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# «SELECTION OF WINTER WHEAT AND RICE VARIETIES ADAPTED TO THE SOIL AND CLIMATIC CONDITIONS OF THE REPUBLIC OF KARAKALPAKSTAN»

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**Abstract:** The effectiveness of grain production greatly depends on selecting the appropriate variety for the region and intended use of the grain. The cultivars differ from one another in yield, adaptability to local conditions, and reaction to stress factors since they each have unique features.

The selection of grain types for the harsh conditions of Karakalpakstan was based on the aforementioned factors, and 10 varieties of winter wheat and 5 kinds of rice were chosen. Winter wheat types ASR and Antonina, ultra-ripe rice variations Gulistan, and late-ripening variety Iskander all differed in terms of winter hardiness, salt resistance, drought resistance, and eventually grain output.

**Keywords:** Winter wheat, rice, variety, selection, circumstances, stressors, grain, harvest, growth stages, density, and growing season.

## Introduction

While agricultural technology helps to increase yields, the actual yield is mostly influenced by the genetically inherited economic and biological characteristics of varieties. Old types can frequently be replaced with new ones to boost yield by 10% to 40%. The new kinds' advantageous traits enable greater use of other production elements, such as agricultural equipment, fertilizer, etc. This result is only possible when the variety's beneficial economic and biological traits are present without any additional expense.

A well-executed seed production program, whose goals are to maintain the genetic traits and qualities of the variety, is essential to getting a consistently high yield of rice. Rice producers sustain enormous financial losses as a result of the low quality of the seed stock, which inevitably reduces rice output and field germination.

In view of the rapidly deteriorating ecological and economic conditions in the Republic of Karakalpakstan, varieties that must adapt to the soil and climatic conditions of this region will be distinguished by high productivity, winter hardiness, resistance to drought and high temperatures, to lodging, diseases, and salinization, as well as high plastid content.

The selection of varieties that are flexible, provide consistently high yields with high grain quality despite a lack of resources, and are the most sensitive to ongoing agrotechnical interventions is the fundamental strategy for tackling these issues.

The developed methods for growing grains in other parts of the Republic of Uzbekistan and overseas are incompatible with the soil and climate of the Republic of Karakalpakstan, and non-zoned varieties are not suitable for the region's soil and climate.

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VOLUME-3, ISSUE-5

The major goal of this research is to support scientifically and practically the choice of varieties that, under the conditions of the Republic of Karakalpakstan, assure good yields of winter wheat and rice.

The choice of cultivars for actual cultivation circumstances is a difficult but crucial undertaking. Practice has demonstrated that it is impossible to cultivate one type in production, even if it is extremely good, under the starkly varying weather conditions that mirror the region of Karakalpakstan. For specialized growth circumstances and a greater potential for adaptation, the selection of cultivars should take into account the specialization of farms. The producers continue to have sole discretion over the types to be sown.

**Research methodology**

In order to solve the tasks set, field experiments were conducted on the following varieties of winter wheat and rice

**1. Varieties of winter wheat:**

1. ASR
2. AZIZ
3. KARADARYA
4. UMID
5. TABOR
6. ДАVR
7. KUREN
8. ANTONINA
9. BEZOSTAYA-100
10. ALEKSEICH

2. Rice varieties:

1. GULISTAN
2. SHARM
3. NOVATOR
4. ISKANDER
5. LAZURNIY

Both grain crop varieties were produced under the identical conditions, and the recommended agrotechnical practices were used in each case. Every observation and record was made using the commonly acknowledged methods.

## RESEARCH RESULTS

Breeding and selecting hardy winter wheat varieties for the conditions of the Republic of Karakalpakstan is currently one of the key objectives. Additionally, since this indicator is dependent on the region of origin, the length of the growing season is a crucial factor. The two most significant variables influencing the variability of this feature are genotypes and ecological and geographic settings. Based on this, the table depicts the beginning of the winter wheat's developmental phase. It was noted that different types go through the following developmental stages: seedlings, tillering, spring regrowth, tubulation, earing, and ripeness.

