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EFFECT OF SALINITY ON TRANSPIRATION RATE OF MEDIUM FIBER COTTON CULTIVARS

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Abstract
This article presents data on the transpiration rate of cotton cultivars at different levels of soil salinity. According to the obtained results, it was noted that the transpiration rate of the studied cotton varieties is different depending on the soil salinity levels and the biological characteristics of the varieties.

Keywords: Cotton, soil, water, salinity, degree of salinity, transpiration rate, humidity, field experiment, air temperature.

Introduction

Deterioration of the ecological environment causes a slight decrease in soil fertility and deterioration of its physical and chemical properties. It is known that currently, 70% of the land in our Republic is saline and areas prone to salinization. Due to the drying up of the Aral Sea, the above figures are expected to increase further.

In recent years, the process of global warming has been observed on the Earth's surface. These plants cause rapid evapotranspiration from the leaf surface and soil surface and the rise of underground seepage water to the soil surface. As a result, soil salinization becomes more active.

The cotton plant is often affected by the lack of water in the soil (soil drought), high air temperature (40-45 °C) and low relative humidity (10-20%) (atmospheric drought), soil salinity (physiological drought) and other factors, especially in the summer months. faces. The combined effect of the above stress factors corresponds to the critical stage of cotton for water, that is, the flowering period [1-3].

The agromelioration method is the main factor in preventing soil salinization. But even with this method, it is not possible to completely eliminate soil salinity. That's why it is difficult to get high-quality crops from cotton varieties in regions with saline soil. In particular, the heavy labour, expenditure and, most importantly, the consumption of a large volume of fresh water (10-15 thousand m3/ha) in the process of salt washing indicate the seriousness of the problem. In addition, during salt washing, along with harmful salts with a high concentration in the soil, the most necessary macro- and microelements for plants are filtered and added to sewage and wastewater. It also

greatly damages the complex of soil microflora, which is active in increasing soil fertility [4-5].

According to the data, the yield of cotton is reduced by 10-20, 20-50 and 50-80% in low-salinity, moderate-salinity and strong-salinity soils. Due to the salinity of the irrigated lands, 0.5 million tons of cotton is harvested annually in our country [6-14].

The initial negative effects of soil salinity begin with cotton seed germination and growth. The strongest negative effect is observed during the flowering stage of cotton. The negative effects of salts change the water balance of cotton and limit the plant's supply of sufficient water. As a result, all physiological and biochemical processes in the plant body slow down. In turn, the disruption of water exchange under the influence of salinity has a negative effect on the productivity of cotton [8-19].

High air humidity in a saline environment has a positive effect on the water regime of cotton. Chlorine salinity reduces the water deficit in the leaves. In this case, the osmotic pressure and suction power of cell sap increase. As a result, the amount of water bound in the leaves increases.

With an increase in soil salinity, the rate of transpiration and the amount of water evaporated by cotton sharply decrease.

In saline soils, the life of plants takes place in a unique way. Sometimes, as a result of the large accumulation of non-toxic salts in the soil, it causes physiological drought due to the increase in the osmotic pressure of the soil solution. As a result, the level of the water supply of plants is disturbed. In such conditions, even when there is enough water, plants are not fully supplied with water [11-19].

A decrease in the rate of transpiration was observed in a saline environment with chloride. That is, the chlorine ion does not prevent water from entering plants, but slows down the rate of transpiration.

According to their data, the rate of transpiration of cotton decreases significantly in a saline environment. According to the research of some scientists, it was noted that the rate of transpiration of cotton increased in saline soils. This condition depends on the salinity of the soil. Regardless of the rate of transpiration, with an increase in salinity, the amount of total water in plants decreases during the growing season. In an environment with saline soil, the water regime of cotton changes. As a result, the water deficit in the leaves decreases [20-27].

It is not advisable to plant plants when the amount of salt in the soil exceeds 0.5%. If the amount of salts in the soil is around 0.2-0.5%, it is recommended to plant crops, but the yield will be relatively low. Such soils are moderately saline. If the amount of salts is 0.1-0.2%, it is possible to plant plants and get a high yield from them, and such soils are not considered saline [28-30].

Methodology

Several field experiments were conducted to study the effect of salinity on the water exchange of cotton varieties. Akhdaryo-6, Bukhara-102 and S-6524 varieties belonging to the group of medium-fibre cotton varieties were used as objects of experiments.

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Currently, these varieties are planted in large areas in several regions of our republic. Field experiments were conducted to study the effect of salinity on the water exchange of cotton varieties.

