# EFFECT OF ORGANO-MINERAL COMPOSTS ON COTTON YIELD IN SALINATED LANDS

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**Abstract:** *This article highlights the importance of using organo-mineral composts to improve the efficiency of cotton cultivation in saline soils. Due to their poor agrotechnical properties, saline lands have a negative impact on the yield of agricultural crops, particularly cotton. During the study, composts prepared from various organic materials (manure, glauconite agro-ore, and licorice waste) were tested. Their effects on cotton growth, development, and final yield were analyzed. The results showed that the use of organo-mineral composts had a positive impact on reducing soil salinity, improving the agrochemical properties of the soil, and increasing cotton productivity. Notably, the application of 22 tons of organo-mineral compost containing a mixture of 16 tons of manure, 3 tons of glauconite, and 3 tons of licorice waste significantly optimized the cotton vegetation period and considerably improved both the quality and quantity of the yield. The article also discusses the ecological and economic advantages of this method. The findings of the study serve as a scientific and practical basis for establishing sustainable agriculture in saline-prone regions.*

**Keywords:** *Soil, cotton, organo-mineral compost, manure, organic and mineral fertilizers, licorice waste, productivity.*

**INTRODUCTION.** In the present day, the rational and efficient use of land resources - particularly for agricultural production on saline soils - has become one of the most pressing issues. In Uzbekistan, the salinization level of irrigated lands, which constitute a significant portion of the country's agricultural area, is increasing year by year. As a result of salinization, the physical, chemical, and biological properties of the soil deteriorate, severely affecting plant growth, development, and ultimately, crop productivity [4, p. 284; 6, p. 236]. Therefore, it is necessary to develop modern, ecologically safe, and economically viable agrotechnical measures to improve crop production efficiency on saline soils.

In recent years, the use of organo-mineral composts has been recognized as an effective method for enhancing the productivity of saline lands. These composts contain not only organic matter but also mineral components rich in macro- and microelements. They play a crucial role in improving the physicochemical properties of soil, regulating water regimes, increasing the activity of beneficial microorganisms, and restoring soil structure [3, pp. 34-39; 7]. Moreover, composts prepared using organic wastes (such as

manure and licorice processing residues) and natural mineral resources (such as glauconite, phosphorite, and bentonite) are considered cost-effective, environmentally friendly, and suitable for sustainable agriculture [5, pp. 19-23; 8, pp. 28-31].

Cotton is a leading technical crop in Uzbekistan's agriculture, and its productivity is directly influenced by soil conditions, nutrient balance, and proper implementation of agrotechnical practices. The results of research conducted by Egamberdiyev indicate that under saline conditions, the growth phases of cotton, photosynthetic activity of leaf surface, root system development, and the ability to form fiber yield are significantly reduced [2, p. 192]. From this perspective, the application of organo-mineral composts in saline soils can improve agro-ecological conditions, stabilize yields, and enhance soil fertility.

This study investigates the effects of various compositions of organo-mineral composts-recommended for saline soils-on the growth, development, and productivity of cotton. The composts were prepared using manure, glauconite, and licorice waste in specific ratios and evaluated under experimental conditions. Based on the research results, the effectiveness of these mixtures was assessed in terms of reducing soil salinity and increasing cotton yield. These findings provide a scientific and practical foundation for the development of sustainable agriculture in saline-affected regions.

**MATERIALS AND METHODS.** The experiment was conducted using the field method. The yield indicators of cotton were determined and subjected to dispersion analysis using the methodology described in Dospekhov's "Методика полевого опыта" [1].

The research consisted of 4 replicates of 9 options, and the options were arranged in a systematic manner. In the control variant, the full annual rate of mineral fertilizers was applied at N250, P175, and K125 kg/ha. In the other variants, the rates of mineral fertilizers were reduced to N185, P130, and K90 kg/ha. In variants 2 to 4, organic fertilizer (well-decomposed cattle manure) was applied under plowing at rates of 10, 15, and 20 tons per hectare, respectively.

In variants 5 to 9, organo-mineral composts were prepared by mixing well-decomposed cattle manure, glauconite agro-ore, and licorice processing waste in different proportions and applied under plowing. Specifically: compost-1 was applied at 12 t/ha (6 t manure + 3 t glauconite + 3 t licorice waste), compost-2 at 14 t/ha (6 t manure + 5 t glauconite + 3 t licorice waste), compost-3 at 20 t/ha (16 t manure + 1 t glauconite + 3 t licorice waste), compost-4 at 22 t/ha (16 t manure + 3 t glauconite + 3 t licorice waste) and compost-5 at 24 t/ha (16 t manure + 5 t glauconite + 3 t licorice waste).

**RESULTS AND DISCUSSIONS.** The average cotton yield across different organo-mineral compost treatments during the 2021—2023 experimental period is presented in Figure 1. These results serve to evaluate the influence of various agro-technical measures—particularly organo-mineral composts—on the growth and productivity of cotton in saline soils.

During the study years, a certain decline in yield was observed across all treatments. This reduction may have been caused by natural climatic conditions, water availability, soil salinity levels, and other agro-ecological factors. Nevertheless, in treatments where organo-mineral composts were applied, the decrease in yield was notably less severe compared to the control treatment. For instance, in Variant 1 (control), yield declined from 25.7 to 23.8 centners per hectare, whereas in Variant 8, it decreased only slightly from 31.9 to 29.9 centners per hectare, maintaining a relatively high and stable yield level. This suggests that the application of composts improved the physical, chemical, and biological properties of the soil, thereby enhancing the plant's resistance to environmental stress.

