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Testing and Evaluation of Rice Variety Samples in Nurseries in The Conditions of Karakalpakstan

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Abstract: This study presents a comprehensive and in-depth analysis of rice variety samples Д-53 (Д-82), Д-66 (Д-154(4-12-2)) in a control nursery plot, providing evaluations and conducting competitive variety testing.

Keywords: Rice, variety, selection, control nursery plot, vegetation.

Introduction: Rice crop ranks first in the world in terms of yield and second after wheat in terms of consumption. It is the main food source for one-third of the world's population and, despite its origin in the tropics, is widely grown in temperate regions. With the global population increasing every year and the amount of agricultural land decreasing, while labor costs are rising, it is crucial to introduce innovations in agriculture, especially in rice cultivation, by creating new varieties adapted to local conditions.

The Republic of Karakalpakstan is a leading region for rice cultivation, with significant potential for large-scale sowing. However, due to unfavorable soil and climatic conditions, water supply issues, delayed irrigation timing, increasing droughts, and factors such as soil salinity and extreme heat days, there are various obstacles limiting the expansion of rice cultivation. These challenges are primarily linked to water supply.

According to B.Abdullayev, U.Abillayev, S.Jalmenova, and D.Turdishev, the current requirements for rice varieties in modern rice cultivation have changed significantly. For Uzbekistan’s rapidly developing agricultural sector, the goal is to create export-oriented long-grain rice varieties with valuable economic traits, early maturity, and resistance to stress factors [1].

D. Utambetov and G. Khojambergenov's experiments indicate that seed germination rate and field emergence vary from 0.9 to 3.9 grains per m2 and 0.2-0.7%, respectively. Processing coefficients for rice varieties range from 1.32 to 1.42%. According to their findings, the early maturing “Guliston” variety matures 4-7 days earlier than other varieties, yielding 2-9 kg/ha more. With water savings, up to 4.5 thousand m3/ha of water is achieved. The “Guliston” variety is proposed for secondary sowing after winter wheat [2].

According to B.Abdullayev and U.Abillayev, the Karakalpakstan rice fields are located in a sharply continental climate zone with saline desert soils in the lower reaches of the Amudarya River. Most irrigated lands in northern Karakalpakstan suffer from strong to moderate chloride and sulfate salinity. These low-fertility soils, saline due to shallow groundwater, are

unsuitable for cotton, wheat, and other crops, with a relatively short warm season in spring-autumn. Complex natural stress factors, limited irrigation water, and especially its late arrival significantly restrict the expansion of rice cultivation [3].

U.Abillayev emphasizes that in the extremely harsh soil and climatic conditions of Karakalpakstan, stress-tolerant varieties play a crucial role in achieving stable rice yields [4].

Given global climate change, the requirements for new varieties have become extremely complex, placing a heavy burden on breeders to consider numerous traits and characteristics.

The factors mentioned above present significant obstacles to rice cultivation in Karakalpakstan, which breeders must address. These challenges highlight the need to develop new varieties well-adapted to local harsh conditions and meet the global market's demand for high-yielding varieties.

Our research aims to identify promising high-yielding rice variety samples with positive traits that are adapted to local stress conditions by conducting thorough evaluations and selecting the most suitable ones for use in breeding programs.

METHODS

The study was conducted at the experimental fields of the "Scientific Production Association of Grain and Rice" in Karakalpakstan.

Observations, measurements, and calculations were carried out according to the standard methods of A.P.Smetanin [1972] and the Methodological Manual for Field Experiments [2007] [5]. The components of yield indicators were analyzed in the laboratory, and the most productive, low-stemmed, early maturing samples were selected. The data obtained were analyzed using the dispersion method of B.A.Dospexov.

RESULTS AND DISCUSSION

Samples in the control nursery plot were sown in pairs (standard) using the standard "Guliston" variety for comparison. The samples were analyzed for their tillering ability (number of stems) during the seedling and full ripening phases.

The ability of rice plants to produce tillers is a key factor influencing growth and yield. The tillering ability of a variety reflects its biological adaptation to the local environment. We observed significant differences in field emergence and survival until full maturity among the varieties.

Through agrobiological evaluation, we identified samples with many positive traits, as well as those that are resistant to the stress factors of Karakalpakstan and capable of full ripening. We paid particular attention to their early maturity and performance indicators.

Table 1

Classification of the ability of studied rice samples in the control nursery plot to produce tillers and their yield characteristics

№	Variety Sample	Tillers at Transplanting (m^2/pcs)		Yield, q/ha	Difference from Standard (q/ha)	Lodging Resistance (score)
		Seedling stage	Full maturity stage			
1	Gulistan st.	220	179	65,4	-	5
2	Д-21 (Д-7(Д-48)	235	178	69,6	4,2	5
3	Д-66 (Д-154(4-12-2)	216	172	74,0	8,6	5
4	Gulistan st.	232	156	66,5	-	5
5	D-17 (otb. Almaz)	216	170	69,0	2,5	5
6	Д-13(Д-32(Д-135)	230	194	73,0	6,5	5
7	Gulistan st.	226	175	68,0	-	5
8	Д-32 (Д-530)	222	177	73,0	5,0	5
9	Д-35(Д-105) Д-192)	197	169	76,0	7,0	5
10	Gulistan st.	212	172	65,8	-	5
11	Д-53 (Д-82)	198	169	76,0	10,2	5
12	Д-20 (Д-442(Д-143)	214	179	68,2	2,4	5

The selected large-grain samples in the control nursery plot formed normal tiller numbers and demonstrated adaptive traits suitable for local conditions (Table 1).

Our observations revealed that, during the seedling phase, the number of germinated grains ranged from 197 to 235 compared to the standard "Guliston" variety. At full ripening, the tiller numbers ranged from

156 to 194. In terms of yield, the studied samples exceeded the standard “Guliston” variety’s yield of 65.4-68.0 t/ha, with Д-53 (Д-82) and Д-66 (Д-154(4-12-2)) showing the highest differences. They also exhibited stress resistance and lodging tolerance. The best-performing samples will undergo competitive variety testing next year, with thorough study and evaluation.

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