In the conducted field experiments, the influence of salinity levels on the transpiration rate of cotton varieties was studied. The rate of transpiration was determined by measuring a torsion balance. This method is convenient for carrying out ecological-physiological research in vegetation and field conditions. Before conducting field experiments, fields with non-saline, weak, medium and strong salinity were determined. Soil salinity levels were also taken into account when conducting field experiments. Field experiments were conducted in non-saline and weakly saline areas, and in areas with medium and strong salinity.

The seeds were sown in rows at an interval of 60 cm. The average number of bushes in experimental areas was 100-105 thousand per hectare. The level of the experimental sites is 1 hectare. The total amount of fertilizers applied per hectare was 250 kg of nitrogen, 175 kg of phosphorus and 100 kg of potassium. Determination of all physiological indicators and phenological observations were carried out in experiments at the stages of cotton budding, flowering and budding. To determine all parameters, the tip of the stem, that is, the third moderately developed leaf, was taken. All observations, measurements and research on plant growth and development were carried out following UzCRI methods.

For plants to carry out normal physiological processes, they must be provided with sufficient water. All mineral elements absorbed by plants must be dissolved in water. Anions and cations dissolved in water are taken up by roots and transported and distributed throughout the plant body. In conditions of soil salinity, it becomes difficult for plants to receive water and nutrients. This, in turn, has a negative effect on the water balance of plants, and a severe water deficit is observed in the plant body [17-20].

Results and Discussion

It is known that transpiration is one of the important physiological processes and is of great importance in the water exchange of plants. Transpiration is one of the main processes in managing the water balance of plants.

Under optimal conditions, i.e. when there is sufficient water, cotton transpires maximally. As a result, the absorption of water and nutrients from the soil increases, and the diffusion of SO_2 into the leaf mesophyll accelerates. In such conditions, photosynthesis accelerates and many organic substances are synthesized.

The rate of transpiration was determined three times a day (8-10 a.m., 12-2 p.m., and 4-6 p.m.) at all stages of cotton (Table 1).

The air temperature was taken into account. Based on the obtained data, it was determined that the rate of water evaporation of cotton varieties changes depending on the concentration of salts in the soil. In all cultivars, the rate of transpiration was lowest in the morning, highest in the afternoon, and lowest in the evening in both the control and experimental variants. The rate of transpiration in this direction is directly related

to the air temperature. The rate of transpiration slowed down with increasing soil salinity in all varieties. In the control options, the consumption of water by plants was more active than in the experimental options.

Table 1. The rate of transpiration in the flowering stage of cotton varieties, mg.m2. s^{-1}

Varieties	Options	Fixed hours		
		8-10	12-14	16-18
		Air temperature		
		26.4	38.9	36.5
Soil moisture 70%				
Akdaryo-6	control	106±1.2	167±1.5	72±0.5
	weak	100±0.9	159±1.3	66±0.7
	medium	93±0.8	153±1.5	61±0.5
	strong	87±0.7	146±1.2	55±0.4
Bukhara-102	control	114±1.3	175±1.6	99±0.6
	weak	110±1.4	169±1.6	95±0.8
	medium	106±1.2	161±1.2	89±0.9
	strong	101±0.9	156±1.0	83±0.7
S-6524	control	111±1.1	172±1.2	95±0.9
	weak	106±1.0	165±1.5	89±1.0
	medium	99±0.8	158±1.7	83±1.1
	strong	93±0.7	151±1.4	79±0.9

As a result of the effect of soil salinity, it was found that the evaporation of water by cotton varieties is much lower.

In such extreme conditions, the Bukhoro-102 variety is distinguished by its active transpiration in the midday hours compared to other varieties. According to this indicator, the Okdaryo-6 variety ranks last. The S-6524 variety took an intermediate place.

Conclusion

With the increase in soil salinity, the rate of transpiration and the amount of water evaporated by cotton decreased sharply. In the course of our research, it is determined that transpiration is the highest during the flowering stage of cotton varieties. Water evaporation by plants slowed down in all the studied cultivars during the flowering stage. This can be explained by a relative decrease in air temperature and a decrease in the plant's need for water. The regularities determined by the rate of transpiration in the flowering stage of cotton varieties were also observed in the stage of heading and heading. Most importantly, soil salinity has a strong negative effect on the water exchange of varieties, reducing the rate of transpiration. Even under these conditions, the Bukhoro-102 variety activates its metabolic processes by evaporating more water

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than other varieties. In terms of transpiration rate, the Okdaryo-6 variety took the last place.

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