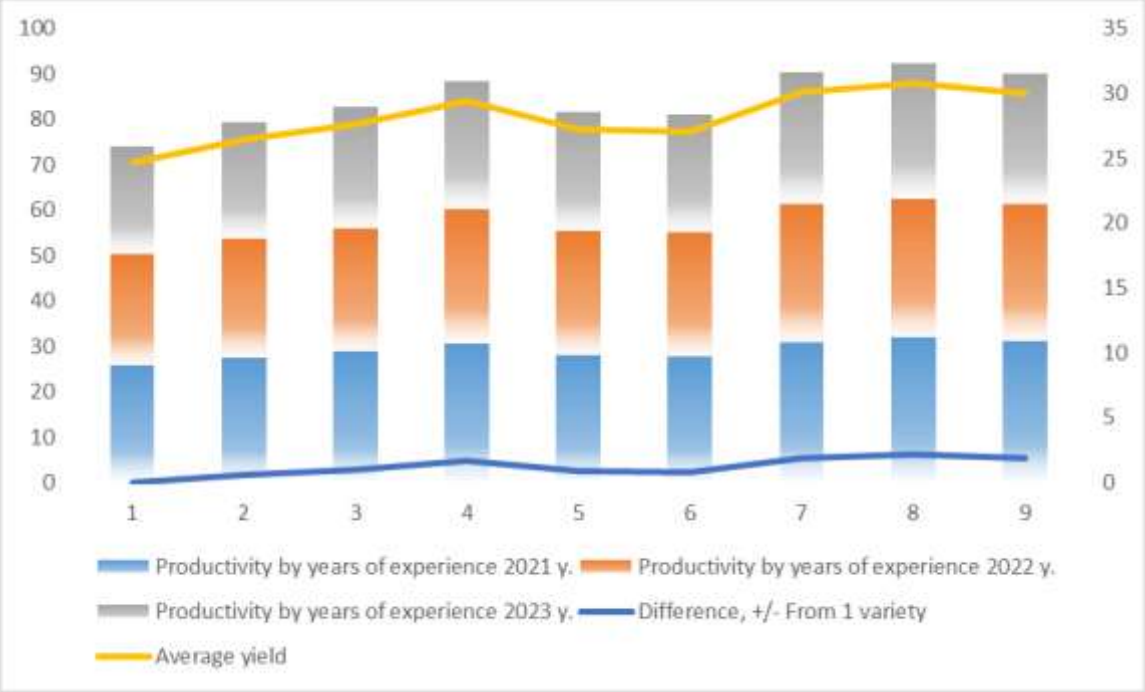


**Figure 1.** Average cotton yield by year, c/ha (2021-2023).

The impact of each treatment on yield was as follows:

Option 1 (Control) showed the lowest yield, with an average of 24.7 centners per hectare, indicating that in saline soils, the absence of organic matter results in low productivity.

Options 2, 3, and 4, which consisted of different combinations of organic and mineral fertilizers, demonstrated significantly higher yields, ranging from 26.5 to 29.4 c/ha compared to the control. These values suggest that these agro-technical measures were moderately effective in improving yield.

In options 5 and 6, the average yield ranged from 27.0 to 27.2 c/ha, which is 2.3—2.5 c/ha higher than the control, showing promising results. This indicates that the organo-mineral composts used in these variants were effective in reducing soil salinity and improving nutrient balance.

Options 7, 8, and 9 recorded the highest yield levels, with average yields ranging from 30.0 to 30.8 c/ha. Notably, Variant 8 stood out with an additional 6.1 c/ha increase over the control. This demonstrates the high efficiency of this compost combination (consisting of manure, glauconite, and licorice processing waste) in improving soil structure, enhancing microbial activity, and creating favorable conditions for plant growth.

The $LSD_{0.05}$ (Least Significant Difference) values presented in the figure for annual yield differences ranged between 1.1 and 1.4 c/ha, with all positive differences exceeding the LSD threshold. This confirms that the yield increases observed in each organo-mineral compost treatment were statistically significant. For example, the 6.1 c/ha increase in Variant 8 compared to the control represents a highly significant difference, making it both scientifically and practically important.

The findings clearly demonstrate that the application of organo-mineral composts is a highly effective approach to increasing agricultural productivity in saline soils. The results of the study show that a well-formulated mixture of organic and mineral fertilizers helps to reduce soil salinity, improve nutrient balance, enhance microbial activity, and optimize the physical and chemical properties of the soil. As a result, plant growth and development improve, leading to a substantial increase in yield.

Moreover, the use of organo-mineral composts not only boosts productivity but also plays a crucial role in ensuring soil sustainability and improving ecological conditions. This, in turn, supports the long-term sustainable development of agricultural production.

**CONCLUSION.** In the conducted field experiment, the effect of composts with different compositions on cotton yield was studied. When composts prepared in varying quantities were applied, the average yield ranged from 27.0 to 30.8 centners per hectare. The highest yield, including both the immediate and residual effects, was obtained with Compost-4 at a rate of 22 t/ha, resulting in an additional cotton yield of 6.1 centners per hectare compared to the control.

In addition, the use of these composts in combination with a 25% reduced rate of mineral fertilizers also yielded effective results. This indicates their agronomic efficiency and highlights their relevance from both economic and environmental perspectives. The study shows that organo-mineral composts can serve as an important tool for increasing cotton productivity and expanding sustainable cultivation practices in saline-affected soils.

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