

Effectiveness of microfertilizers in corn cultivation

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Abstract: The effectiveness of various microfertilizers in corn cultivation under the conditions of the Samarkand region was studied. The highest effectiveness was achieved with the use of alcohol-based microfertilizers in combination with NPK, which ensured high rates of plant growth, development, and yield.

Keywords: corn, mineral fertilizer, microfertilizer, growth, development, yield

Introduction. Increasing grain production in our republic largely depends on the full utilization of the potential of grain crops, including maize varieties and hybrids, and improving their productivity and grain quality. Maize is one of the most valuable and high-yielding crops, having food, fodder, technical, and agrotechnical significance.

In the modern farming system, growing maize varieties and hybrids as a secondary crop is one of the urgent issues. At the same time, studying the effect of various microfertilizers on the yield of maize cultivated as a secondary crop is of both theoretical and practical importance.

To form the green mass yield of maize, the nutrient use coefficients of applied fertilizers were calculated. It was determined that plants utilize 45-68% of nitrogen from nitrogen fertilizers, 4.0-13.6% of phosphorus from phosphorus fertilizers, and 86-100% of potassium from potassium fertilizers. When $N_{60}P_{60}K_{60}$ kg/ha was applied, the plant height increased by 6.8-10.6%, depending on the hybrid and preceding crop. Fertilizer application increased dry matter accumulation by 11.7-23.4% and yield by 9.5-16.0%.

Under the conditions of the Samarkand region, the potential for increasing maize yield through the use of microfertilizers has not been sufficiently studied. In particular, the effect of microelements on the photosynthetic potential, net photosynthetic productivity, and combined use of macro- and microelements remains a relevant topic.

Research Methods.

The research was conducted based on the guidelines “Methodological Recommendations for Conducting Field Experiments with Corn”, “Methods of Field Experiments for Studying Agrotechnical Practices for Maize Cultivation”, and “Methods of State Variety Testing of Agricultural Crops”. Statistical analysis of the results was carried out according to B.A.Dospekhov’s “Methods of Field Experimentation” using the dispersion analysis method and processed using Excel 2010 and Statistica 7.0 for Windows.

Results and Discussion

Although the elements of the yield structure in maize depend on the biological characteristics of each variety or hybrid, the study revealed differences in yield components of the Uzbekistan-306 AMV hybrid under the influence of various microfertilizers.

The number of ears per plant ranged from 1.04 to 1.30, with the highest number (1.30) observed in the variant treated with copper microfertilizer and the lowest (1.04) in the variant treated with zinc microfertilizer. However, despite the greater number of ears per plant under copper treatment, this variant showed the lowest results in ear mass and 1000-grain weight.

№	Experimental variant	Number of ears per plant	Grain mass per ear (g)	1000-grain weight (g)
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1	Without fertilizer (control)	1.02	55.2	156.6
2	NPK background	1.07	57.3	174.3
3	NPK + Cu	1.18	68.7	198.5
4	NPK + Zn	1.30	62.8	185.8
5	NPK + Mn	1.15	70.5	219.6
6	NPK + Mo	1.14	78.6	211.2

Indeed, the 1000-grain weight depends on the rate and duration of grain filling. Unfavorable external conditions can significantly affect this process. Many studies indicate that yield reduction is more strongly influenced by a decrease in the number of formed grains than by a decrease in grain weight.

In the experiment, under the influence of various microfertilizers, the grain yield of maize grown as a secondary crop averaged 38.0-45.9 centners per hectare. The lowest grain yield was obtained with copper microfertilizer, while the highest yield was achieved with zinc microfertilizer.

№	Experimental variant	I	II	III	Average
1	Without fertilizer (control)	33.7	35.4	33.8	34.7
2	NPK background	72.2	67.5	73.7	69.7
3	NPK + Cu	81.3	75.1	75.8	78.2
4	NPK + Zn	73.9	76.5	71.6	74.5
5	NPK + Mn	79.8	83.0	79.2	81.1
6	NPK + Mo	78.4	75.6	73.6	77.2

Conclusion

Based on the obtained data, zinc microfertilizer showed the best results in terms of maize growth and development compared to other microfertilizers. Although no significant difference was observed between zinc and molybdenum treatments, both had a positive influence on the yield structure elements. When various biologically active substances and microfertilizers were applied in secondary maize cultivation, the average grain yield ranged from 38.0 to 45.9 c/ha. The lowest yield was recorded with copper microfertilizer, while the highest yield was obtained with zinc microfertilizer.

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