ECO-PHYSIOLOGICAL CHARACTERISTICS OF FINE-FIBERED COTTON VARIETIES UNDER STRESS CONDITIONS IN BUKHARA REGION

Nazarova Firuza Ilkhomovna
Assistant Professor, Department of Medical Biology, Bukhara State Medical Institute

Annotation. *The article presents some data on physiological indices of stress resistance of fine-fiber cotton varieties under conditions of water deficit of varying degrees of salinity. During the experiments, the level of stress resistance and some agrotechnological aspects of fine-fiber cotton varieties Surkhan-16, Termiz-202, Termiz-208 and SP-1607 were described. High indices of productivity and endurance of SP- 1607 and Termiz-208 varieties were revealed under stressful conditions of the region.*

Key words: *stress, fine-fiber cotton, varieties, water deficit, salinity, endurance, productivity.*

ЭКО-ФИЗИОЛОГИЧЕСКИЕ ХАРАКТЕРИСТИКИ ТОНКОВОЛОКНИСТЫХ СОРТОВ ХЛОПЧАТНИКА В УСЛОВИЯХ СТРЕССА В БУХАРСКОМ РЕГИОНЕ

Назарова Фируза Илхомовна
Ассистент, кафедра медицинской биологии,
Бухарский государственный медицинский институт

Аннотация. В статье представлены данные о физиологических показателях стрессоустойчивости тонковолокнистых сортов хлопчатника при водном дефиците и различной засоленности почвы. В ходе экспериментов были изучены уровень стрессоустойчивости и некоторые агротехнологические особенности сортов Surkhan-16, Termiz-202, Termiz-208 и SP-1607. Выявлено, что сорта SP-1607 и Termiz-208 характеризуются высокой продуктивностью и выносливостью в стрессовых условиях региона.

Ключевые слова: стресс, тонковолокнистый хлопчатник, сорта, водный дефицит, засоление, выносливость, продуктивность.

Abiotic stressors have a strong negative impact on agricultural plants, reducing their growth and productivity. Water deficit, soil salinity, and high

temperature, in particular, are among the main reasons for decreased crop yield and food production worldwide. Therefore, studying the effects of abiotic stressors on plants and the mechanisms of stress tolerance is one of the key areas of plant physiology. Mechanisms of resistance to abiotic stress also include practical aspects, such as mitigating the harmful effects of stress through various methods or utilizing locally adapted varieties as sources of genetic material for stress-resilient breeding**.**

The ongoing changes in climatic conditions inevitably lead to the deterioration of the ecological environment, which in turn contributes to the salinization of fertile soils. As a consequence, the productivity of agricultural crops experiences a significant decline, adversely affecting both yield quantity and quality. Salinized soils are widely distributed across many countries worldwide, occupying approximately one-fourth of the earth's surface and nearly half of all irrigated lands. Moreover, these salinized areas are progressively expanding due to various natural and anthropogenic factors. In arid and semi-arid climatic regions, the majority of irrigation water is lost through evaporation, which accelerates soil salinization over time. This gradual accumulation of salts in the soil profile increasingly limits the availability of water and essential nutrients for crops, posing a major challenge for sustainable agricultural production.

Abiotic stressors are considered major limiting factors that negatively affect the growth and development of agricultural crops. They significantly reduce plant growth, development, and productivity worldwide. In the future, the decline in crop yields in agriculture is expected to intensify due to global climate change, increasing environmental pollution, and the reduction of fertile land. Moreover, one of the main challenges facing agriculture today and in the future is ensuring sufficient food production for the rapidly growing population under deteriorating ecological and climatic conditions in many regions of the world. Minimizing the exposure of plants to various abiotic stressors such as high temperatures, water scarcity, salinity, and other unfavorable conditions and enhancing their resilience is

currently one of the most pressing scientific and practical issues in crop production.

