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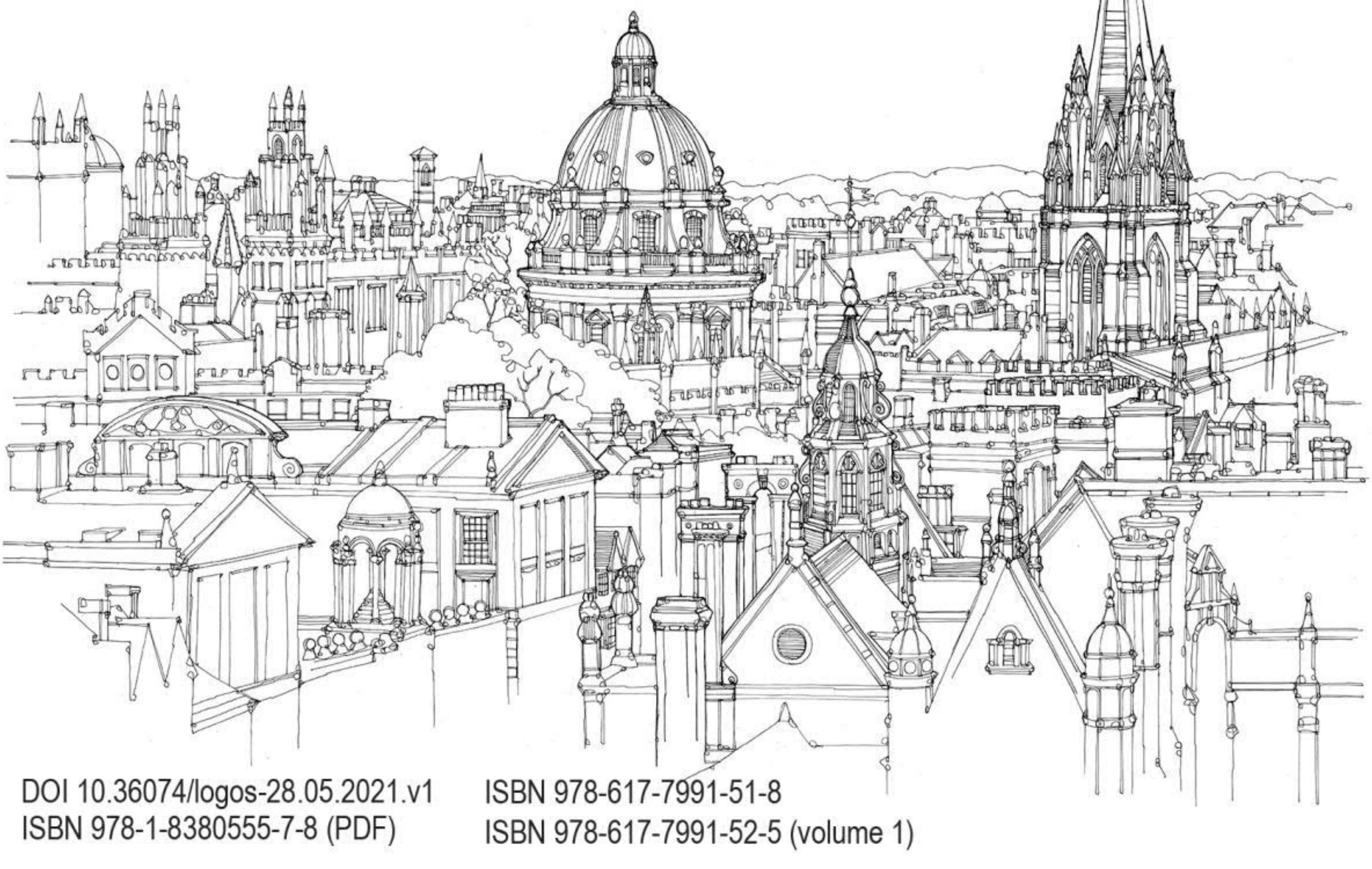

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THE INFLUENCE OF SALINITY ON THE ECOPHYSIOLOGY OF DURUM WHEAT

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The salt resistance of agricultural crops, including cereals, has been the subject of study by many researchers. However, the problem of resistance to various salinities of grain crops and the mechanisms of salt effects on physiological processes are still not fully understood. Climate change will inevitably lead to a deterioration of the ecological situation, which will lead to drought and salinization of fertile soils, resulting in a sharp decline in crop yields [1-3]. Saline soils are common in many countries around the world. They cover about a quarter of the earth's surface, including half of all irrigated land, and saline areas are expanding nearby. In arid climates, almost all irrigation water evaporates and soil salinity gradually increases [4-7].

