

Effect of Microbiological Preparations on Growth and Productivity Level of Cotton

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Abstract:

The effect of microbiological preparations on the growth of cotton, evaluation of the effect of microbiological preparations on the growth rate of cotton at the stage of heading, flowering and budding, as well as on the expansion of the leaf surface of cotton evaluation of the effect of microbiological preparations, evaluation of the effect of microbiological preparations on the expansion of the leaf surface of cotton, data on the specificity of the effect of biopreparations on the yield weight of cotton under different salinity conditions is given .

Key words: cotton budding, flowering and budding, leaf levels, net photosynthetic productivity, Algobiostim, strong salinity, weak salinity.

Introduction: one of the main requirements in the production of agricultural products is the creation of biological preparations that can reduce the consumption of chemical fertilizers and meet ecological requirements. Growth regulators, i.e., microbiological preparations, have a positive effect on plant metabolism and accelerate cell division. It is of particular importance in providing plants with nutrients, hormones, vitamins and other physiologically active compounds. As a result, it has an effect on seed germination and acceleration of the growth period.

Results and their analysis: additionally during our research, the effect of microbiological preparations on the growth of cotton was studied. The data obtained on the assessment of the effect of microbiological preparations on the growth rate of cotton at the stage of tillering, flowering and budding are presented below (see Table 1).

Table 1 Effect of microbiological preparations on the growth of cotton

№	Biopreparations	Tillering	Flowering	Clumping	Relative to control, % (clumping)
		cm ²	cm ²	cm ²	
1	Control	44,0±0,58	73,0±0,65	105,3±0,88	100,0
2	Exemplary Algobiostim-1	48,2±0,43	80,4±1,53	113,6±1,48	107,88
3	Exemplary Algobiostim-2	51,2±0,36	85,8±1,26	118,0±1,34	112,06

The value of this indicator in the control variant, that is, in the case where biopreparations were not affected, the growth rate of cotton was 44 cm² during the tillering period, 73 cm during the flowering period, and 105.3 cm during the flowering period. 48.2 cm during flowering, 80.4 cm during flowering, and 113.6 cm during flowering under the influence of the exemplary algobiostim-1 biopreparation; in the third variant treated with exemplary algobiostim-2, it was noted that it was 51.1 cm in the budding phase, 85.8 cm in flowering, and 118.0 cm in budding.

In the control version, the growth rate was 100%, while it was 107.88% in the exemplary algobiostim-1 biopreparation, and 112.06% in the exemplary algobiostim-2 biopreparation. It can be seen that microbiological preparations increase the plant's growth rate by accelerating the physiological processes.

In general, studied microbiological preparations had a positive effect on the growth of cotton. In particular, among microbiological preparations, exemplary algobiostim-2 took the leading and higher place in the level of positive effect. Low results according to this indicator were found in variants using the exemplary biopreparation algobiostim-1.

During our observations, the effect of microbiological preparations on one of the important morphological indicators of plants - the expansion of leaf surfaces was also determined. We know that the leaf is the main assimilation organ of the plant, and the level of the leaf is one of the main indicators in the formation of productivity. Leaf level is of particular importance in determining the rate of photosynthesis.

The results of the assessment of the effect of microbiological preparations on the expansion of the leaf surface of cotton are presented in Table 1.2 below. The effect of microbiopreparations was studied at all stages of cotton development, i.e. at the stages of tillering, flowering, and budding. It was noted that the expansion of the cotton leaf surface increased sharply mainly during the flowering and budding phases.

It was found that the growth of the leaf surface and the size of the surface were accelerated in the studied microbiological preparations compared to the control option.

Table 1.2 Effect of microbiological preparations on the leaf surface of cotton

№	Biopreparations	Tillering	Flowering	Clumping	Relative to control,% (clumping)
		sm ²	sm ²	sm ²	
1	Control	755±4,41	1323±5,25	2691±4,36	100,0
2	Exemplary Algobiostim-1	884±3,24	1719±4,78	2875±5,98	106,83
3	Exemplary Algobiostim-2	901±3,56	1818±5,89	2911±6,35	108,17

The amount of growth rate was 100 % in the control compared to the reduction, while it was 106.83 % in exemplary algobiostim-1 and 108.17 % in exemplary algobiostim-2. In particular, in the control option, i.e. in the case where biopreparations were not affected, the growth of cotton was 755 cm² during the tillering period, 1323 cm² during the flowering period, and 2691 cm² during the flowering period. 884 cm² during flowering, 1719 cm² during flowering, 2875 cm² during flowering under the influence of the exemplary Algobiostim-1 biopreparation; in exemplary Algobiostim-2, it was recorded at the level of 901 cm² during the budding phase, 1818 cm² during flowering, and 2911 cm² during flowering.

