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Productivity Of Cotton Varieties In Soil Salinity And Water Deficiency

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ABSTRACT

The following article deals with the data obtained as a result of studying the productivity of cotton varieties in conditions of soil salinity and water scarcity. During experiments ythe results have shown that in the soil-climatic and salinity conditions of the Bukhara oasis, the growth of the Bukhara-8 cotton variety, the expansion of the leaf surfaces are higher than that of the Omad and C-4727 cotton varieties. According to the results of the research, it was recommended to use Bukhara-8 and C-4727 varieties, which had high adaptability in grassland-alluvial, red-brown and desert-sandy saline soils of the Bukhara oasis, as a starting material in selection processes and to plant in areas with unfavorable abiotic factors.

KEYWORDS

Cotton varieties, soil salinity, soil types, water scarcity, drought, adaptation, growth, leaf level, hardiness, moisture levels productivity.

INTRODUCTION

The strongest negative impact of unfavorable environmental factors such as soil salinity and water scarcity falls on the water demanding critical period of cotton, for example, in the flowering stage. At the same time, due to the lack of water in the soil and high air

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temperatures together adversely affect the physiological and biochemical processes that take place in the cotton, the yield and its quality decreases. Therefore, it is important to zoning cotton varieties that are resistant to such adverse factors based on specific soil and climatic conditions [1,2].

The effect of irrigation work on the normal development of plants can be as follows: the first is to supply the nutrients and moisture needed for plants; and the second is to accelerate biological and physicochemical processes in soils through exposure to the microclimate and finally to increase soil temperature. The conclusion to be drawn from this is that normal plant growth and high yields are essential for these plants to be supplied with the moisture, nutrients, heat, light and air they need for all phases at the same time [3,4].

Therefore, high yields in agriculture are determined not only by watering, but also by taking into account all the conditions necessary for this plant. For example, if a plant is only supplied with water to get a high yield, first of all the plant grows well and then it feels that it lacks its body and the elements it needs to produce the crop, and the yield decreases. In addition, the most dangerous for agriculture is soil degradation can lead to rising groundwater, salinization or swamping of soils. In addition, under the influence of irrigation water, fine-grained soil structure can be formed, particles with a diameter of 2.5 mm are formed about 1 mm in solution, and soil colloids are weakened and viscosity is reduced, this phenomenon occurs in more thin layers of soil and affects the air regime of soils [5,6].

As mentioned above, the irrigated meadows in the Bukhara oasis - alluvial, arable and newly developed desert-sandy soils have different levels of salinity, which greatly impairs the normal growth and yield of cotton. Therefore, in order to combat saline soils, saline soils were washed on irrigated lands, including the Bukhara oasis [7,8].

As the groundwater level approaches the surface, the cotton root is damaged in a highly moist and saline layer. Subsequently, the groundwater level rises further closer to the soil surface layer, increasing evaporation processes. This situation, in addition to increasing salinization processes in soils, leads to a violation of their water-salt and nutrient regimes, as well as the destruction of cotton plants. In such saline soils, not only the yield of cotton is reduced, but also the quality of the fiber is finally reduced [9].

SUBJECTS OF THE RESEARCH

Bukhara-8, Omad and C-4727 medium-fiber cotton varieties, as well as alluvial, red-brown and desert-sandy soil types with different levels of salinity were used as a subject of the research.

METHODS OF THE RESEARCH

The experiments were carried out in the scientific laboratory and experimental field of Bukhara State University, as well as in the fields of farms of Karakul and Jondor districts. The experiments were carried out in meadow-alluvial, red-brown and desert-sandy fields. The depth of groundwater was 2-3 meters. Based on the pre-irrigation soil moisture, volumetric weight, and moisture capacity, the degree of moisture depletion in the soil was determined and irrigation standards were set.

In all field experiments, soil water deficit was studied and irrigation was carried out by determining soil moisture before irrigation, its volumetric weight and field moisture capacity. In some experiments, soil moisture was kept at 70-75-70, 65-70-65, 60-65-60 percent of the total moisture capacity. Seeds were planted in

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rows at 60 cm intervals. During the experiments, the agrochemical, agrophysical properties and other indicators of the grassland-alluvial, gray-brown and desert-sand soils, which are widespread in the Bukhara oasis, were determined. Soil salinity levels were also taken into account during field experiments.

Some physiological indicators of cotton varieties, the impact of agroecological factors on the growth and development, phenological observations, calculations and research on the growth and development of plants were carried out in accordance with the methods of UzPITI.

