



THE EFFECT OF POTASSIUM FERTILIZER ON SESAME CROP YIELD IN SANDY DESERT SOILS

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ABSTRACT

This study investigates the influence of potassium (K) fertilizer application on the growth and yield of sesame (Sesamum indicum L.) cultivated in sandy desert soils. The experiment was conducted under arid climatic conditions typical of desert regions, where soil fertility is generally low. The findings revealed that the application of potassium significantly improved plant growth, capsule formation, and seed yield compared to the control group. The study emphasizes the importance of balanced potassium fertilization for enhancing sesame productivity and maintaining soil fertility in desert agro-ecosystems.

1. Introduction

Sesame (*Sesamum indicum* L.) is one of the oldest oilseed crops cultivated for its high-quality edible oil and protein-rich seeds. It is well adapted to arid and semi-arid environments, making it suitable for cultivation in desert regions such as those found in Central Asia. However, the productivity of sesame is often limited by the low fertility of sandy desert soils, which are deficient in essential nutrients, particularly potassium.

Potassium is a macronutrient that plays a vital role in photosynthesis, enzyme activation, water regulation, and stress resistance in plants. In sesame, potassium contributes to improved oil content, seed weight, and resistance to drought. Therefore, understanding the response of sesame to potassium fertilizer application in sandy desert soils is crucial for optimizing yield and sustainable cultivation practices.

2. Materials and Methods

The field experiment was conducted during the growing season on sandy desert soils located in a dry climatic zone. The experimental design included four treatments with different potassium application rates:

- **K₀**: control (no potassium applied)
- **K₁**: 60 kg K₂O/ha
- **K₂**: 90 kg K₂O/ha
- **K₃**: 120 kg K₂O/ha

Potassium sulfate (K₂SO₄) was used as the source of potassium. Sesame seeds of the local variety were sown at a spacing of 45 × 10 cm. Standard agronomic practices such as irrigation, weeding, and pest control were followed.

Soil samples were analyzed before sowing and after harvest for pH, organic matter, and

available K content. Growth parameters (plant height, number of capsules per plant) and yield attributes (seed yield and oil percentage) were recorded at maturity. Statistical analysis was performed using ANOVA to determine the significance of treatment effects.

3. Results and Discussion

The application of potassium fertilizer had a significant effect on sesame growth and yield. Compared with the control, all potassium treatments increased plant height, number of capsules per plant, and seed yield. The **K₂ (90 kg K₂O/ha)** treatment showed the best performance, producing the highest seed yield and oil content.

The improvement in yield parameters can be attributed to the role of potassium in photosynthesis and assimilate transport, which enhances seed filling and oil synthesis. Additionally, potassium improved the water-use efficiency of plants under arid conditions, which is crucial in sandy soils with low water-holding capacity.

Excessive potassium application (K₃) did not significantly increase yield compared to K₂, suggesting that 90 kg K₂O/ha is the optimal dose for sesame in sandy desert soils. These findings are consistent with previous studies indicating that moderate potassium fertilization enhances crop performance without causing nutrient imbalance.

4. Conclusion

The study concludes that potassium fertilizer significantly enhances the growth, yield, and oil content of sesame cultivated in sandy desert soils. The optimal application rate was found to be **90 kg K₂O/ha**, which ensures efficient nutrient utilization and sustainable productivity. Regular application of potassium fertilizers is recommended to improve soil fertility and ensure the economic viability of sesame production in arid and semi-arid regions.

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