All studied biopreparations differed depending on the level of influence on the leaf surface of cotton. According to the above indicators, the highest positive result was obtained by the exemplary Algobiostim-2, and the average indicator by the exemplary biopreparation Algobiostim-1.

During our experiments, we determined the effect of biopreparations on the net productivity of photosynthesis along with a number of indicators that determine the growth and development of cotton, and for this purpose, a number of experiments were conducted. Our experiments were conducted at the stages of carding, flowering and budding of cotton. The results obtained during the experiments are presented in Table-1.3.

Table-1.3 Effect of biopreparations on net photosynthesis productivity of cotton

№	Biopreparations	Tillering	Flowering	Clumping	Relative to control,% (clumping)
		g/m ² in a day	g/m ² in a day	g/m ² in a day	
1	Control	4,4±0,31	5,9±0,28	7,2±0,34	100,0
2	Exemplary Algobiostim -1	6,9±0,32	8,7±0,43	10,1±0,32	140,27
3	Exemplary Algobiostim-2	7,2±0,31	9,1±0,36	10,5±0,45	145,83

During our experiments, it was found that the effect of the studied biopreparations on the net productivity of photosynthesis is higher than that of the control option. If we analyze in the section of biopreparations, the value of this indicator was higher in the exemplary biopreparation algobiostim-2. Relatively lower value was observed in experimental variants treated with model algobiostim-1.

The amount of the net productivity of photosynthesis decreased in the control option compared to the effect of biopreparations, for example, it was 100% in the control, and 140.27 % in the Algobiostim-1 biopreparation; It was noted that it was 145.83 % in exemplary algobiostim-2. So, under the influence of biopreparations, the physiological and biochemical processes in the plant are activated, and the quantitative indicator of the net productivity of photosynthesis is accelerated. All this, in turn, leads to an increase in the weight and quality of biological, especially farm crops.

In particular, the net photosynthesis productivity of cotton is 4.4 g/m² day in the tillering phase of the control variant, 5.9 g/m² day in flowering, 7.2 g/m² day in budding; 6.9 g/m² day during flowering, 8.7 g/m² day during flowering, 10.1 g/m² day during flowering under the influence of exemplary algobiostim-1; and under the influence of exemplary algobiostim-2, it was found that it was 7.2 g/m² day during flowering, 9.1 g/m² day during flowering, and 10.5 g/m² day during flowering.

In general, during our scientific research, it was proved that the increase in the value of the net productivity of cotton photosynthesis is directly related to the level of exposure to biopreparations.

Plant productivity is one of the most important indicators. In the course of our research, we conducted experiments to evaluate the effect of microbiological preparations on the yield weight of cotton. The data obtained on this indicator are presented in Table 1.4.

Table-1.4 Effect of microbiological preparations on crop weight in medium salinity conditions

№	Biopreparation	Productivity, c/ha					
		2021	2022	2023	Average	Relative to control %	Relative to control c/ha
1	Control	36,3	35,9	38,2	36,80±0,06	100,0	36,80
2	Exemplary Algobiostim-1	37,3	40,8	41,6	39,90±0,05	108,42	+3,11
3	Exemplary Algobiostim-2	38,7	42,0	43,5	41,40±0,07	112,50	+4,68

The weight of the crop was studied in the control variant, that is, without the influence of biopreparations and in the section of 2 different biopreparations. Differences in productivity in the section of biopreparations were also determined. According to the data in the table, it was observed that all studied biopreparations are directly related to the increase in the weight of the cotton crop. In particular, it was noted that cotton productivity increased by 108.42 % under the influence of exemplary algobiostim-1, and by 112.50 % under the influence of exemplary algobiostim-2 compared to the control. This is 12.50 % higher than the control option. In the control option, where biopreparations were not applied, the yield weight was lower than in all experimental options. In this case, it was scientifically proven that the yield in the experimental variant in which the standard Algobiostim-1 was used compared to the control was 3.11 centners, and in the version treated with Algobiostim-2, the yield increased by 4.68 centners compared to the control in the conditions of moderately saline soils.

