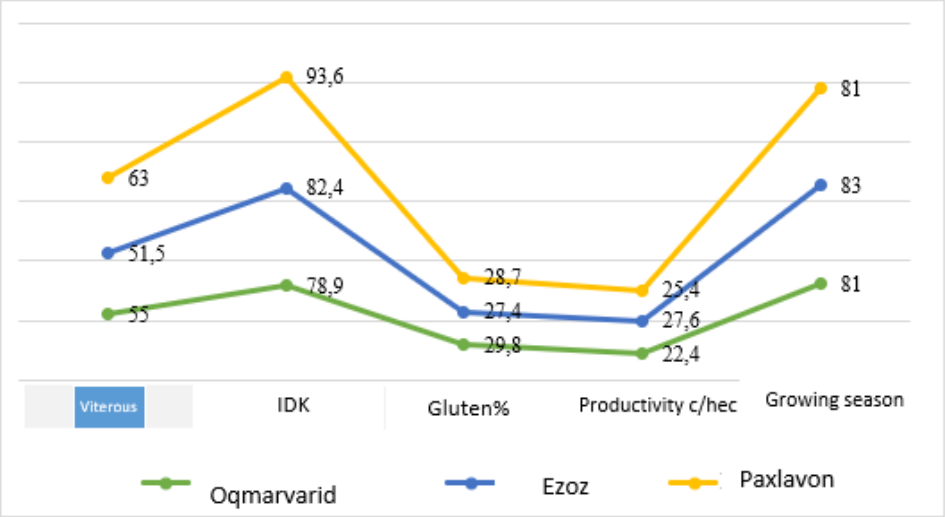

Figure 2. Grain quality indicators of certain varieties.

In the experiment, it was found that the viterous of the grain of the variety is 55% in the Oqmarvarid variety, 51.5% in the Ezoz variety and 63.5% in the Paxlavon variety.

Based on the above data, it is important to introduce local varieties of spring wheat with a high gluten content and high yield, establish seeding and expand the crop lands, corresponding to the soil and climatic conditions of the Aral shore region.

In saline areas, water-soluble salts in the soil can seriously harm the development of crops and dramatically reduce their productivity. Therefore, in order to increase the productivity of irrigated land in the Saline Area, the salt -washed works was carried out.

Conclusion

According to the results of our studies, we can draw the following conclusions: at the "0" point of the Aral shore district, wheat seeds did not germinate and at this point came to the conclusion that it is advisable to grow wheat.

On the no tilling land of the Moynok district closest to the Aral shore, spring soft wheat varieties were first planted and harvested, its grain was fully ripe and the yield was 15 ts/hec.

Spring wheat varieties grown in the Aral region have an average dry gluten content of 29%, and according to the IDK index, all varieties belong to the first class of "good" quality. 7 varieties of spring soft wheat are planted in 8 agricultural fields on an area of 11.75 hectares, in 6 districts of the Aral shore region and are fully harvested.

Spring wheat fields were fertilized, wheat was not irrigated until 15 May, wheat in all fields grows satisfactorily due to the moisture irrigated during the Salt-washing process, these varieties turned out to be drought-resistant.

In our experiment, we can conclude that among the selected wheat varieties studied are the varieties of Oqmarvarid and Paxlavon by growing season, Oqmarvarid and Ilgor varieties with gluten and grain content, Paxlavon varieties with grain content. It has been found that varieties with a high index of such valuable economic properties can be used as sources in seedbreeding and genetic research.

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