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2023-5.384 ResearchBib IF: 8.848 / 2023

THE MULTIDISCIPLINARY JOURNAL OF SCIENCE AND TECHNOLOGY

VOLUME-3, ISSUE-5

Table 1

**The growing season of various varieties of winter wheat, days**

| № | Name of Varieties | Sowing | seedlings | Tillering | Spring regrowth | Pipe-forging | heading | Ripeness | Vegetation period, days |
|---|---|---|---|---|---|---|---|---|---|
| 1 | ASR (st) | 08.10. | 19.10 | 22.11 | 26.02. | 23.04 | 06.05 | 11.06. | 246 |
| 2 | Aziz | 08.10. | 19.10 | 24.11 | 26.02. | 24.04 | 07.05 | 13.06. | 248 |
| 3 | Koradaryo | 08.10. | 21.10 | 22.11 | 26.02. | 23.04 | 06.05 | 13.06. | 248 |
| 4 | Умid | 08.10. | 21.10 | 24.11 | 26.02. | 24.04 | 08.05 | 15.06. | 250 |
| 5 | Davr | 08.10. | 20.10 | 22.11 | 27.02. | 23.04 | 06.05 | 14.06. | 249 |
| 6 | Tabor | 08.10. | 21.10 | 23.11 | 27.02. | 26.04 | 10.05 | 15.06. | 250 |
| 7 | Kuren | 08.10. | 21.10 | 24.11 | 27.02. | 26.04 | 10.05 | 13.06. | 248 |
| 8 | Antonina | 08.10. | 21.10 | 26.11 | 27.02. | 24.04 | 08.05 | 16.06. | 251 |
| 9 | Bezostaya-100 | 08.10. | 20.10 | 22.11 | 26.02. | 23.04 | 06.05 | 13.06. | 248 |
| 10 | Alekseich | 08.10. | 20.10 | 22.11 | 26.02. | 25.04 | 10.05 | 15.06. | 250 |

The information in the table shows that there are variations in the length of the growing season among the winter wheat cultivars. The study's findings showed that Asr, Aziz, Koradare, Kuren, and Bezostaya-100 were the most mid-ripening varieties, with grains fully ripening in 246 and 248 days, respectively. Davr, Umid, Tabor, Alekseevich, and Antonina were the most late-ripening varieties, with grains fully ripening in 249 and 251 days, respectively. The table shows that there are no appreciable differences in the length of the growth season among the various winter wheat cultivars. This enables the farm to grow three to four types with various stalk lengths.

On the territory of the Republic of Karakalpakstan, the summer is hot and long, but there are also frequent cold spells and frosts in the second decade of April, as well as fall frosts in the second or third decade of October. Winter wheat's growth and development are notably impacted by the exceptionally low relative humidity of the air, the extreme lack of precipitation, and the highly salinized soil.

All of the above elements point to particularly unusual growing conditions for winter wheat, which in large part dictates the specifications for the selection of seeded types. Table 2 provides some information on the tested local and international winter wheat types for germination and winter hardiness in this regard.

The whole germination and spring regrowth periods were used to calculate the standing density of winter wheat plants. According to the findings, the density of winter wheat plants varied between 359 and 456 pieces per square meter during the complete germination phase, and between 290 and 373 pieces per square meter after the spring regrowth.

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2023-5.384 ResearchBib IF: 8.848 / 2023

THE MULTIDISCIPLINARY JOURNAL OF SCIENCE AND TECHNOLOGY

VOLUME-3, ISSUE-5

**Table 2.**

**Density of standing of various varieties of winter wheat and their degree of wintering**

| № | Names of varieties | The number of plants in the period of full germination pcs per 1 m² | Number of plants during spring regrowth, pcs per 1 m² | % of winter hardiness |
|---|---|---|---|---|
| 1 | ASR (st) | 402,8 | 351,6 | 87,3 |
| 2 | Aziz | 409,6 | 336,8 | 82,5 |
| 3 | Koradaryo | 422,0 | 344,0 | 81,5 |
| 4 | Умid | 455,6 | 373,2 | 81,9 |
| 5 | Davr | 407,2 | 338,4 | 83,1 |
| 6 | Tabor | 427,2 | 353,2 | 82,6 |
| 7 | Kuren | 359,2 | 290,0 | 80,7 |
| 8 | Antonina | 392,4 | 332,4 | 84,7 |
| 9 | Bezostaya-100 | 424,0 | 330,0 | 77,8 |
| 10 | Alekseich | 456,4 | 373,2 | 81,7 |

The studied types' levels of winter hardiness vary among them.

