

# EFFECT OF TRACE ELEMENT FERTILIZERS ON CHANGES IN THE THICKNESS AND SURFACE OF COTTON LEAF

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## Abstract

In this article, when fed through cotton leaves with NPK microelements made from local raw materials, the thickness of the cotton seedling and the surface of the leaf surface increased as a result of the suspensions applied through the leaf, the process of photosynthesis is accelerated, the metabolism is improved, and as a result, the plant Information about the optimal development and increase in cotton yield is provided.

**Keywords** Microfertilizers, crop, seedling thickness, level, cotton, leaf, biological, photosynthesis, liquid, mineral.

## Introduction

The development of technology for foliar application of macro- and microfertilizers in appropriate proportions, convenient terms, norms and methods of growing a high and high-quality cotton harvest in the conditions of soils of our republic, devoid of trace elements, is one of the urgent tasks. agricultural sector, and now it is important to conduct scientific research on this issue. Various mineral and organic fertilizers are applied in the necessary amount so that the trace elements in the soil can be well absorbed by the plant (M.A. Belousov, B.M. Isaev). E.K. Kruglova, M.M. Alieva, T.P. Pirakhunov, B.I. Niyazaliev, B.A. Tillabekov and other scientists were involved in the study of the criteria and conditions for the use of trace elements in cotton growing, determining their importance and solving the issues of use. Many studies and experiments have shown that micronutrients should only be used in areas with low soil content, not everywhere. However, in the soil and climatic conditions of the Fergana region, it is relevant to conduct scientific research to determine the effectiveness of the introduction of trace elements in liquid form through the leaves, depending on the norms of mineral fertilizers. [p. 5; 6.] Material and method of research. Field experiments and phenological observations, cotton selection, seed processing according to the methodology of the Scientific and Experimental Institute of Agricultural Technologies, mathematical and statistical analysis data were calculated in the Microsoft Excel program of B.A. Dospekhov. Although the required thickness of seedlings of the cotton variety C-8290 used in the experiment was determined by the authors, its change was observed under the influence of the norm of mineral fertilizers and trace elements in the liquid state when using the same thickness of seedlings in all variants. It should be noted that, since the climatic conditions of the years of study differed sharply from each other, it was found that the dynamics of seed germination differed from year to year in all variants, in addition, it was noted that the agricultural techniques used by us did not have a negative or positive effect on the



thickness of cotton seedlings.

