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THE EFFECTS OF SOIL SALINITY AND NITROGEN FERTILIZERS ON COTTON LEAF SURFACE

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Annotation. This article contains information about the fact that cotton plants control many physiological functions due to their large leaf surface area. Among them, it is important for such indicators as photosynthesis rate, net photosynthetic productivity, and leaf water evaporation. The leaf surface area of cotton plants in the tillering phase in the control variant without fertilizer was 252.9 cm2. In the variant with N250, P175, K125 kg recommended in the experiment, it was 346.3 cm2, which was the best result in this phase among all salinity levels.

Key words: non-saline soils, slightly saline soils, cotton plant, stem height and leaf number, nitrogen fertilizers

Bukhara region is located in the lower reaches of the Zarafshan River. The entire oasis consists of areas formed by wide and short river beds. In the wide part of the river, in the lower part of Bukhara, there are oases of Kara Kul.[3.4.]

Due to the large leaf surface area, the cotton plant controls many physiological functions, including photosynthesis intensity, net photosynthetic productivity, and leaf water evaporation. The leaf surface area of the cotton plant in the budding phase was 252.9 cm2 in the control variant without fertilizer. The variant with N250, P175, K125 kg recommended in the experiment recorded the best result in this phase among all salinity levels, amounting to 346.3 cm2.

If we look at the flowering phase of a cotton plant, the indicators are much higher and range from 1464.2 cm2 to 2123.8 cm2 in all the variants studied. The best result in these indicators was also observed in the sixth variant. During the growing season, the indicators reached their highest point, of course, from the control of the 8 variants studied in our experiment, they ranged from 3225.3 cm2 to 4628.9 cm2, respectively. By the end of the cotton growing season, these indicators range from 2275.5 cm2 to 4497.5 cm2, in accordance with the above.

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Field experiments conducted on slightly saline soils show that in the no-fertilizer control variant, the cotton budding phase was from 248.2 cm2 to 326.6 cm2 in all variants of the experiment. By the flowering phase and budding period, these indicators were found to be from 1429.0 cm^2 to

4501.3 cm2. By the end of the vegetative period of the cotton plant, the indicators in the experimental variants were much lower than in the phase of fruit element formation. For example, in the control variant it was 2193.4 cm2, while in the background variant this indicator was higher and amounted to 3666.6 cm2. The sequence of variants 3; 4; 5; 6; 7; 8, conducted to study nitrogen fertilizers, which was the aim of the experiment, was 3709.5; 3899.9; 4085.2; 4296.3; 4368.9; 4400.0 cm^2.

Table 1

Effects of soil salinity and nitrogen fertilizers on changes in cotton leaf area (cm^2/plant)

№	Variants	Flowering	Flowering		Clumping	At the end of the growing season
Not salted						
1	Nazorat	252,9±1,37	1464,2,±0,5		3225,3,±0,1	2275,5,±5,4
2	$P_{175}K_{125}$-fon	295,3,±1,01	1986,9,±0,9		4105,4,±0,7	3715,2,±1,78
3	Background +N_{100}	308,7,±1,14	1925,3,±0,64		4247,8,±1.01	3863,4,±1,63
4	Background +N_{150}	325,4,±1,36	2002,3,±0,84		4386,2,±1.09	3959,8,±0,73
5	Background +N_{200}	328,1,±0,25	2025,7,±0,065		4435,7,±1.11	4240,5,±1,7
6	Background +N_{250}	346,3,±0,12	2123,8,±0,65		4503,6,±0,11	4345,4,±1,5
7	Background +N_{300}	342,2,±0,065	2098,4,±0,13		4526,0±9,59	4401,2,±0,5
8	Background +N_{350}	345,9,±0,95	2118,5,±0,37		4628,9,±0,14	4497,5,±0,8
Slightly salty						
1	Nazorat	248,2±2,89	1429,0,±1,33		3192,9,±1,1	2193,4,±2,54
2	$P_{175}K_{125}$-fon	286,6,±2,02	1904,2,±1,8		3869,2,±6,1	3666,6,±1,25
3	Background +N_{100}	310,3,±1,56	1910,7,±1,16		4002,7,±2,13	3709,5,±3,14
4	Background +N_{150}	315,7,±1,89	1965,8,±1,12		4106,8,±3,12	3899,9,±6,14
5	Background +N_{200}	318,6,±1,05	1996,4,±1,26		4263,5,±1,77	4085,2,±2,14
6	Background +N_{250}	324,8,±1,004	2005,3,±1,20		4435,4,±1,45	4296,3,±2,17
7	Background +N_{300}	326,6,±1,002	2012,5,±1,05		4499,2,±2,11	4368,9,±1,52
8	Background +N_{350}	289,4,±2,001	2026,1,±1,02		4501,3,±2,55	4400,0,±3,2