RESULTS OF THE RESEARCH AND ITS DISCUSSION

Salinity has a strong effect on plant growth processes. Their growth rate is directly related to the degree of salinity and its potency. Due to the low root pressure in the 3-4 leaf stage of cotton, it does not absorb enough water from saline soils. Adult plants, on the other hand, have the ability to absorb the water they need through the developed root system and as a result of transpiration in the leaves. Harmful salts accumulated in the body of adult plants are released into the external environment using special glandular cells and feathers [10].

The salinity of plants varies in their ontogeny. Plants are resistant to salt in the early stages of growth. Therefore, plants can be protected to a certain extent from the harmful effects of salts by regulating the water balance in the body during the early stages of growth [11].

During the cotton growing season, this figure was taken into account 2 times. The study found that the growth rate of cotton varieties studied was directly related to soil types, soil salinity, as well as growth and development stages.

According to the data obtained and analyzed, for the first time in the Bukhara oasis in medium-saline irrigated meadow-alluvial, newly developed desert-sandy, newly developed red-brown soils, the studied cotton varieties were found, because the cotton varieties studied have different resistance to salinization, the development and growth of plants also take place in different processes. According to the observations, depending on the type of soil, mechanical composition and moisture level, changes in the morphological structure of cotton varieties, including the growth and development of their height during the growing season, were observed.

In meadow-alluvial soils with 70-75-70% humidity, the height of Bukhara-8 variety at the stage of mowing was 63.4 cm, while the height of Omad and C-4727 cotton varieties was 54.5 and 56.3 cm, respectively. Similar changes or changes in the growth height of cotton varieties during the growing season are also observed in 65-70-65 and 60-65-60% soils. In meadow-alluvial soils with 65-70-65 and 60-65-60% humidity, plant height was shorter than in plants with 70-75-70% humidity. Significant slowing of growth and development was found under the influence of salinity.

In the newly developed red-brown soils and desert sandy soils of the Bukhara oasis, the height of the plants was shorter than the height of the plants grown on the alluvial soils. In the studied soils, the differences in plant growth and development in this case were, in our observations, directly related to the type of soil, mechanical composition, soil salinity, and moisture level.

The variation in height of the cotton varieties studied may depend on soil types on the one

hand, and on moisture levels on the other, as well as on the biological characteristics of the varieties.

The height of all cotton varieties studied in 65-70-65 moisture conditions of meadow alluvial soils is 58.5 in Bukhara-8 variety at the stage of mowing, 68.4 at the stage of flowering, 50.8 at the stage of mowing, 60.9 at the stage of flowering, respectively, C-4727 The variety was 52.5 cm at the stage of mowing and 62.1 cm at the stage of flowering. A similar relationship was observed in cotton varieties grown in 60-65-60 humidity conditions.

In the red-brown soils at 65-70-65% humidity at the stage of mowing Bukhara-8 variety equaled to 56.3, at the flowering stage 66.2; Omad variety equaled to 48.8 at the stage of mowing, at the flowering stage 55.6; C-4727 equaled to 50.5 cm in the flowering stage and 60.4 cm in the flowering stage. In the desert-sandy soils in the conditions of 65-70-65 humidity at the stage of mowing Bukhara-8 variety equaled to 52.3, at the stage of flowering 65.4; Omad variety at the stage of mowing equaled to 46.8, at the stage of flowering 52.6; at the stage of mowing C-4727 equaled to 48 , 8, while at the flowering stage it was 59.3 cm.

It was observed that the height of all cotton varieties grown in conditions of 60-65-60% humidity was low in all varieties depending on soil types. High results on this indicator were observed in Bukhara-8 cultivar in 70-75-70 moisture conditions of meadow-alluvial soils. The last place was taken by Omad variety. Variations in the height of the studied varieties at different levels may depend on the biological characteristics of the varieties, soil-climatic conditions, as well as the level of water supply.

One of the main functions of leaves is to assimilate. Important processes, such as photosynthesis, transpiration, respiration, mineral nutrition, water regime, and others are directly related to leaf activity, and in turn the activity of these processes affects the yield and its quality.

In addition to the indicators that characterize plant productivity during the study, it was also found that leaf surfaces change depending on salinity, soil moisture levels, and soil types. Leaf formation and their developmental stages in plants play an important role in characterizing the vital processes of plants, especially their photosynthetic ability. Leaf levels of plants vary depending on soil types and moisture levels.

As a result of the decrease in humidity, the productivity of cotton leaves also decreases. Leaves, the main photosynthetic substance, play an important role in providing nutrients to plants. Leaf formation and their developmental stages in plants play an important role in characterizing the vital processes of plants, especially their photosynthetic properties.

