



INFLUENCE OF MINERAL FERTILIZER RATES ON COTTON YIELD IN NO-TILL FARMING SYSTEMS

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ABSTRACT

This article examines the effect of mineral fertilizers applied at different rates on yield components and productivity of cotton under no-till technology. The research was conducted in 2024 under field experimental conditions using six treatments with three replications. During the experiment, the influence of mineral fertilizers on cotton yield under no-till conditions was determined, and a comparative analysis of the treatments was carried out. The obtained results showed that the application of mineral fertilizers at optimal rates under no-till technology significantly improves the formation of yield components and increases the overall productivity of cotton.

Introduction. In recent years, the introduction of technologies aimed at preserving soil fertility, ensuring efficient use of water and energy resources, and maintaining environmental sustainability has become increasingly important in agriculture. The main direction in the development of modern agricultural production requires the adoption of methods, technologies, and technical means adapted to specific soil and climatic conditions [2]. Among such approaches, no-till technology (direct seeding without soil tillage) contributes to sustainable crop production by reducing soil degradation, conserving soil moisture, and slowing down the decomposition of organic matter. Studies have shown that the no-till system has a high potential for conserving soil moisture and increasing crop productivity [3]. However, it has also been reported that during the initial years of implementation, the no-till system may lead to a slight reduction in yield, although these negative effects tend to diminish over the long term [4]. Therefore, determining the optimal rates and ratios of mineral fertilizers for cotton cultivation under no-till conditions is of significant scientific and practical importance.

The main objective of this study was to investigate the effect of mineral fertilizers applied at different rates on cotton yield under no-till technology.

Materials and Methods. The research was conducted in 2024 under field conditions on irrigated meadow-alluvial soils in the Nukus district using no-till technology. The experimental design consisted of six treatments with three replications. Treatment I was taken as an unfertilized control, while mineral fertilizers were applied at different rates in treatments II–VI.

In each treatment, 30 cotton plants were randomly selected for phenological observations and determination of final yield parameters. The weight of cotton per boll was calculated based

on all harvests. Cotton yield was determined in centners per hectare (c/ha), and the mean values were statistically analyzed [1].

Results. According to the results obtained for cotton yield, productivity across the experimental treatments ranged from 20.1 to 32.8 c/ha, with significant differences observed among the treatments (Table 1). The lowest yield was recorded in Treatment I, where no fertilizers were applied, with an average yield of 20.1 c/ha. In contrast, the application of mineral fertilizers at higher rates in Treatment II resulted in the highest cotton yield of 32.8 c/ha, which was 12.7 c/ha higher than that of the control treatment.

Table 1

Cotton yield, c/ha, 2024

Treatments	Replications			Average	Difference, ±
	I	II	III		
Control	20,5	20,0	19,8	20,1	00
N ₂₅₀ P ₁₇₅ P ₁₂₅	34,0	32,5	32,0	32,8	+12,7
N ₀ P ₅₀ P ₂₅	27,2	27,1	25,2	26,5	+6,4
N ₁₀₀ P ₇₀ P ₅₀	28,5	26,4	25,4	26,7	+6,6
N ₁₂₅ P ₉₀ P ₆₀	29,3	26,5	24,5	27,1	+6
N ₁₅₀ P ₁₀₀ P ₇₅	30,5	30,8	29,6	30,3	+10,2

The average cotton yield in treatments with moderate application of mineral fertilizers (III, IV, and V treatments) was 26.5, 26.7, and 27.1 c/ha, respectively. One of the highest yield values was recorded in treatment VI, with an average of 30.3 c/ha. In this treatment, the optimal ratio of mineral fertilizers positively influenced cotton growth and the formation of yield components.

Overall, the results of the experiment demonstrated that the correct determination of the rates and ratios of mineral fertilizers is crucial for improving cotton yield components, increasing the weight of cotton per boll, and achieving high and stable productivity.

Conclusion. The results of the field experiments indicate that the application of mineral fertilizers under no-till technology positively affects the formation of cotton yield components and the final productivity. The control treatment without fertilizers showed the lowest cotton yield, while treatments with mineral fertilizers significantly increased productivity. The highest and most stable cotton yields were recorded in treatments with high and optimal fertilizer rates. The scientifically justified application of mineral fertilizers at proper rates and ratios contributed to an increase in cotton boll weight, complete formation of yield components, and overall yield improvement. In general, the use of optimal mineral fertilizer rates under no-till technology is an important agrotechnical factor for obtaining high and stable cotton yields.

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