

EFFECT OF APPLICATION RATES AND PERIODS OF APPLICATION OF BAIKAL EM-1 MICROBIOLOGICAL FERTILIZER ON COTTON AGAINST THE NORMS OF MINERAL FERTILIZERS ON THE ACCUMULATION OF PLANT ORGANIC MASS

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Abstract. In the article, the application of Baikal EM-1 microbiological fertilizer N₁₅₀ P₁₀₅K₇₅ and N₂₀₀ P₁₄₀K₁₀₀ kg/ha in the conditions of old irrigated typical gray soils improved soil agrochemical properties and plant nutrient absorption. "Baikal EM-1" microbiological fertilizer is in the form of an aqueous solution, the microorganisms in it enrich the soil with various enzymes, physiologically active substances, etc., enhance the activity of mineral fertilizers, and increase soil fertility by absorbing nitrogen from the air. In the conducted research and experiments, it was determined that when Baikal-EM-1 microbiological fertilizer is added to the soil in an acceptable amount, the physiological process, photosynthesis and respiration of plants are improved. The results are presented that the use of mineral fertilizers of cotton and Baikal EM-1 microbiological fertilizer had a positive effect on the accumulation of organic mass during the period of operation, depending on the rate and duration. The effect of the applied Baikal EM-1 microbiological fertilizer on the dry mass accumulation of the plant was found to be different from the control starting from the period of 2-3 true leaves of cotton, and these differences increased in the following periods. The optimal effect of Baikal EM-1 microbiological fertilizer on the accumulation of dry mass of cotton was observed at the rates of mineral fertilizers N₁₅₀ P₁₀₅K₇₅, which means that high rates of mineral fertilizers have a relatively negative effect on the passage of microbiological processes in the soil, but even so, according to the parameters of the obtained cotton yield, the rates of N₂₀₀P₁₄₀K₁₀₀ kg/ha acceptable observed that

Key words: Typical gray soil, cotton, Baikal EM-1, nitrogen, phosphorus, potassium, NPK mobile forms, organic mass.

Introduction

Currently, in agriculture around the world, maintaining and increasing soil fertility, wide introduction of new resource-saving agro-technologies, regular supply of food products to the population, efficient use of land, obtaining high and quality organic crops from crops, fuel and lubricant products and other costs, and cultivated products work is being carried out on a large scale to reduce the cost.

The cotton plant is fed mainly through the roots. It has been proved by many years of experience that fertilizers should be used mainly before plowing, before planting, together with planting and during the period of operation.



Therefore, looking at the history of feeding plants through leaves, it is known that this method was used by the English scientist Grice S. A and the German botanist Sachs J. in the 19th century [9, 10].

It is known that among all the elements used in cotton, only nitrogen accelerates photosynthesis in the leaf and also ensures more accumulation of chlorophyll. In addition, nitrogen is an important plant nutrient. It includes all amino acids involved in protein synthesis, N.S. Avdonin [2].

E.M. Kakhorov, M.O. Davronovalar [6] says that nitrogenous fertilizers play the most important role in the mineral nutrition of the plant. The plant absorbs nitrogen from the soil, mineral compounds and converts it into protein substances. Fertilizer is an organic and mineral substance that increases plant nutrition and soil fertility. Almost all mineral fertilizers are obtained from inorganic salts and nitrogen in the air.

Academician D.N. Pryanishnikov, the founder of agrochemistry [7] said about the importance of nitrogen: "Protoplasm of a cell cannot be divided without protein, just as protein substances cannot be formed without nitrogen." Nitrogen is also included in nucleic acids, chlorophyll, phosphatides, glucosides and other organic substances, which are important in plant life.

Sh. Karimov, F. Quvvatov [5] in the experiments, it was observed that when cotton was fed with a suspension of mineral fertilizers during the flowering period, the weight of the additional crop increased by 3.0-4.7 ts/ha.

When plant leaves were sprayed with suspensions containing nitrogen, it was observed that their color was dark green the next day.

It is known that plants meet their requirements mainly by assimilating nitrate nitrogen. The transition of amide and ammonium nitrogen to nitrate form is influenced by chemical changes and the activity of bacteria. The transition of nitrogen to an acceptable state for the plant is slow and takes a long time, L.A. Jmay [4].

