

## EFFECT OF VERMICOMPOST MANURE ON GROWTH AND YIELD OF OKRA (*Abelmoschus esculentus* L.)

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### ABSTRACT

The research aimed to investigate the impact of varying doses of vermicompost on the growth and productivity of okra (*Abelmoschus esculentus*). Study conducted over four months from March to August 2024 at the IUBAT Agricultural Research Station (IARS) in Rajendrapur, Gazipu. The experiment followed a Randomized Complete Block Design (RCBD) with four treatments ( $T_0$  = control,  $T_1$  = vermicompost 1 dose,  $T_2$  = vermicompost 2 doses, and  $T_3$  = vermicompost 3 doses) and three replications. Data were collected on morphological, phenological, and yield parameters, including plant height, number of flowers, fruit weight, and total yield. The findings revealed that the application of vermicompost had a significant positive influence on both the growth and yield of okra plants. The highest dose of vermicompost ( $T_3$ ) led to the best performance, with an increased plant height, no. of flowers, fruit number, and overall yield. Plants treated with  $T_3$  produced an average fruit yield of 15.6 tons per hectare, which was substantially higher than the control ( $T_0$ ). The intermediate treatments,  $T_1$  and  $T_2$ , also showed improvements over the control but were outperformed by the highest dose. Hence, the results highlight the potential of organic manure as a sustainable alternative to chemical fertilizers, offering promising benefits for okra cultivation in sub-tropical climates of Bangladesh.

**Key words:** Vermicompost, sustainable agriculture, okra, growth, yield.

### Introduction

Organic fertilizers, particularly vermicompost, are increasingly recognized for their role in enhancing crop productivity and improving soil health sustainably (Abou El-Nour *et al.*, 2022; Gupta and Thakur *et al.*, 2022). Vermicompost, a product of organic waste decomposition through earthworms, is rich in essential nutrients and microbial activity, making it an effective soil amendment. Previous studies have demonstrated its positive impact on plant growth and yield by improving soil structure, water retention, and nutrient availability (Jahan *et al.*, 2021; Mishra and Sahoo, 2023). Additionally, vermicompost can significantly enhance nutrient uptake efficiency in okra, contributing to higher yields and better fruit quality (Rao and Patel, 2022; Yadav and Sharma, 2023), which is a valuable vegetable crop widely cultivated in tropical and subtropical regions, is renowned for its nutritional benefits, including high fibre, vitamins, and antioxidants. This study aims to evaluate the effect of different doses of vermicompost on the growth and yield of okra. Specifically, it seeks to (i) determine the influence of varying vermicompost levels on okra's growth parameters, and (ii) assess yield responses to these applications. By integrating organic amendments like vermicompost into farming systems, this study also addresses broader goals of improving soil fertility and reducing dependency on chemical fertilizers, aligning with the principles of sustainable agriculture (Sharma and Singh *et al.*, 2023).

### Materials and Methods

The experiment was completed at the agricultural research from of IUBAT at Rajendrapur, Gazipur during May to august 2024 to find the yield response of okra to different doses of vermicompost. The experimental site had sub-tropical climate. It was characterized by high temperature accompanied by moderate high rainfall during kharif season (April to September) and low temperature in the Rabi season

(October to March). The experiment followed a Randomized Complete Block Design (RCBD) with four treatments ( $T_0$  = control,  $T_1$  = vermicompost 1 dose,  $T_2$  = vermicompost 2 doses, and  $T_3$  = vermicompost 3 doses) and three replications. Weeds and other stables were collected and removed carefully from the experimental plot and levelled properly. The experiment plot was prepared by several ploughing and cross ploughing followed by laddering and harrowing with tractor and power tiller in the first week of May 2024. During the last stage of land preparation, the entire amount of cow dung, TSP, and half of the MOP were applied to the plot as a baseline dosage. Ammonium molybdate was also used as a base treatment, and boric acid (16% B) was used to apply the element. The remainder of the MOP was administered in two equal instalments at 15 and 30 days after transplanting, while urea was applied in three equal instalments at 15, 30 and 45 DAT. The seeds were soaked overnight into water before sowing. Seeds were dibbled at about 1.5 cm depth in the soil. Two seeds were placed in each hole. After successful growth, the morphological, phenological, and yield-related data were recorded, focusing on parameters such as plant height, number of flowers, fruit weight, and ultimately yield as well as yield attributes of Okra. The data obtained in respect of all the characters has been subjected to the statistical analyses as follows: Mean =  $\frac{\sum x}{n}$ ; Where,  $\sum x$  = the sum of all the observations,  $n$  = Number of observations.

## Results and Discussion

### *Plant height*

The study revealed insightful results across three distinct time points (25, 50 and 75 DAT) for a variety of treatments. The control treatment ( $T_0$ ) served as the baseline, with measurements of 14.07, 46.65, and 76.20 at the respective time points, while, the application of Vermicompost 3 dose ( $T_3$ ) showed values of 16.79, 92.10, and 107.70 cm (Table 1). These findings provide a comprehensive understanding of the effects of different treatments on okra growth, yield, and quality, facilitating robust comparisons and informed conclusions.

