



Growth and Herbage Yield of *Ocimum Sanctum*: Vermicompost and Nitrogen Impact Analysis

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Abstract

Two experiments were conducted during the rainy season at Swami Shukdevanand College, Shahjahanpur, Uttar Pradesh, to analyze the impact of vermicompost and nitrogen on the growth and herbage yield of *Ocimum sanctum*. In the first experiment, five nitrogen levels ranging from 0 to 200 kg/ha were applied. In the second experiment, vermicompost was applied alone at a rate of 5t/ha, and a half dose of vermicompost with half doses of NPK at rates of 2.5t/ha, 75kg/ha, 25kgP/ha, and 25kgK/ha respectively. The results revealed that the optimum plant growth was achieved with 150kg N/ha, significantly higher than the control. In the second experiment, the combination of half vermicompost dose and NPK resulted in the best enhancement of plant growth and herbage yield in both main and ratoon crops. This suggests that the application of vermicompost can reduce the requirement for inorganic fertilizers, leading to economic savings while still producing favorable outcomes.

Keywords: *Ocimum sanctum*, vermicompost, nitrogen, growth, herbage yield

Introduction

Many medicinal plants have been used to treat various diseases since ancient times, with a growing demand for plant-based drugs and pharmaceuticals in the global market. *Ocimum sanctum* (Holy basil), belonging to the family Lamiaceae, is an important medicinal plant commonly known as "Tulsi" and is grown in households for religious purposes. Approximately 250-300 tons of oil are obtained from this crop annually, and the oil of *Ocimum* is highly beneficial in the production of numerous medicines. Therefore, there is a need to increase the production of its oil using organic and inorganic fertilizers. In this study, we attempt to investigate the effect of vermicompost and nitrogen fertilizers on the growth of *Ocimum sanctum*.

Material and Methods

The experiment involved planting 35-day-old *Ocimum sanctum* seedlings in rows spaced 30 x 30 cm apart within 5 square meter plots. Treatments included vermicompost at 2.5 t/ha and five nitrogen levels: 0, 50, 100, 150, and 200 kg N/ha. A randomized block design with five replicates was used. Nitrogen was applied in three stages, and irrigation was

provided after planting. The main crop was harvested in February.

In the second experiment, combinations of NPK and vermicompost were tested. Inorganic fertilizers were applied at 150:50:50 kg/ha (N:P:K) alongside vermicompost at 5 t/ha. Half doses of both were applied together for efficacy and economic analysis. Similar planting parameters were maintained, and the main and ratoon crops were harvested 90 days after planting and in February, respectively. Plant height and herbage yield were recorded post-harvest and subjected to statistical analysis.

Results and Discussion

The data presented in the table revealed that the application of nitrogen significantly increased plant height and herbage yield in both main and ratoon crops. This increase was directly proportional to the nitrogen doses, up to 150 kg N/ha. However, at 200 kg N/ha, the effectiveness was slightly diminished compared to 150 kg N/ha, as the plant height and herbage yield of both main and ratoon crops declined slightly but remained much higher than the control.

Table 1: Effect of nitrogen application on plant height and herbage yield.

Dose of Nitrogen (kg/ha)	Plant height (cm)		Herbage yield (t/ha)		Total herbage(t/ha)
	Main Crop	Ratoon Crop	Main Crop	Ratoon Crop	
0	42.2	41.0	3.78	6.75	10.35
50	55.6	54.5	7.70	11.25	18.95
100	61.6	61.1	10.85	15.15	26.00
150	68.0	67.2	15.10	16.75	31.85
200	64.7	66.2	12.20	16.35	28.55

Table 2: Effect of vermicompost and inorganic fertilizers on plant height and herbage yield.

Dose of Nitrogen (kg/ha)	Plant height (cm)		Herbage yield (t/ha)		Total herbage(t/ha)
	Main Crop	Ratoon Crop	Main Crop	Ratoon Crop	
0	52.0 51.5	3.895.02	8.91	0	52.0 51.5
50	57.5 57.0	6.786.78	13.56	50	57.5 57.0
100	67.1 67.6	11.72 10.65	22.37	100	67.1 67.6
150	70.2 69.5	12.44 11.04	23.48	150	70.2 69.5
0	52.0 51.5	3.895.02	8.91	0	52.0 51.5

The data presented in Table 2 indicates that applying vermicompost at a rate of 5 t/ha increased plant height and herbage yield in both main and ratoon crops. Similarly, the application of NPK 15:50:50 kg/ha increased plant height and herbage yield in the ratoon crop, surpassing both the control and vermicompost treatment. When half doses of NPK (75:25:25) and vermicompost (2.5 t/ha) were combined, there was an increase in plant height and herbage yield in both main and ratoon crops compared to the full dose of NPK alone.

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