During the summer months in the Bukhara region, when prolonged heat waves are observed, the impact of intense solar radiation leads to the establishment of extremely high air temperatures, ranging from 38.1 to 46.3 °C. Such extreme thermal conditions significantly enhance the rate of atmospheric evaporation, resulting in daytime drying of up to 10–15% of the air's moisture content. Prolonged periods of elevated temperatures and insolation contribute to the development of severe drought conditions, which are further exacerbated by the combination of low relative humidity and minimal precipitation. The resulting aridity creates a pronounced moisture deficit in the atmosphere and soil, adversely affecting crop water availability, plant physiological processes, and overall agricultural productivity. These environmental stressors highlight the critical importance of understanding local climatic conditions for the sustainable management of water resources and the cultivation of drought-tolerant crop varieties in the region.

The study focused on the fine-fibered cotton varieties Surxon-16, Termiz-202, Termiz-208, and SP-1607. Some physiological traits that determine stress tolerance of these cotton varieties were identified under water-deficit and saline conditions in Bukhara region. The experiments were conducted from 2020 to 2023 in the fields of “Akrombobo Nabirasi Gulshoda” farm in Kogon district and “Bukhara Bahor Obod Yerlar” farm in Bukhara district.

In cotton, it was observed that at the onset of the generative organ development phases, the daily demand for nutrients increases, and the proportion of nutrient requirements changes. During ontogenesis, the composition of vital complex compounds in assimilates produced through biochemical and physiological processes and metabolic reactions also changes. Significant qualitative changes occur during flowering, full flowering, boll formation, and boll

maturation stages, accompanied by alterations in the composition of complex substances formed and in the proportion of elements absorbed from the soil.

During the period of quality changes in cotton development, particularly in the full flowering to maturity phase, significant differences were observed in the shedding of yield components among different treatments. In saline and water-deficit conditions, the loss of flowers, bolls, and other yield elements was notably higher compared to the well-watered control. These findings indicate that environmental stress factors, such as elevated soil salinity and limited water availability, can strongly influence reproductive development and final yield formation.

Furthermore, extremely high air temperatures combined with prolonged exposure to dry and hot winds exacerbate the adverse effects of water and nutrient deficiencies. Under such conditions, the uptake and translocation of essential nutrients can be disrupted, leading to additional stress on the developing cotton plants. Consequently, these abiotic stressors not only reduce the number of harvestable bolls but also affect fiber quality and overall crop productivity. The results highlight the importance of understanding the combined effects of temperature, water availability, and salinity on cotton physiology to develop strategies for mitigating yield losses under harsh environmental conditions.

Continued scientific research on newly developed fine-fiber cotton varieties is required to optimize their specific agrotechnical practices for achieving high yield and superior fiber quality. It is essential to further refine cultivation technologies, incorporating the latest scientific advancements and innovative approaches to enhance productivity and stress resilience. Results obtained from field experiments indicate that, under the water-deficit and saline conditions typical of the Bukhara region, the SP-1607 and Termiz-208 varieties demonstrated a higher level of stress tolerance compared to other studied varieties. These findings suggest that the selection and cultivation of these varieties, along with the application of improved agrotechnical measures, can significantly contribute to

achieving sustainable cotton production under challenging environmental conditions.

Literature used:

1. Norboyeva U.T., Kholliyev A.E. Soil salinity and saline tolerance of the sorts of
cotton//Mechanisms of resistance of plants and microorganisms to unfavorable environmental. – Irkutsk, July 10-15, 2018.(PART I). –S.567- 570.

2. Norboyeva U.T., Kholliyev A.E. Physiology, Productivity and Cotton Plant Adaptation under the Conditions of Soil Salinity. International Journal of Recent Technology and Engineering (IJRTE) // Volume-8, Issue-2. S3, July 2019. – R. 1611– 1613.

3. Kholliyev A.E., Norboyeva U.T., Boltayeva Z.A. Productivity of cotton varieties in soil salinity and water deficiency //The American Journal of Applied Sciences. Vol 02, Issue 10- 2020.- P. 7-1