O.A. Toshtemirov [8], it is said that the chronic use of nitrogenous fertilizers in large quantities leads to the accumulation of toxic compounds of nitrosamine, increase of nitrate and nitrite in the product, and has a negative effect on the health of people and animals and their metabolism. In addition, if the ratio of nitrogen-phosphorus-potassium is in a moderate state, the fertility level of the soil will not only improve, but it will lead to a decrease in the transfer of toxic substances to the body of plants.

Abdualimov Sh.Kh [1], Burkhanova D.U [3] and other scientists conducted scientific and research work. In the conducted research and experiments, it was found that when the Baikal EM-1 microbiological fertilizer is applied to the soil in moderation, the physiological process, photosynthesis and respiration of plants are improved, growth and development are accelerated, and manure and organic plant residues are quickly broken down and turned into humus. As a result, the plant in the soil breaks down micronutrients that are difficult to absorb and makes them easily absorbed.

A brief history of research on foliar feeding of plants, the effect of foliar feeding on the rate of photosynthesis, increasing crop yield, disease and pest resistance, and finally the results of initial research on foliar feeding of cotton were described.

Materials and Methods

Field experiments and phenological observations were conducted according to UzPITI methods (2007). Agrochemical analysis of soil and plant samples obtained from field



experiments was determined according to the methods "Методы агрохимических, агрофизических и микробиологических исследований в поливных хлопковых районах" (1963) and "Методы агрохимических анализов почв и растений Средней Азии" (1977). The total amount of nitrogen, phosphorus and potassium in the plant samples taken from the field experiments during the cotton season was determined by the methods of I.M. Maltseva and L. Gritsenko (in modification).

The field experiment was conducted at the PSUEAITI experimental site under typical gray soil conditions. This soil has been irrigated since ancient times, the mechanical structure is medium humus, the underground water is deep (18-20 m).

According to the initial agrochemical description of a typical gray soil, humus in the plow (0-30 cm) and lower (30-50 cm) layers is 0.860 and 0.620%, nitrate nitrogen (14.3 and 9.5 mg/kg), mobile phosphorus (20.5 and 10.1 mg/kg) and moderate potassium (202 and 178 mg/kg).

The following types of mineral fertilizers were used in the experiments: ammonium nitrate (N-33-34%), PS-Agro (N-4-5%, R_2O_5 -40%), local potassium chloride (K20-60%).

"Baikal EM-1" microbiological fertilizer is in the form of an aqueous solution, the microorganisms in it enrich the soil with various enzymes, physiologically active substances, etc., enhance the activity of mineral fertilizers, and increase soil fertility by absorbing nitrogen from the air.

Phosphorous fertilizers 60-70% potassium 50% were applied before autumn plowing, the rest of the standards were applied together with nitrogenous fertilizers during the flowering period of cotton, and potassium fertilizer was applied during the tillering period. Nitrogen fertilizers (50, 75, and 75 kg/ha) were applied three times during cotton feeding periods-2-3 true leaves, tillering and flowering.

Sultan cotton variety was planted in the field experiment. Experiment variants are carried out in 3 repetitions and placed in one tier. The area of Delyankas is $4.8 \times 30 = 144 \text{ m}^2$, the calculation is -72 m^2 . The experimental system is presented in Table 1.

Results and Discussion

The use of cotton mineral fertilizer rate and Baikal EM-1 microbiological fertilizer had a positive effect on organic mass accumulation during the period of operation, depending on the rate and duration. Against the background of mineral fertilizers N-200 P_2O_5 -140, K_2O -100 kg/ha, the dry mass of one plant (control) in the samples taken during the period of 2-3 true leaves of cotton was 0.62 g, 4.8 g in planing, and 24.1 g in flowering.

It is worth noting that the effect of the used Baikal EM-1 microbiological fertilizer on the accumulation of dry mass of the plant began to be observed in the early stages, and in the 2nd option, which was used at the rate of 10.0 l/ha in this autumn plow, the above indicators were proportionally 0.64; 0.02 of the control with 5.1 and 25.1 g; 0.3 and 1.0 g were observed to be higher. Compared to these indicators, it was found that the dry weight of cotton was different from the control starting from the period of 2-3 true leaves, and these differences increased in the following periods.