With increasing salinity levels, the leaf surface of the cotton plant decreased. For example, studies conducted on moderately saline soils show that in the budding phase, these indicators, i.e., leaf surface area, were found to be from 225.3 cm^2 to 318.6 cm^2 in the sequence of 8 variants studied.

When the leaf surface area of a cotton plant was studied in the flowering phase, it was as follows in the variants studied on moderately saline soils. For example, the control variant without fertilizer was 1409.2 cm2, and in the background variant it was observed that it was 2013.7 cm^2.

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The cotton leaf surface area was higher in the variants where nitrogen was applied during the boll formation period, from 3909.2 cm2 to 4488 cm2. At the end of the vegetation period, these indicators were observed to be from 2009.1 cm2 to 4215.5 cm2.

Studies conducted on highly saline soils showed that the leaf surface area of a cotton plant in the budding phase ranged from 219.2 cm2 to 312.9 cm2, in the flowering phase from 1410.0 cm^2 to 2005.8 cm2, in the budding period from 3002.9 cm2 to 4431 cm2, and by the end of the growing season, the leaf surface area of cotton in all studied variants was from 2024.0 cm^2 to 4011.0 cm^2.

The development of the root system of cotton plants in non-saline, non-salinate, moderately and highly saline soils was determined in the budding and flowering phases and root weight at the end of the growing season, the soil was analyzed up to one meter. For example, in studies conducted on non-saline soils, in the cotton budding phase, the control variant of the experiment had a layer thickness of 0-25 cm, which was 21.0 g/m2. When roots were detected in the lower soil layers, i.e. in the 25-70 cm layer, it was 5.3 g/m2. In this phase, the absence of root systems was observed in the 70-100 cm layer, which was observed in all salinity levels and in all variants of the experiment. In the 0-25 cm layer of the background variant, where nitrogen fertilizers were not applied, the root weight was 23.3 g/m2, slightly increased compared to the control. In the 25-70 cm layer of the soil, this indicator also increased slightly compared to the control, reaching 7.3 g/m2. The most convincing result, with a positive effect of nitrogen fertilizer rates on the development of the root system, was observed in the sixth option with background + N250 kg, i.e. 33.7 g/m2 in the 0-25 cm layer and 10.4 g/m2 in the 25-70 cm layer. This indicator amounted to 441 kg per hectare.

In conclusion and recommendation, it can be said that,

1. As a result of improving the salt regime of saline, especially moderately and strongly saline meadow alluvial soils, measures to reduce salinity in these soils are recommended, taking into account the optimization of cotton plant nutrition and physiological processes of the plant, as well as an increase in crop yield.
2. In order to enhance cotton nutrition and accelerate physiological and biochemical processes in cotton plants, and increase the net productivity of photosynthesis in plants, it is advisable to apply nitrogen fertilizers at a rate of 250 kg/ha on the background of P175K125 on non-saline, weakly, moderately and strongly saline meadow alluvial soils.
3. It is recommended to improve the nitrogen regime on saline soils and, through it, the physiological indicators of cotton plants by applying nitrogen fertilizers at a rate of 250 kg/ha.

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