### Analysis and results

At the control of the second background, where mineral fertilizers were applied at the rate of N180 P125 K90 kg/ha, the true thickness of cotton seedlings was 89.2 in proportion to the years of research; 84.1 and 86.3 thousand/ha on average for 3 years, 88.6 thousand/ha and 83.0 at the end of the validity period; 81.8 and 81.2 thousand/ha, and on average 82.0 thousand/ha, the average indicator of which differed from the control for the first background by 1.5 and 0.7 thousand/ha. That is why the studies have determined the dynamics of the germination of cotton seedlings! It should be noted that when determining the leaf surface area of 1 hectare of cotton, the indicators of 1 plant were determined by multiplying by the actual thickness of seedlings of this variant and period. Against the above background of mineral fertilizers, when sprayed 3 times through a cotton leaf with a fertilizer containing trace elements in a liquid state, the leaf surface is 1130 cm<sup>2</sup> per 1 plant, 1810 cm<sup>2</sup> during flowering and 2000 cm<sup>2</sup> at ripening, proportionally 9695 cm<sup>2</sup>. 1 hectare; It is determined that it is equal to 15529 and 16920 m<sup>2</sup>. These figures are 343 from the control; Therefore, as a result of an increase in the leaf surface area of cotton under the influence of suspensions applied through the leaves, there is an acceleration of the process of photosynthesis, an improvement in metabolism and, as a result, conditions are created for the optimal development of the plant and an increase in cotton yield. This information will be provided in the following sections. Separately, it should be explained that the area of the leaf surface of cotton in all variants is observed decreasing from flowering to ripening and rapidly increasing from the tillering period to flowering. In this 2nd option, regardless of the effect of the suspension, there was an increase in the surface area of the cotton leaf from the moment of combing to flowering by 5834 m<sup>2</sup>, and from flowering to the ripening period by 1391 m<sup>2</sup>. Therefore, it has been observed that physiological processes in cotton proceed faster during its flowering period [1]. In option 3, the leaf surface area of 1 ha is proportionally equal to 10,068; 716 from control with 16839 and 17176 m<sup>2</sup>; above 1310 and 1435 m<sup>2</sup> and 373 from option 2; 1310 and 256 m<sup>2</sup> were increased. This situation indicates that the effectiveness of liquid fertilizers containing NPK and trace elements is higher compared to the use of micronutrients alone. In foliar fertilization of cotton, liquid fertilizer "Kafolon", containing various trace elements, was applied 4 times according to the experimental system, when planing the surface of sheet 9531; 15,913 at flowering and 16,666 m<sup>2</sup> at ripening, which is 175 proportionately more control; 1416 and 925 m<sup>2</sup> more than option (3), but less than option 2, 510 m<sup>2</sup> and 254 m<sup>2</sup> less than option 2 (at the planting period). In the control by variants (5-8) in the peak period of cotton development, mineral fertilizers N180 P125 K90 kg/ha were applied, the leaf surface area per 1 ha was 9839 m<sup>2</sup> at flowering, 14423 m<sup>2</sup> at ripening and 16360 m<sup>2</sup>. in maturity proportionally 487 of the control against background I; 646 and 619 m<sup>2</sup> were superfluous, which is undoubtedly due to the additional application of fertilizers N50 P35 K25 kg/ha. In option 6, where trace elements in a liquid state were applied 3 times through the leaf, these indicators are proportionally 10946; 15577 and 17117 m<sup>2</sup>/ha, 1107 from control; 1150 and 517 m<sup>2</sup>/ha, as well as 1251 of the parameters of the parallel option (2) in the I-background; In the experiment, relatively acceptable (high) indicators were observed with three times the application of liquid NPK and trace elements through the leaves during the development of cotton (option 7), and the leaf surface area was proportionally 11229; 16065 and 17517 m<sup>2</sup>/ha. These indicators are



1390 proportionally higher than the control; 1582 and 1157 m<sup>2</sup>/ha, and 283 compared to option 6, where liquid trace elements were used; 486 and 400 m<sup>2</sup>/ha were found to be excessive. Mineral fertilizers were applied from the norms H130 P90 K65 kg/ha (I-fon), called Kafolon, a liquid fertilizer containing various trace elements in the form of a suspension, with 4 times application through the leaves, the dry weight of cotton leaves. was 25.0; trunk-25, 6; thigh – 29.2 g and cotton – 45.9 g, and a total of 115.7 g. 0.5 in proportion to the control, which is; 1,0; 1,6; It was noted that it was higher by 5.8 and 9.0 g, but these figures are proportional to 0.3 indicators of option 3, which are considered acceptable; 0,2; 0,1; 0.4 and 1.0 g less than in variant 2, 0.12 (less), 0.5 g (more), 0.1 g (excess) and turned out to be 1.0 g higher. If we evaluate the effect of the suspensions used on fertilizers, then those containing NPK and trace elements would be in 1st place, Cafolon in 2nd place, and liquid trace elements in 3rd place. However, this level of assessment is applicable to all cotton indicators. In the control of variants (5-8), mineral fertilizers H130 P90 K65 kg/ha were used, the dry weight of cotton leaves was 26.1 g, the stem was 26.1 g; the total weight of 119.1 g, cotton 20.1 g and cotton 45.8 (38.4%) g turned out to be equal to These indicators are higher than those of the control (1) variant on the I-background, especially since the weight of cotton is 5.7 g, and the yield is 0.9% higher. Trace elements in liquid form were used 3 times during the periods of cotton development (6), by dry weight - 26.8; 26,8; 21,3; total 47.6 g and 122.5 g, proportional to 0.7 of the control; 0,7; 1,2; It was 1.8 and 3.4 g higher, but the cotton yield was 1.1% less, since an increase in the fertilizer rate caused an increase in the vegetative part of cotton [3,4].