Against the above background of mineral fertilizers, Baikal EM-1 fertilizer at the rate of 10.0 l/ha is sprinkled on the plow in the spring, when the harrowing is carried out, relatively acceptable indicators are obtained. 5.4 and 25.6 g and 0.03 of the control; 0.6 and 1.5 g, and 0.01 compared to option 2; 0.03 and 0.5 g higher is facilitated. Because the effectiveness of the



microbiological fertilizer applied in the spring was better compared to the one in the fall, which is caused by the increase in soil temperature.

Baikal EM-1 microbiological fertilizer is proportionally 3.6 during the development periods of cotton; The dry weight of 1 plant in the period of 2-3 true leaves (4-6 var) is 0.61 in options 4-6, sown through leaves at rates of 3.5 and 3.5 l/ha; 0.60 and 0.58 g, 5.0 when combing; 4.8 and 4.9g and 24.0 in flowering; 24.2 and 24.1 g, 0.1 of the control; 0.2; 0.4 g and 0.2; 0.0; 0.1 and 0.1; 0.1; 0.02 g more or less was observed. Therefore, lower results were obtained when Baikal EM-1 microbiological fertilizer was applied as a suspension through cotton leaves than when it was applied to the soil. Relatively high dry weight in the above periods of cotton development was obtained when Baikal EM-1 microbiological fertilizer was applied at the rate of 10.0 l/ha in the plow, 10.0 l/ha in the spring and 3 times in total at the rate of 30.0 l/ha and 0.68; 5.3; 25.3 g, 0.06 of the control; 0.05 and 1.2 g were higher.

Mineral fertilizers N-150 P₂O₅-105, K₂O-75kg/ha at the rate, Baikal EM-1 microbiological fertilizer at the rate of 30.0 l/ha were used 5 times in (8) option, the dry mass of the plant was 0.62 in proportion to the development periods; 4.9 and 24.0 g of its own control (variant 9) 0.02; 0.1 and 0.0 g higher, and N-200 P₂O₅-140, K₂O-100 kg/ha were observed to be almost equal to option 1.

A greater difference in the dry mass of cotton between the variants was observed in the plant samples taken at the end of the period of operation, the dry mass of the leaves (in 1 plant) in the control variant was 23.0 g, in the stem 17.0; it was determined that the pods accounted for 12.0 g and cotton 36.0 for a total of 88.0 g, including vegetative fractions for 52.0 g or 59.0 %.

Against the background of the standards of mineral fertilizers N-200 P₂O₅-140, K₂O-100 kg/ha, in the 2nd option, the Baikal EM-1 microbiological fertilizer was applied to the autumn plow, the above indicators are proportionally 24.1; 17.5; 12.8 and 37.8 g in 1 plant 92.2 g, including the vegetative mass of 54.4 g, 0.5 of the control; 0.8; 1.8; 4.2 and 2.4 g were found to be excessive.

At the end of the period of operation, relatively acceptable indicators of the dry mass of cotton by raw organs were obtained when Baikal EM-1 microbiological fertilizer was applied to the plow in the spring, and the weight of cotton was 39.6 g, a total of 95.4 g, 3.0 and 7.4 g from the control, it was observed that this fertilizer was 1.2 and 3.2 g more than when it was applied in autumn (2).