The salinity of irrigated lands sharply reduces their productivity, which leads to a decrease in the gross yield of crops and, above all, wheat, which are very important for food security. Under such conditions, it is necessary to study and identify valuable genotypes of wheat suitable for climate change conditions.

In this regard, the study of the adaptive potential and mechanisms of resistance of wheat to salt stress is relevant and of theoretical and practical interest [8-12].

In addition, the study of the effect of soil salinity on the physiological and biochemical parameters of durum wheat varieties allows revealing the ability of these wheat varieties to adapt to saline stress. Helps create new species. However, the physiological and biochemical aspects of the resistance of cereals to different types of salinity and the specific features of the effect of salt stress on the physiological and biochemical processes of wheat require a broader explanation. Under natural conditions, wheat is often subjected to various stresses such as drought, extreme temperatures, salinity. However, salinity has the greatest detrimental effect. Wheat belongs to the group of medium-tolerant crops in terms of salt resistance. It can withstand between 0.4 and 0.6% of the salt content in the dry mass of the soil. Salinity inhibits plant growth and development, disrupts water exchange and ion balance, photosynthesis processes and respiration processes, and consequently reduces the yield of crops [13-16].

The adaptation of plants to extreme environmental factors depends on the genotype that determines the morphological, biochemical, and physiological mechanisms that ensure the growth and development of plants under adverse conditions. Thus, high concentrations of salts lead to a violation of the ionic, osmotic and oxidative state of the organism. Maintaining homeostasis under these conditions is accomplished through the accumulation and division of ions, the synthesis of corresponding osmolites, the accumulation of free polyamines, and changes in inactivity. Salt stress usually slows significantly until complete cessation of growth, but in many cases this effect is consistent with changes in other physiological processes. For example, under salt stress, the rate of transpiration may decrease and potassium uptake may be replaced by its output. High concentrations of table salt cause oxidative stress along with ionic balance and hyperosmotic stress, which is accompanied by membrane destruction and chlorophyll breakdown. Numerous studies have shown that varieties characterized by high levels of antioxidant activity or the ability to increase it rapidly are more resistant to oxidative damage under stress, including stress resulting from salinization. There is evidence that stresses resulting from a decrease in turgor, as well as salt stress, can cause changes in the plant's hormonal balance, help close pockets, reduce root hydrodynamic resistance, and ultimately lead to premature leaf ageing. The accumulation of large amounts of sodium and chloride ions in the cytoplasm, which is necessary to maintain the water absorption capacity of the root system, can lead to metabolic disorders [17 - 20].

The effect of soil salinity depends on many factors: genetic characteristics of plants, stage of growth and development (i.e., ontogenetic stage), precipitation, temperature, the chemical composition of salt, type of salinity, soil fertility, and agronomic practices. For example, cereals are more sensitive to salinity than sugar beets and sunflowers. However, with respect to soil salinity, there are large differences even in the group of cereals: hexaploid wheat, which is more resistant than barley wheat, is more resistant to tetraploid. It has been shown that under saline conditions the yield is doubled when the plant is in the vegetative growth stage, and the yield at the stage of reproduction and ripening is only doubled under saline conditions. It has been experimentally shown that the adsorption of ions for K + ions found during the accumulation of Cl-ions also depends on the stage of development in which the plants are under saline conditions. For example, a greater decrease in K + adsorption was observed during the vegetation phase than during the multiplication phase. Another aspect of the negative impact of salinity on plants is that it is necessary to maintain the difference in water balance between plant cells and the environment for water to enter plants, which is limited by the decrease in soil water potential [21-27].

A reliable assessment of a plant's resistance to salinity is characterized by the fact that its salinity toxicity level is reliably demonstrated only 10 days after the onset of action. In most cases, the growth of plants characterized by salt tolerance is at the same level as when salt stress begins. The germination of seeds and the beginning of the acquisition of wheat seedlings is one of the stages sensitive to the effects of soil salinity. According to the data, there are also differences between varieties in the reaction of plants. For example, seedlings of salt-tolerant and sensitive wheat varieties grow at different rates. Small accumulations of dry matter have been identified in varieties that are susceptible to salinity [28 - 32].

To reliably assess the salt tolerance of plants, studies have been conducted on the ratio of sodium and potassium ions in the environment to the effect of high levels of NaCl on growth processes in the early stages of ontogeny. Under saline conditions, plants show signs of xeromorphism.

Thus, it was shown that soil salinity, as a limiting factor, resulted in a one-and-a-half-fold decrease in leaves compared to the control option. At present, the identification of mechanisms of influence of salt stress on the process of photosynthesis remains one of the important tasks of research in the field of environmental physiology of plants. It is assumed that the resistance properties and adaptation of plants to stressors are primarily related to the ability to keep photosynthetic systems active.

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