Varieties Asr, Antonina, and Davr had the maximum winter hardiness among the examined varieties, ranging from 83.1 to 87.3%. It was also between 77.8 and 82.6% in other variations.

The production of plants serves as the ultimate test of any agricultural approach. Table 3 displays the impact of several cultivars on winter wheat yield.

As can be seen from the data in Table 3 for the study period, high yields of winter wheat grain were obtained in the standard variety ACP and Antonina (60.0-63.5 c/ha). The increase in yield in the standard variety ASR compared with the studied varieties ranged from 1.5 to 12.2 q/ha.

ISSN: 2582-4686 SJIF 2021-3.261,SJIF 2022-2.889,
2023-5.384 ResearchBib IF: 8.848 / 2023

THE MULTIDISCIPLINARY JOURNAL OF SCIENCE AND TECHNOLOGY

VOLUME-3, ISSUE-5

**Table 3**

**Biometric indicators of the tested varieties of winter wheat**

| № | Varieties | Productivity, c/ha | Height of plant cm. | Spike length, cm. | Number of grains per ear, pcs. | Weight of 1000 grains, g |
|---|---|---|---|---|---|---|
| 1 | ASR (st) | 63,5 | 88,1 | 9,8 | 42,1 | 45,2 |
| 2 | Aziz | 57,0 | 83,9 | 9,4 | 37,4 | 36,7 |
| 3 | Koradaryo | 62,0 | 91,4 | 9,6 | 45,9 | 40,3 |
| 4 | Умid | 51,3 | 91,5 | 9,7 | 36,9 | 36,3 |
| 5 | Davr | 53,5 | 80,2 | 7,7 | 38,5 | 38,6 |
| 6 | Tabor | 57,5 | 81,2 | 8,8 | 35,8 | 33,4 |
| 7 | Kuren | 55,3 | 91,3 | 8,6 | 36,9 | 40,2 |
| 8 | Antonina | 60,0 | 89,1 | 11,0 | 42,7 | 41,0 |
| 9 | Bezostaya-100 | 57,0 | 87,3 | 9,2 | 39,2 | 34,1 |
| 10 | Alekseich | 57,0 | 84,7 | 9,3 | 39,3 | 36,7 |

$HCP_{05}$ c/ha 3,23
$HCP_{05}$ % 5,61

These kinds outperform other evaluated types in terms of number of grains per ear (42.1-45.9 pieces), mass of grain per ear (1.6-1.8 g), and weight of 1000 grains (41.0-45.2 g).

According to the findings of the second year of research, ASR (63.5 c/ha), Koradaro (62.0 c/ha), and Antonina (60.0 c/ha) were the types of winter wheat with the highest yields.

Like other agricultural crops, rice productivity depends on the emergence of numerous quantitative and qualitative features. Quantitative features, the severity of which in rice is characterized by a significant amplitude of fluctuation under diverse environmental conditions, are particularly crucial in the establishment of productivity. Due to the ability of one group of features to grow more favorably under some conditions than another, rice has the ability to produce high yields under specific environmental conditions.

In our research, the direction concerns the choice of high-yielding, low-water-consuming, early-ripening rice varieties.

Sowing was carried out in the third decade of May with a seeding rate of 180 kg/ha. During the growing season, we carried out phenological observations on 5 varieties on the onset of the development phase of various rice varieties, the results of which are shown in Table 4

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2023-5.384 ResearchBib IF: 8.848 / 2023

THE MULTIDISCIPLINARY JOURNAL OF SCIENCE AND TECHNOLOGY

VOLUME-3, ISSUE-5

**Table 4**

**Phenological observations of different varieties of rice**

| Names of varieties | sowing | seedlings | tillering | into the pipe | bulging | Ripeness | | | Veg. period, days |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | milky | waxy | whole | |
| Gulistan | 26.05 | 08.06. | 04.07 | 28.07 | 01.08. | 07.08 | 15.08 | 01.09 | 98 |
| Noavtor | 26.05 | 08.06. | 04.07 | 22.07 | 30.07. | 06.08 | 18.08 | 30.08 | 96 |
| Sharm | 26.05 | 08.06. | 04.07 | 20.07 | 30.07. | 06.08 | 17.08 | 24.08 | 92 |
| Iskander | 26.05 | 10.06. | 06.07 | 07.08 | 15.08. | 26.08 | 14.09 | 28.09 | 125 |
| Lazurniy | 26.05 | 10.06. | 08.07 | 14.09 | 22.09. | 29.08 | 20.09 | 23.10 | 140 |

The information in Table 4 demonstrates a considerable difference in the length of the growing season for varieties belonging to the early-ripening, late-ripening, and ultra-early groups. Because the grains did not ripen at the same time, the growing season varied from 92 to 140 days.