The accumulation activity of dry matter in cotton is one of the signs of their salt resistance. Salt-tolerant cotton varieties accumulate more dry matter than non-salt-tolerant ones [12].

Under the influence of soil salinity, the performance of the leaves slows down and its overall level decreases. As a result, a decrease in the rate of synthesis of organic matter was observed. During our experiments, the effect of different soil moisture levels on the expansion of leaf levels of cotton varieties under moderately saline conditions was taken into account during the mowing and flowering stages in three different soil types.

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From the data obtained, it was found that the expansion of the leaf surface depends on the moisture level in the soil. Especially under the influence of moderate soil salinity, a decrease in leaf surfaces was observed in the variants grown in conditions of 60-65-60% humidity. With a decrease in soil moisture, a decrease in leaf level was observed in all varieties. Such a decrease was observed in cotton varieties grown in desert-sandy soils with moderate soil salinity and humidity 60-65-60.

It was noted that the leaf level of all varieties grown in 70-75-70% humidity conditions was higher than the leaf level of varieties grown in 65-70-65 and 60-65-60% variants. The expansion of the leaf surfaces of cotton varieties varied depending on their growth and development stages, soil salinity, moisture levels, and the characteristics of the varieties. It was noted that in the variants grown in different soil conditions, the leaf levels of all varieties increase from the stage of mowing to the stage of flowering. It was noted that the value of leaf surfaces in Bukhara-8 and C-4727 varieties is higher than in Omad navigation, depending on the moisture levels in the meadow-alluvial soils.

Leaf level increases in all varieties from the stage of pruning to the stage of flowering. The smallest leaf surfaces were observed in all cultivars grown in desert-sandy soils at a moisture content of 60–65–60%.

During the study, it was also noted that one of the indicators characterizing the productivity of plants is the change of leaf surfaces depending on the moisture level. In general, the expansion of the leaf surface is also one of the indicators directly related to the overall photosynthetic productivity of plants. This is because the intensity of photosynthesis in the leaves and the amount of organic matter that accumulates as a result are also important in the formation of biological and economic yields in plants. Unfavorable factors of the external environment also affect the formation of leaf surface in plants. The small size of the leaf surface led to a decrease in the pure productivity of photosynthesis.

Soil salinity, depending on moisture levels and soil types, had a negative effect on the expansion of leaf surfaces of all cotton varieties studied. The response of varieties to such a negative impact force varied depending on their biological characteristics.

For example, in cotton varieties grown in meadow-alluvial soils with 70-75-70% humidity, the leaf level was as follows: Bukhara-8 variety at the stage of mowing - 1096.9, flowering stage-2015.7, Omad variety at the stage of mowing -980.0, at the flowering stage it was -1897.2, at the C-4727 cultivar it was 998.9 cm2, at the flowering stage it was 1911.5 cm2 .

Leaf level in cotton varieties grown in meadow-alluvial soils at 65-70-65% humidity was as follows: Bukhara-8 variety at the stage of mowing - 899.5, flowering stage -1806.9, Omad variety at the stage of mowing -879.9, flowering stage -1739 , 0, C-4727 cultivar reached -880.3 cm2 during the mating stage and -1774.7 cm2 during the flowering stage.

Leaf levels in cotton varieties grown in meadow-alluvial soils with humidity of 60-65-60% percent were as follows: in Bukhara-8 variety at the stage of mowing - 860.5; during the experiments, it was found that in the flowering stage -1766.0, in the flowering stage of Omad -761.4, in the flowering stage -1722.1, in the flowering stage C-4727 -840.0, in the flowering stage -1745.5.

According to the data obtained, the expansion of leaf surfaces of cotton varieties varies depending on the stages of growth and

development, moisture levels and salinity, which may be due to the individual characteristics of varieties, as well as their adaptability to adverse factors.

CONCLUSION

In the irrigated meadow-alluvial, red-brown and desert-sand moderately saline fields of the Bukhara oasis, Bukhara-8, Omad and C-4727 cotton varieties were found to grow taller in different humidity conditions, and the leaf level increased in the variety. As the salinity levels in the environment increased, the growth rate of cotton varieties decreased.

In experiments, it was found that in the soil-climatic and saline conditions of Bukhara, the growth of Bukhara-8 cotton varieties, the expansion of the leaf surface is higher than that of Omad and C-4727 cotton varieties. According to the results of the research, Bukhara-8 and C-4727 cultivars with high adaptability to meadow-alluvial, red-brown and desert-sandy saline soils of Bukhara oasis can be recommended for use as a starting material in selection processes and for planting in areas with unfavorable abiotic factors.

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