If we analyze in terms of years, the weight of the cotton harvest in 2021 is 36.3 per hectare; in exemplary algobiostim-1 – 37.3, in exemplary algobiostim-2 - 38.7 centners. in control in 2022 - 35.9; Exemplary algobiostim-1 40.8; 42.0 quintal yield was obtained in exemplary algobiostim-2. In 2023, in control - 38.2; exemplary algobiostim-1da- 41.6; in exemplary algobiostim-2, 43.5 centners of yield was obtained. The weight of the harvest for three years (2021-2023y) the average productivity level is 36.80 per hectare in control; 39.90 in exemplary algobiostim-1; exemplary algobiostim-2 was 41.40 centners in the used experimental variant.

So, the level of positive effect of exemplary algobiostim-1 and exemplary algobiostim-2 biopreparations from biopreparations on the yield weight of cotton in moderately saline soil conditions was determined. According to the level of influence, it was found that the exemplary biopreparation Algobiostim-2 takes the highest place.

During the field experiments, the effect of biopreparations on the productivity characteristics of the Bukhara-10 cotton variety was studied even in the conditions of highly saline soils. According to the obtained data, it was noted that the effect of highly saline soils is higher than that of weakly saline fields. The data obtained from these experiments are presented in Table 1.5.

Table-1.5 Effect of microbiological preparations on crop weight in highly saline conditions

№	Biopreparations	Productivity, c/ha					
		2021	2022	2023	Average	Relative to control, %	Relative to control c/ha
1	Control	28,37	29,14	32,85	30,12±0,06	100,0	30,12
2	Exemplary	29,37	33,48	34,65	32,50±0,05	107,90	+2,38

	algobiostim-1						
3	Exemplary algobiostim-2	30,14	34,13	35,57	33,28±0,07	110,49	+3,16

The weight of the crop was studied in the control variant, that is, without the influence of biopreparations and in the section of 2 different biopreparations. Differences in yield were also found in the section of biopreparations. According to the data in the table, it was observed that all studied biopreparations are directly related to the increase in the weight of the cotton crop.

If we analyze in terms of years, the weight of the cotton harvest in 2021 is 28.37 per hectare; in exemplary algobiostim-1 – 29.37; exemplary algobiostim-2 was 30.14 centners. in control in 2022 - 29.14; exemplary algobiostim-1- 33.48; in exemplary algobiostim-2 - 34.13 centners of yield was obtained. In 2023, in control - 32.85; in exemplary algobiostim-1 – 34.65; in exemplary algobiostim-2 - 35.57 centners of yield was obtained. The weight of the crop is under control on average per hectare in three years - 30.12; exemplary algobiostim-1da- 32.50; exemplary algobiostim-2 was 33.28 centners.

In particular, it was noted that cotton productivity increased by 107.90% under the influence of exemplary algobiostim-1, compared to control by 110.49% under the influence of exemplary algobiostim-2. This is 10.49 percent higher than the control option. In the control option without biopreparations, the weight of the crop decreased compared to all the experimental options. Compared to the control, in the experimental version where the model algobiostim-1 was used, the yield was increased by 2.38 centners compared to the control, and in the version treated with algobiostim-2, the yield was increased by 3.16 centners compared to the control in the conditions of highly saline soils.

The level of positive effect of exemplary algobiostim-1 and exemplary algobiostim-2 biopreparations on the productivity of cotton in highly saline soil conditions was evaluated. According to the degree of positive effect, a high yield was recorded in the experimental options where the exemplary algobiostim-2 biopreparation was used.

Conclusions: foliar application of microbiological biopreparations has a positive effect on the growth and development of plants. Also, during the experiments, it was observed that the liquid form of the model algobiostim biopreparation is easy to use, and has an effective positive effect on the growth of plants.

All studied biopreparations differed in the level of positive effect potential on cotton growth, leaf area, net photosynthetic productivity, yield weight and 1000 seed weight. According to the above indicators determined in the experiments, the highest positive indicator was recorded in the variants treated with the exemplary algobiostim-2, and the average indicator was recorded with the exemplary algobiostim-1 biopreparation.

The weight of the crop was studied in the control option, that is, without the influence of biopreparations, and in the experimental options, in the section of biopreparations. Differences in productivity were determined in the section of biopreparations. It was observed that all studied biopreparations are directly related to the increase in the weight of the cotton crop in the conditions of moderately and strongly saline soils. In particular, it was noted that the yield weight of cotton increased by 114.67% when treated with model algobiostim-1 through leaves, and by 116.84% when treated with model algobiostim-2 compared to the control in medium salinity conditions. Also, these indicators were 107.90 and 110.49%, respectively, compared to the control in medium salinity conditions.

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