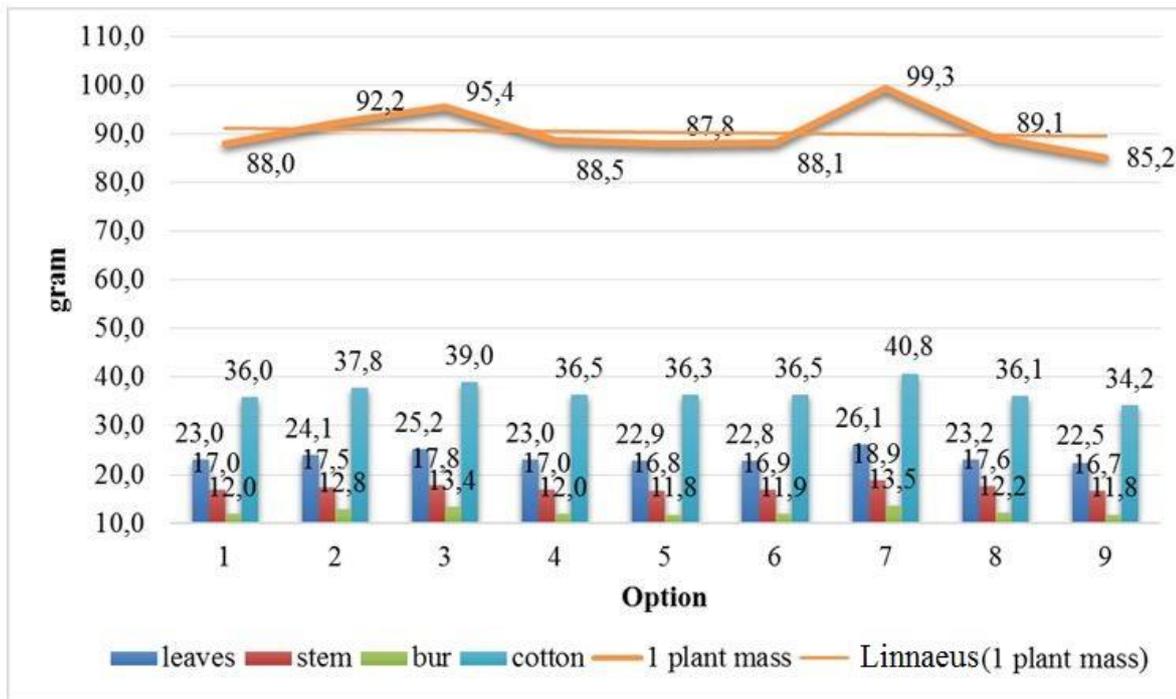
Against the background of norms of mineral fertilizers N-200 P₂O₅-140, K₂O-100 kg/ha Baikal EM-1 microbiological fertilizer 3 times 3.0 during the period of application of cotton; In options 4-6 used at rates of 3.5 and 3.5 l/ha, the dry mass of one plant is proportionally 88.5; 87.8 and 88.1 g, while the weight of cotton is 36.5; It was equal to 36.3 and 36.5 g. These values are 0.5 proportional to the control; (-0.2); 0.1 g and 0.5; 0.3; differed by 0.5 g.

Hence, the efficiency of applying this microbiological fertilizer as suspension through cotton leaf was found to be almost close to control.

Relatively high results in the experiment were obtained in the 7th option, where the Baikal EM-1 microbiological fertilizer was applied 5 times at the rate of 30.0 l/ha, and the cotton weight was 40.8 g, the vegetative part was 58.5 g, and the total was 99.3 g, compared to the control. 4.8; 1.8 of the indicators of option 3, which are considered acceptable compared to 6.5 and 11.3 g; 2.1 and 3.9 g were found to be excessive.



Against the background of the standards of mineral fertilizers N-150 P₂O₅-105, K₂O-75 kg/ha, the dry mass of cotton is 36.1; the vegetative part is 53.0 and the total is 88.1 g, proportionally 1.9 from its control (var 9); At 2.0 and 2.9 g, the yield of cotton was 40.9%, while this figure was 41.0% in option 7.



Conclusion

The optimal effect of Baikal EM-1 microbiological fertilizer on the accumulation of dry mass of cotton was observed at lower rates of mineral fertilizers, which means that high rates of mineral fertilizers have a relatively negative effect on the passage of microbiological processes in the soil, but even so, according to the parameters of the obtained cotton yield, N-200 P₂O₅-140, K₂O -100 kg/ha norms were observed to be acceptable.

