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SECTION 5.
AGRICULTURAL SCIENCES AND FOODSTUFFS

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EXPLORING THE IMPACT OF SOIL MOISTURE ON WATER DYNAMICS IN DIFFERENT SORGHUM VARIETIES

In the world, the problem of using the gene pool of plant resources, especially the preservation of biodiversity in ensuring environmental stability, high nutrition and productivity of agriculture, is being carried out on a large scale. In this regard, to determine the valuable characteristics of sorghum (*Sorghum vulgare* (Pers.)) according to the characteristics and agroecology of growing new plants, to create new varieties, to develop new methods of cultivation by determining the physiological and biochemical characteristics of plants, to determine the characteristics of growth and development of promising plants, and water shortage attention is paid to the ecological and physiological characteristics of cultivation in the regions.

Grain sorghum plays an important role in the production of quality food in arid regions. At the same time, it was found that corn grain is cheaper than other grain crops. In world agriculture, sorghum is one of the most valuable grain and fodder crops that are extremely resistant to drought. The biological nature of this crop, i.e., it is not very demanding in terms of environmental conditions, is confirmed by many years of experience. The practice of growing sorghum in arid and poorly watered areas shows that this crop is active concerning soil and air dryness, normal transpiration process and high concentration of cell sap can easily tolerate hot garmsil (dry hot winds) [1].

Sorghum are cultivated in large areas, they are not soil-selective, they are undemanding, they do not require much seed, they have high ecological adaptability, and they are resistant to heat, drought and salt. Due to its high productivity, nutritional value and versatility of use, sorghum is one of the most promising crops in the world.

Sorghum are an ancient and widespread agricultural crop. In terms of cultivated area, sorghum ranks fifth in world agriculture after wheat, rice, corn, and barley, and in terms of gross grain yield, it ranks third among fodder crops after corn and barley. The feasibility of growing sorghum in arid and semi-arid regions of the country is determined by its high productivity and versatility of use. Oat grain contains a lot of carbohydrates, proteins, amino acids, minerals, and vitamins, which are important in increasing animal productivity. Oat grain contains 70-75% starch, more than 12% protein, 3.5% fat and is an excellent concentrated feed [2].

The lack of scientifically based placement of sorghum crops in the regions, especially in years of water shortage, unlike most agricultural crops, sorghum has the characteristic of giving a relatively high grain yield according to its biological characteristics [3].

Sorghum is the fifth most important food crop and occupies approximately 46 million hectares of land in more than 100 countries, with an average annual production of 60 million tons [4,5].

70 mln. of corn in the world. more than tons of grain are grown. This figure is 21.6 million tons in Africa, 26.5 million tons in the USA, 16.2 million tons in Asia, 6.4 million tons in Mexico and 2.5 million tons in Argentina [6].

Sorghum are the third largest food crop after wheat and rice. It is noted that protein makes up 87% of human nutrition, and people get this protein from plant and animal products, including sorghum, which occupies a special place among agricultural crops [7].

Grain sorghum plays an important role in the production of quality food in arid regions. At the same time, it was found that corn grain is cheaper than other grain crops [8].

The plant is mainly grown in arid and semi-arid regions of the world, where other crops cannot fulfil their productive potential. Drought resistance of Sudanese grass occurs due to a well-developed root system, the presence of a waxy coating on leaves and stems structure of oral apparatus and epidermis, and the ability of plants to enter suspended anabiosis until it is more favourable [9].

Connecting corn cultivation with the processing industry, poultry farms, livestock enterprises and other sectors of agribusiness is one of the important factors in further development of the economy. Among the priority directions for increasing the efficiency of sorghum cultivation are the technological methods of growing high-yielding and highly flexible early varieties and the stability of the seed system [10].

Although sorghum is considered a drought-tolerant crop and can be productive under low-fertility conditions, drought stress caused by water deficit affects its ability to absorb nutrients from the soil and its uptake and transport of nutrients. Sorghum is mainly grown in semi-arid and arid regions prone to water scarcity. For example, 60% of sorghum land in sub-Saharan Africa is prone to recurrent droughts, and 80% of sorghum grown in the U.S. is grown under non-irrigated conditions, with water being the main limiting factor and significantly reducing yields [11].

The response of plants to stress consists of biochemical changes involving water use efficiency, transpiration rate and remobilization of photosynthetic assimilations, as well as proline and other metabolites. Sorghum is the fifth most important food crop and occupies approximately 46 million hectares of land in more than 100 countries, with an average annual production of 60 million tons [12].

During the conducted experiments, Karabash, Massino, Samurai, Uzbek Pakana and Uzbek-18 varieties of sorghum (*Sorghum vulgare* (Pers.)) were taken as research objects. Some physiological indicators of water exchange of corn cultivars grown in control and experimental variants under conditions of laboratory and field experiments were studied in optimal and water deficit conditions of saline soils. In all field experiments, soil water deficit was studied by determining soil moisture before irrigation, its volumetric weight and field moisture capacity, and irrigation was carried out. Irrigation rates were determined based on soil moisture deficit. During the entire growing season, all experiments were carried out under two conditions: 1. (70%) optimal humidity and 2. (50%) dry-water deficit conditions.

Based on research physiological-biochemical indicators and productivity of corn varieties were tested in water-scarce and saline soil conditions of Bukhara region, and the water stress resistance levels of corn varieties were evaluated on a five-point scale.

ResearchThe practical significance of the results is that planting Massino, Samurai and Uzbek pakana varieties with a high level of resistance to adverse environmental factors in areas with water shortages and hot winds, and Uzbekistan-18 and Karabash varieties with an average level of stress resistance, in areas with relatively weak effects of water stress factors, proved to get a high yield.

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