COLLECTION SAMPLES OF WINTER SOFT WHEAT BY PRODUCTIVITY AND SOLD RESISTANCE IN THE CONDITIONS OF KARAKALPAKSTAN

Reymov Timur Polatovich.
Trainee researcher of the Scientific and
Production Association for Grain and Rice
Utambetov Duisenbay Usnatdinovich.
Scientific and Production Association
for Grain and Rice. ***c.a.s., s.r.***

One of the most pressing problems in the agriculture of the Republic of Karakalpakstan is the shortage of water resources, high soil salinity, and the deterioration of the land reclamation status of irrigated lands. These factors significantly limit the possibility of obtaining stable crop yields and require the creation of new varieties of winter soft wheat adapted to the extreme soil and climatic conditions of the region.

The effectiveness of selection work largely depends on the availability of starting material with valuable economically useful traits. Therefore, studying collection specimens based on productivity, adaptability, and resistance to salinity is of great importance. According to several researchers (Kotula L., Zahra N., 2024; Zhang Y., ნიუ ლ., 2025), multiple selection of plants in saline conditions contributes to the accumulation of salt-tolerant traits and increases the adaptive potential of the varieties. In modern breeding programs, increasing adaptability is considered one of the priority areas (Hussein M.A.A., 2023).

The purpose of this study was to identify promising collection samples of winter soft wheat that combine high productivity and resistance to salinity in the conditions of Karakalpakstan.

The object of the study was 150 collection samples of winter soft wheat of various ecological and geographical origins. Field experiments were conducted at

the experimental plots of the Grain and Rice Scientific and Production Association, located in a zone of saline soil distribution. All agrotechnical measures were carried out in accordance with the current recommendations for this region.

To evaluate resistance to salinity, the most productive samples were investigated under laboratory conditions using the seed germination method in a 2% sodium chloride (NaCl) solution.

The results obtained indicate significant variability in the studied samples across the main productivity elements. The duration of the growing season ranged from 250 to 268 days, which ensures the timely maturation of plants in the conditions of the saline lands of Karakalpakstan.

The highest indicators were noted in the D-190 (9.01 g), D-149 (8.86 g), and D-197 (8.15 g) samples. The high productivity of these samples is attributed to a favorable combination of structural elements in the harvest, including grain weight, number of grains in the ear, and the level of productive bushiness. This indicates their high genetic value and adaptability to local cultivation conditions.

Laboratory studies have shown that the action of a 2% NaCl solution exerts a pronounced inhibitory effect on seed germination and the initial growth of seedlings. If in the control variant (distilled water), the laboratory germination rate was 93.2–98.0%, then in salinized conditions, this indicator decreased by 4–5 times.

The increased concentration of salts caused a reduction in the length of both the above-ground part and the root system of the seedlings. At the same time, the roots proved to be more sensitive to salinization compared to the above-ground organs. The degree of growth inhibition significantly depended on the genotypic characteristics of the studied samples.

Analysis of seedling growth showed that salinization leads to the disruption of physiological and biochemical processes in the early stages of ontogenesis. At the same time, samples D-149, D-190, and D-197 were characterized by relatively high resistance to salt stress, maintaining better growth and development indicators compared to other genotypes.

Thus, the isolated samples combine high productivity and relative salt resistance, allowing them to be recommended for use in breeding programs as valuable sources of adaptation traits to saline soils.

LIST OF LITERARY SOURCES

1. Kotula L., Zahra N., Farooq M., Shabala S., Siddique K.H.M. Making wheat salt tolerant: What is missing? // The Crop Journal. - 2024. - Vol. 12, No. 5. – P. 1299–1308.

2. Wang W., Zou J., Zhang Y., Nyu L., Yu L., Wang Z. et al. Salt stress phenotyping of wheat germplasm under multiple growth conditions and transcriptomic analysis of two wheat varieties contrasting in their salt stress tolerance // Plant Growth Regulation. – 2025. - Vol. 105. – P. 739–757

3. Hussein M.A.A., El-Shaer H.M., Ahmed M.A. et al. Exploring Salinity Tolerance Mechanisms in Diverse Wheat Genotypes // Plants. - 2023. - Vol. 12. - No. 18. – Article 3330. – P.