Table 1

Experiment system

| Option order | Annual rate of mineral and Baikal EM-1 fertilizers, kg, l/ha | | | | Before the plow, kg, l/ha | | | Before planting, l/ha | 2-3 leaves period, kg, l/ha | | Bud period, kg, l/ha | | | Bloom period, kg, l/ha | | |
|--------------|--|-------------------------------|------------------|-------------|-------------------------------|------------------|-------------|-----------------------|-----------------------------|-------------|----------------------|------------------|-------------|------------------------|-------------------------------|-------------|
| | N | P ₂ O ₅ | K ₂ O | Baikal EM-1 | P ₂ O ₅ | K ₂ O | Baikal EM-1 | Baikal EM-1 | N | Baikal EM-1 | N | K ₂ O | Baikal EM-1 | N | P ₂ O ₅ | Baikal EM-1 |
| 1 | 200 | 140 | 100 | - | 100 | 50 | - | - | 50 | - | 75 | 50 | - | 75 | 40 | - |
| 2 | 200 | 140 | 100 | 10,0 | 100 | 50 | 10,0 | - | 50 | - | 75 | 50 | - | 75 | 40 | - |
| 3 | 200 | 140 | 100 | 10,0 | 100 | 50 | - | 10,0 | 50 | - | 75 | 50 | - | 75 | 40 | - |
| 4 | 200 | 140 | 100 | 3,0 | 100 | 50 | - | - | 50 | 3,0 | 75 | 50 | - | 75 | 40 | - |
| 5 | 200 | 140 | 100 | 3,5 | 100 | 50 | - | - | 50 | - | 75 | 50 | 3,5 | 75 | 40 | - |
| 6 | 200 | 140 | 100 | 3,5 | 100 | 50 | - | - | 50 | - | 75 | 50 | - | 75 | 40 | 3,5 |



| | | | | | | | | | | | | | | | | |
|---|-----|-----|-----|------|-----|----|------|------|----|-----|----|----|-----|----|----|-----|
| 7 | 200 | 140 | 100 | 30,0 | 100 | 50 | 10,0 | 10,0 | 50 | 3,0 | 75 | 50 | 3,5 | 75 | 40 | 3,5 |
| 8 | 150 | 105 | 75 | 30,0 | 70 | 40 | 10,0 | 10,0 | 50 | 3,0 | 50 | 35 | 3,5 | 50 | 35 | 3,5 |
| 9 | 150 | 105 | 75 | - | 70 | 40 | - | - | 50 | - | 50 | 35 | - | 50 | 35 | - |

Note: Baikal EM-1 fertilizer was sprinkled on the soil before plowing, sprinkled on the soil before planting, and worked on the soil (harrow). 2-3 true leaves of cotton were applied through the leaf based on the experimental system in the period of tillering and flowering.

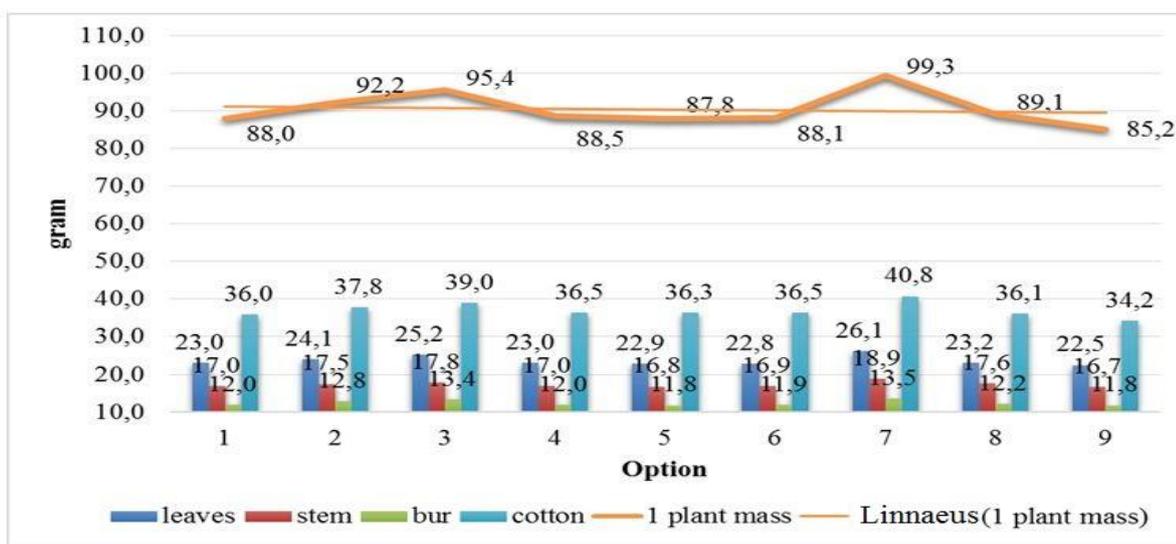
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