The ultra-early varieties "Sharm" and "Innovator" of Russian origin ripened 2 and 6 days earlier than the early-ripening variety of local origin "Gulistan" if the length of the growth season of the tested kinds is examined. Additionally, it ripens 15–30 days later in the Iskander and Azure cultivars' late-ripening group. The usage of irrigation water is impacted by this indication in turn. In the heading and ripening phases, rice is said to use 181.0 and 164.6 m3.ha daily. According to our research, the amount of water saved for this time period is roughly 3620-3292 m3.ha and 6335-5761 m3.ha (evaporation, transpiration, and filtration) if we multiplied the water use by the length of these rice types.

Having friendly and dense shoots and keeping them throughout the growth season are two aspects that affect rice's output. Table 5 displays the standing density of rice based on this.

**Table 5**

**Standing density of different varieties of rice** (S=1м$^2$.)

| № | Names of varieties | Number of seedlings, pcs | Field germination,% | Coef. tillering | Number of plants before | Number of stems, pcs | Safety for cleaning, % |
|---|---|---|---|---|---|---|---|
| 1 | Gulistan | 235,6 | 39,3 | 1,5 | 207,8 | 311,7 | 88,2 |
| 2 | Sharm | 233,0 | 38,8 | 1,4 | 204,4 | 286,1 | 87,7 |
| 3 | Novator | 234,1 | 39,0 | 1,4 | 203,0 | 284,2 | 86,7 |
| 4 | Iskander | 232,4 | 38,7 | 1,3 | 200,5 | 260,6 | 86,3 |
| 5 | Lazurniy | 231,8 | 38,6 | 1,3 | 198,6 | 258,2 | 85,7 |

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VOLUME-3, ISSUE-5

In order to quantify the field germination, the standing density of the rice plant throughout the complete germination and full ripening phases was determined. The statistics obtained demonstrate that the differences in the seed germination duration, measured in terms of pieces per square meter (m2) and 0.3-0.7%, respectively, are negligible. The range of rice types' tillering coefficients was 1.3 to 1.5 percent. The ultra-early group showed a substantially greater survival rate of the plant by the end of the growing season than the early-ripening and late-ripening rice types, ranging from 0.5 to 2.5%.

Biometric sheaves were collected prior to harvesting in accordance with the technique, and the findings are displayed in Table 6.

**Table 6**

**Elements of the crop structure of various varieties of rice**

| Names of varieties | Panicle length см. | Number of grains in 1 panicle, pcs | | Weight, gr | | Biological yield c/ha. |
|---|---|---|---|---|---|---|
| | | full | empty | Biological yield c/ha. | 1000 grains. | |
| Gulistan | 14,2 | 80,9 | 16,8 | 5,1 | 27,1 | 71,0 |
| Sharm | 18,9 | 74,5 | 11,1 | 3,9 | 29,8 | 43,0 |
| Novator | 15,1 | 83,3 | 17,6 | 4,4 | 27,9 | 46,0 |
| Iskander | 25,3 | 140,9 | 32,6 | 7,9 | 33,7 | 70,0 |
| Lazurniy | 21,7 | 94,8 | 22,4 | 4,1 | 23,4 | 31,0 |

$НСР_{05}$ c/ha 2,08

$НСР_{05}$ % 3,98

The results of various rice varieties' biometric indicators show that the ultra-early rice variety Gulistan (71.0 centner/ha) and the late-ripening rice variety Iskander (70.0 centner/ha), which has a better yield structure than other subject rice varieties, obtained the highest grain yields.

The examined rice varieties in the late-ripening group "Lazurniy" had a low indicator (31.0 c/ha) when compared to the indicators from the variety's features, according to the results of the biometric study.

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