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THE EFFECT OF APPLICATION RATES OF NEW MICRONUTRIENT FERTILIZERS ON THE FLOWERING DYNAMICS OF COTTON PLANTS

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Abstract
This article presents the results of research conducted under the soil conditions of the Fergana Scientific Experimental Station of the Research Institute of Cotton Breeding, Seed Production and Cultivation Agrotechnologies on the effect of application rates of new micronutrient fertilizers on the flowering dynamics of the "S-8296" cotton variety.

Keywords: Cotton growing, cotton plant, budding, flowering, phenological observations, soil fertility, liquid micronutrient fertilizers, flowering dynamics, photosynthesis process, crop yield.

Introduction

It is well known that, under any soil and climatic conditions, the creation of cotton varieties resistant to various external factors, diseases and insect pests, the development of specific cultivation agrotechnologies for these varieties, and the production of early, high and high-quality yields are considered urgent issues in cotton growing.

The main problems in cotton production include environmental problems and environmental protection, soil fertility, wind and water erosion, labour productivity and the efficiency coefficient of all agrotechnical measures in the sector, increasing cotton yields, and improving product quality.

LITERATURE REVIEW AND METHODOLOGY

Micronutrients have a significant effect on the growth and development of cotton plants. For example, boron, which accumulates in large quantities in the reproductive organs of cotton flowers, increases the growth capacity of pollen.

When nitrogen is deficient, plant growth and development deteriorate, the leaves become smaller, and their normal green colour changes to yellowish green. Conversely, when nitrogen is supplied in excessive amounts, the plant grows excessively and its leaves become dark green.

If phosphorus is deficient in the soil, the plant grows short, its leaves become smaller, and reddish

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veins may sometimes appear on the leaves. In cotton cultivation, the application of phosphorus fertilizers containing micronutrients increases cotton yields [3, 4, 6].

Foliar application of fertilizers is economical and effective and significantly increases crop yields. It plays an important role in addressing the reduction of mineral substances in plants during the late growing period and in restoring the rapid growth of crops after natural disasters.

It is very important to scientifically determine the concentration of fertilizers applied to leaves. If the concentration is too high, it may damage the plant and cause injury to its main organs [2, 5].

Thus, it was determined that liquid micronutrient fertilizer mixtures should be applied three times through the leaves against a background of mineral fertilizers at rates of N_{180}, P_{125} and K_{90} kg/ha, as this accelerated the flowering rate of cotton by 13.0% compared with the control [8, 9].

Research Materials and Methods

Field experiments were carried out in 2024 at the Fergana Scientific Experimental Station of the Research Institute of Cotton Breeding, Seed Production and Cultivation Agrotechnologies.

The experiment consisted of ten variants, including a standard variant treated with Universal and variants treated with Avangard Start and Avangard Nitrogen + Micro liquid micronutrient fertilizers. The experiment was arranged in three tiers with three replications, and the S-8296 cotton variety was planted in small experimental plots.

For the field experiments, we used the new liquid complex micronutrient fertilizers enriched with micro- and macronutrients, named “Avangard Start” and “Avangard Nitrogen + Micro”, which are being developed by SWISSAGRO LLC.

According to the research, mineral fertilizers were applied to the soil at rates of N–200, P_2O_5–140 and K_2O–100 kg/ha. During additional foliar feeding, the effects of the timing and rates of micronutrient fertilizer application on the following indicators were determined:

-plant growth and development;

-cotton leaf area, dry mass and photosynthetic productivity;

-formation and shedding of yield components;

-flowering dynamics of the plants, which were analysed on the basis of tables.

The first foliar application of the working solution of liquid micronutrient fertilizers was carried out on 2 June 2024, during the true-leaf development stage, using a manual Avtomaks spraying apparatus.

Observations conducted during the experiment showed that the budding and flowering periods of cotton plants began between 15 and 20 June.

The second foliar application of the liquid micronutrient fertilizer working solution was carried out on 2 July 2024, and the third application was carried out on 25 July 2024.

In the experimental variants, the working solutions were prepared and sprayed at the prescribed application rates using 400 litres of water per hectare.

Phenological observations of the biological condition of the cotton plants were conducted on the first day of every month.

At the beginning of flowering on 23 July 2024, an average flowering rate of 23% was recorded in the control plot. On 25 July 2024, flowering entered an intensive stage. The flowering rate in the control plot was 32.2%. By 27 July 2024, flowering had reached an almost complete stage.

The analysis of the observations of plant flowering dynamics conducted from 23 to 27 July showed

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that flowering rates were significantly higher in variants 5, 6, 9 and 10, in which liquid micronutrient fertilizers were applied at the specified rates, compared with the control variant.

The obtained observation results showed that, in addition to higher indicators of plant height, number of true leaves and number of fruiting branches, the application of physiologically active substances also had a positive effect on flowering dynamics.

In the control variant, these indicators amounted to 23.3%, 32.2% and 64.3%, respectively. In variants 5, 6, 9 and 10, in which liquid micronutrient fertilizers were applied three times, the results amounted to 29.2–30.8%, 43.7–46.6% and 76.2–77.5%, respectively. Thus, it was determined that these variants had higher indicators of plant flowering dynamics.