#### Effect of foliar application of microfertilizers on seedling density, (ths/ha)

Option Order	Annual rates of mineral fertilizers, kg/ha			Mineral fertilizers with trace elements, ml, l/ha	After Yagana	At the end of the validity period
	N	P	K		2021	2021
1	130	90	65	With water	89,5	79,5
2	130	90	65	Liquid trace elements (Aminomax)	85,8	82,1
3	130	90	65	Liquid NPK and (Ento Micro) Trace Elements	89,1	84,2
4	130	90	65	Kafolon	85,1	82,1
5	180	125	90	With water	84,1	81,8
6	180	125	90	Liquid trace elements (Aminomax)	84,2	82,1
7	180	125	90	Liquid NPK and (Ento Micro) Trace Elements	83,8	81,1
8	180	125	90	Kafolon	85,1	82,4
9	230	160	115	With water	81,2	80,3
10	230	160	115	Liquid trace elements (Aminomax)	82,0	79,1
11	230	160	115	Liquid NPK and (Ento Micro) Trace Elements	82,5	79,8
12	230	160	115	Kafolon	86,5	81,3



**Effect of foliar application of microfertilizers on changes in the leaf surface area of cotton, (cm<sup>2</sup>/m<sup>2</sup>), 2021 Table 2**

Option Order	Annual rates of mineral fertilizers, kg/ha			Mineral fertilizers with trace elements ml, l/ha	In preparation		Abloom		Maturation	
	N	P	K		In 1 plant, cm <sup>2</sup>	1 ha/m <sup>2</sup>	In 1 plant, cm <sup>2</sup>	1 ha/m <sup>2</sup>	In 1 plant, cm <sup>2</sup>	1 ha/m <sup>2</sup>
1	130	90	65	With water	1120	9352	1700	13777	1980	15741
2	130	90	65	Liquid trace elements (Aminomax)	1130	9695	1810	15529	2000	16920
3	130	90	65	Liquid NPK and (Ento Micro) Trace Elements	1135	10068	1890	16839	2040	17176
4	130	90	65	Kafolon	1132	9531	1870	15913	2030	16666
5	180	125	90	With water	1170	9839	1715	14423	2000	16360
6	180	125	90	Liquid trace elements (Aminomax)	1300	10946	1850	15517	2085	17117
7	180	125	90	Liquid NPK and (Ento Micro) Trace Elements	1340	11229	1910	16005	2160	17517
8	180	125	90	Kafolon	1320	11133	1860	15318	2095	17262
9	230	160	115	With water	1240	10068	1800	14616	2040	16381
10	230	160	115	Liquid trace elements (Aminomax)	1320	10824	1870	15334	2180	17243
11	230	160	115	Liquid NPK and (Ento Micro) Trace Elements	1350	11137	1920	15840	2225	17755
12	230	160	115	Kafolon	1300	11245	1880	16262	2200	17887

**Conclusions and recommendations**

1. The actual density of cotton seedlings in the experiment averaged 80.1-84.1 thousand/ha, regardless of the applied agrotechnical measures, and the difference in the scientific data obtained was not associated with these indicators. According to the data obtained in 2021, mineral fertilizers were applied at the rates of N130 P90 K65 kg/ha (1-4) and it was observed that the leaf surface of 1 plant was 1120 cm<sup>2</sup>, in 1 - 9352 m<sup>2</sup>. hectare 2. Against the background of mineral fertilizers H180 P125 K90 kg/ha, a liquid fertilizer consisting of a mixture of trace elements Kafolin is applied through the leaves of cotton 4 times (the last one when forming bolls) (option 8), the leaf surface area is 11133 m<sup>2</sup>/ha during the tillering period, 15318 m<sup>2</sup> during the flowering and ripening period. 17262m<sup>2</sup>, this turned out to be 1294m<sup>2</sup>/ha, 895m<sup>2</sup>/ha and 902m<sup>2</sup>/ha more than the control, but 187m<sup>2</sup>/ha, 687 and 315m<sup>2</sup>/ha less than the optimal (7) options.

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