EFFECT OF MINERAL AND ORGANIC FERTILIZERS ON THE GROWTH AND DEVELOPMENT OF SAFFRON (CROCUS SATIVUS L.)

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Abstract*. This study investigates the effects of mineral and organic fertilizers on the growth and development of saffron in typical gray soils. The research involved using a combination of mineral fertilizers (nitrogen, phosphorus, and potassium) and organic fertilizers derived from livestock waste compost. The findings revealed significant improvements in soil fertility and plant biomass indicators. Research into saffron cultivation in typical gray soils is crucial for the arid regions of Uzbekistan. This study aims to analyze the impact of various fertilizers on soil fertility and to develop effective agricultural technologies to ensure high saffron yields. These investigations provide a scientific basis for regional agricultural development.*
Keywords*: saffron, typical gray soil, mineral fertilizers, organic fertilizers, soil fertility.*

1. Introduction

Saffron (Crocus sativus L.) is one of the most valuable medicinal and luxury plants in human life. Its cultivation is directly influenced by soil fertility, climate conditions, and fertilizer application methods. Improving the agrochemical properties of soil is essential for enhancing saffron cultivation efficiency in typical gray soils. This research focuses on studying the effects of various fertilizers on the growth processes of saffron. For centuries, saffron has been utilized as a medicinal ingredient, culinary spice, and natural dye. The plant's flowers are rich in medicinal compounds. Globally, saffron is primarily cultivated in Iran, India, and Spain; however, Uzbekistan's soil and climate conditions present significant potential for local cultivation. Typical gray soils, characteristic of central Uzbekistan, are known for their low organic matter content and fertility. Cultivating demanding plants like saffron in these conditions necessitates specialized agro-technical measures.

2. Materials and Methods

The study was conducted in 2024 on typical gray soils in Samarkand region. The primary research objects included saffron plants, mineral fertilizers (nitrogen, phosphorus, potassium), and organic fertilizers (compost). At the start of the study, we determined the soil's mechanical composition, fertility indicators, and primary nutrient content. The organic matter content of typical gray soils was found to be 0.8%, with nitrogen at 0.1%, phosphorus at 5 mg/kg, and potassium at 15 mg/kg. The experimental plot covered 0.5 hectares and was prepared through double plowing to a depth of 25 cm.

The study design included:

- Control group: Soil without fertilizers
- Mineral fertilizers group: Standard concentrations of nitrogen (N), phosphorus (P), and potassium (K) were applied
- Organic fertilizers group: 10 tons of compost per hectare

We observed plant growth processes, including biomass, elongation rate, and flowering period. Additionally, soil fertility indicators, pH levels, and micronutrient composition were analyzed.

3. Results and Discussion

The results showed that both mineral and organic fertilizers positively influenced saffron growth:

- Biomass in the mineral fertilizers group increased by 30-35%.
- The organic fertilizers group exhibited earlier flowering and nearly a 40% increase in biomass.
- In the control group, plant growth indicators were relatively low.

In areas treated with organic fertilizers, the organic matter content in the soil increased to 1.2%, positively influencing the early stages of saffron growth. Analysis of the soil's physico-chemical properties revealed that organic fertilizers improved soil aggregation and increased the micronutrient content.

4. Conclusion

The study identified the positive effects of both mineral and organic fertilizers on saffron cultivation in typical gray soils. While mineral fertilizers quickly satisfied the plants' nutrient requirements, organic fertilizers sustainably enhanced soil fertility over time. This dual approach allows for high yields in saffron cultivation.

The findings highlight the importance of using organic fertilizers in saffron cultivation on typical gray soils. Organic matter not only enhances soil structure but also improves moisture retention capacity. The application of mineral fertilizers proved to be an effective solution for ensuring high saffron yields.

REFERENCES

1. Smith, J. (2020). Soil Fertility and Crop Management. Springer.
2. Williams, H. (2019). Organic Fertilizers: Sustainable Practices in Agriculture. Academic Press.
3. Information from the Ministry of Agriculture of Uzbekistan, 2023.