Table 1 Effect of micronutrient fertilizers on the flowering dynamics of cotton plants, %, 2024

No.	Experimental variants	Application rate at the 2–3 true-leaf stage, kg or L/ha	Application rate during the budding–flowering stage, kg or L/ha	Application rate during the flowering and fruiting stage, kg or L/ha	23 July	25 July	27 July
1	Control	–	–	–	23.3	31.2	62.3
2	Standard treatment, Universal	1.0	1.0	1.0	27.5	37.0	69.8
3	Avangard Start	1.0			24.1	33.0	64.5
4	Avangard Start	1.0	1.5		26.9	37.6	74.8
5	Avangard Start	1.0	1.5	2.0	29.7	45.8	77.1
6	Avangard Start	1.5	2.5	3.0	29.2	43.7	76.2
7	Avangard Nitrogen + Micro	1.0			24.2	33.2	65.0
8	Avangard Nitrogen + Micro	1.0	1.5		27.0	36.6	74.9
9	Avangard Nitrogen + Micro	1.0	1.5	2.0	29.2	45.9	77.5
10	Avangard Nitrogen + Micro	1.5	2.5	3.0	29.2	44.7	76.3

CONCLUSION

During the phenological observations, the overall condition of the plants improved in the variants where micronutrient fertilizers were applied three times. This resulted in an increase in the number of fruiting branches and buds, as well as higher flowering dynamics. The application of micronutrient fertilizers improved the photosynthesis process of cotton plants and accelerated their development, thereby making it possible to increase crop yields. This, in turn, contributes to improving the efficiency of agricultural production and increasing resistance to the effects of abiotic stresses such as climate change.Therefore, the use of physiologically active substances and micronutrient fertilizers to improve cotton yields may play an important role in developing drought-resistant crops.

REFERENCES

1. Xo‘jayev, J.X. Plant Physiology. Textbook. Tashkent, 2004.
2. Davronov, Q. “The Effect of Applying the Bioenergiya Biofertilizer in Cotton Cultivation on Cotton Yield.” Agriculture of Uzbekistan, 2018, pp. 41–42.

Web of Agriculture: Journal of Agriculture and Biological Sciences
webofjournals.com/index.php/8

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ISSN (E): 2938-3781

3. Davronov, Q., and Abdullayeva, G. “The Role of Micronutrients in Plant Life.” Proceedings of the International Scientific and Practical Conference titled Prospects for the Innovative Development of Agriculture in New Uzbekistan, 15 May 2024, pp. 70–75.
4. Davronov, Q., and Teshaboyev, N. “The Effect of Foliar Application of Micronutrient Fertilizers in Cotton Cultivation on the Flowering Dynamics of Cotton Plants.” Agro Ilm, Collection of Articles on Agriculture and Water Management of Uzbekistan, No. 1, 2023, pp. 2–3.
5. Davronov, Q.A., and Ibragimova, D.Q. “Foliar Biostimulants Affecting Cotton Plants and Their Advantages.” Scientific Bulletin of Fergana State University, Vol. 31, Issue 3, 2025, pp. 83–85.
6. Davronov, Q., and Teshaboyev, N. “The Effect of Foliar Application of Micronutrient Fertilizers on the Weight of 1,000 Cotton Seeds and the Weight of Seed Cotton per Boll.” Science and Innovation, Vol. 2, No. 8, 2023, pp. 489–492.
7. El-Tanahy, A.M.M., Sami H. Mahmoud, Mohamed S.A. Abd Elwahed, and Dina M. Salama. “Enhancing Celery’s Growth, Production, Quality, and Nutritional Status Using Tryptophan and Glycine Amino Acids.” Scientific Reports, Nature Publisher Group, London, Article 26574.
8. Ibragimov, O.O., and Davronov, Q.A. “Measures to Prevent the Shedding of Fruit Buds under the Influence of Agrotechnical Factors in Cotton Cultivation.” In Current State and Development Prospects of Agricultural Crop Breeding and Seed Production. Collection of Articles of Tashkent State Agrarian University and the Research Institute of Cotton Breeding, Seed Production and Cultivation Agrotechnologies, Part 2. Tashkent, 2015, pp. 390–393.
9. Tillabekov, B.X., Qodirxo‘jayeva, M.F., Karimov, Sh., Azimova, M., and Farmonov, S. “The Effect of Suspensions on Cotton Yield.” In Introduction of New Resource-Saving Agrotechnologies in Agriculture. Collection of Articles of the Uzbek Cotton Research Institute. Tashkent, 2011, pp. 164–166.
10. Tillabekov, B.X., Qodirxo‘jayeva, M.F., Xayitboyev, X., and Siddiqova, D. “The Effect of the Timing of Suspension Application on the Technological Properties of Cotton Fibre.” In Improvement of Agrotechnologies for the Cultivation of Cotton and Crops Included in the Cotton Complex. Collection of Articles of the Uzbek Cotton Research Institute. Tashkent, 2013, pp. 185–188.
11. Ulug‘ov, Ch.X. Cotton Growing. Textbook. Tashkent, 2021.

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webofjournals.com/index.php/8