ADAPTATION POTENTIAL OF WHITE SORGHUM VARIETIES TO SALINE SOILS

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ABSTRACT

This thesis presents information on the degree of soilsalinization, the biological characteristics of white sorghum, as well as salt-tolerant varieties and their adaptation potential to saline soils

Currently, the rapid growth of the world population is leading to an increasing demand for food products. This, in turn, necessitates strengthening the fodder and food base in saline and arid regions. Saline soils are defined as soils containing more than 0.3% of easily soluble salts in water, which negatively affect plant growth and development. Such soils are mainly distributed in semi-desert and desert zones, as well as in alluvial plains of the lower reaches of rivers.

Soil salinization is divided into primary (natural) and secondary (recurrent) types. Primary salinization occurs as a result of natural processes such as wind activity, evaporation, biological activity, or volcanic processes. Secondary salinization is mainly formed due to changes in the soil water regime caused by artificial irrigation. It is known that 23–25% of cultivated lands worldwide and 50–55% of agricultural lands in Uzbekistan are affected by salinity to varying degrees. Therefore, salt- and drought-tolerant fodder crops, including white sorghum (Sorghum vulgare (Pers.)), are of great importance.

White sorghum is considered one of the most important crops resistant to salinity and drought. It is a heat-loving plant, and its seeds begin to germinate when the soil temperature reaches 10–12°C. Under favorable conditions, seedlings emerge within 6–7 days. Sorghum is sensitive to cold, and even a temperature of 1°C can severely affect young seedlings. Being a southern crop, sorghum develops rapidly under hot conditions and shows high drought tolerance. Its transpiration coefficient is around 200; however, irrigation significantly increases its yield. It is also tolerant to soil salinity. Among salt- and drought-resistant white sorghum varieties, "Uzbekistan-5", "Uzbekistan-15", "Uzbekistan-18", and "Kattakurgan" are of particular importance.

"Uzbekistan-5" is a white sorghum variety developed under the conditions of Uzbekistan and adapted to arid and moderately saline soils. This variety is mainly cultivated for grain and fodder purposes. Its deep and well-developed root system enables the plant to absorb moisture from deeper soil layers. The presence of a waxy layer on the leaf surface reduces water evaporation. The transpiration coefficient is relatively low (≈200), ensuring efficient water use. Rapid opening and closing of stomata limits excessive water loss. Under hot and dry conditions, the photosynthesis process remains relatively stable, allowing the crop to maintain yield even under limited irrigation.

This variety belongs to the group of moderately salt-tolerant crops. Sodium (Na^+) and chloride (Cl^-) ions in the soil are partially retained in the roots, restricting their translocation to above-ground organs. To maintain osmotic balance in the cell sap, proline and soluble sugars accumulate. In saline soils, seed germination capacity is higher compared to many other cereal crops.

Conclusion

White sorghum is an important cereal crop widely used for food, fodder, and technical purposes. Under the conditions of Uzbekistan, it is distinguished by its resistance to drought and salinity. In saline regions such as the Republic of Karakalpakstan, Khorezm, Bukhara, Navoi, Syrdarya, and Jizzakh regions, white sorghum provides higher yields compared to other cereal crops. Expanding the cultivation area of white sorghum contributes to the creation of a stable food and fodder base for agriculture and livestock production even on saline and arid soils of the country.

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