Table 1. Effect of vermicompost on plant height of okra

Treatments	25 Days	50 Days	75 Days
$T_0$	14.07	46.65	76.20
$T_1$	15.38	58.00	79.45
$T_2$	16.48	82.30	105.00
$T_3$	16.79	92.10	107.70
CV%	7.85	30.16	16.55
SD	1.24	21.04	16.56

### *Number of leaves for plant*

The different treatment of nutrient management created measurable impact on number of leaves or plant of okra at the three period of observation (25 DAT, 50 DAT, and 75 DAT). The control treatment ( $T_0$ ) established the baseline, recording leaf numbers of 4.00, 9.20, and 12.50. The application of the vermicompost 3 dose ( $T_3$ ) influenced growth, producing leaf numbers of 4.45, 19.45, and 20.45 (Table 2). These comprehensive findings shed light on the diverse effects of treatments, enabling robust comparisons and providing valuable insights into the strategies for enhancing okra growth and leaf quality.

### *Yield and yield attributes of okra*

The findings demonstrated that the application of vermicompost significantly enhanced the yield of okra plants. Among the treatments, the highest dose of vermicompost ( $T_3$ ) consistently showed superior results, leading to increased fruit length, and total yield. The treatment produced the highest yield of 15.6 tons per hectare, indicating its effectiveness in boosting okra productivity. The control group ( $T_0$ ) displayed the least

growth and yield performance, reaffirming the importance of organic manure application in agricultural practices (Table 3).

Table 2. Effect of vermicompost on leaves per plant of okra

Treatments	25 Days	50 Days	75 Days
T <sub>0</sub>	4.00	9.20	12.50
T <sub>1</sub>	4.25	13.15	17.25
T <sub>2</sub>	4.30	15.55	19.75
T <sub>3</sub>	4.45	19.45	20.45
CV%	4.40	29.89	20.57
SD	0.19	4.30	3.60

Table 3. Effect of vermicompost on yield and yield contributing attributes of okra

Treatments	Fruit length (cm)	Fruit diameter (cm)	Weight (g)	Yield (t/ha)
T <sub>0</sub>	12.54	1.42	17	91.49
T <sub>1</sub>	13.44	1.52	18.2	97.95
T <sub>2</sub>	15.5	1.58	21.4	141.17
T <sub>3</sub>	18.9	1.78	27.2	156.39

The study noted that vermicompost, a type of fertilizer derived from earthworm castings, has a positive impact on okra (*Abelmoschus esculentus*) growth and yield. Studies have shown that using vermicompost can lead to increased germination rates, enhanced plant growth, and higher fruit yields compared to traditional methods or chemical fertilizers

### Conclusion

The study concluded that vermicompost plays a crucial role in improving the growth and yield of okra. Higher doses of vermicompost not only improved morphological traits like plant height and branching but also led to a significant increase in the number and weight of fruits. The treatment T<sub>3</sub>, with the highest vermicompost dose, emerged as the most effective, significantly outperforming the control and lower doses in all measured parameters. These findings suggest that vermicompost can serve as a viable and environmentally friendly alternative to synthetic fertilizers, promoting sustainable okra cultivation.

### Recommendations

For sustainable farming, vermicompost should be used along with chemical fertilizers, organic practices, crop rotation, mulching, and pest management to maintain soil fertility and boost up productivity. Farmers should regularly assess soil nutrient levels and explore vermicompost's effects on other crops, soil types, and climates. Government agencies, agricultural extension services, and NGOs should provide training and demonstration plots to promote vermicompost use. Economic feasibility studies are needed to evaluate its cost-effectiveness, particularly for small-scale farmers. Further research on its long-term impact on soil health and crop productivity is recommended for more sustainable agricultural practices.

### References

Abou El-Nour, M. M., Abdelhamid, M. T., and Hussein, M. M. 2022. Effect of organic and inorganic fertilizers on growth and yield of okra (*Abelmoschus esculentus* L.) under saline conditions. *J. Plant Nutri.*, 45(10), 1525-1536. <https://doi.org/10.1080/01904167.2021.2018991>

- Gupta, R., and Thakur, S. 2022. Comparative analysis of organic and chemical fertilizers on growth, yield, and nutrient content of okra. *Indian J. Agric. Sci.*, 92(8), 1121-1126. <https://doi.org/10.5958/2231-636X.2022.00158.9>
- Jahan, M., Ahmed, S. and Alam, M. 2021. Role of vermicompost and organic fertilizers in improving soil fertility and crop productivity in okra production systems. *Agriculture*, 11(9), 823. <https://doi.org/10.3390/agriculture11090823>
- Mishra, R. and Sahoo, N. R. 2023. Impact of vermicompost on soil fertility, nutrient uptake, and yield of okra under sustainable farming systems. *Sustainable Agric. Res.*, 12(1), 45-55. <https://doi.org/10.5539/sar.v12n1p45>
- Rao, M. J. and Patel, J. P. 2022. Synergistic effect of vermicompost and inorganic fertilizers on growth, yield, and quality of okra (*Abelmoschus esculentus* L.). *J. Applied Hort.*, 24(2), 128-132. <https://doi.org/10.37855/jah.2022.v24i02.24>
- Sharma, R. and Singh, D. K. 2023. Impact of organic manures and inorganic fertilizers on yield and soil properties in okra (*Abelmoschus esculentus* L.). *Sustainable Agric. Res.*, 12(1), 98-106. <https://doi.org/10.5539/sar.v12n1p98>
- Yadav, P. K. and Sharma, S. 2023. Effects of vermicompost and cow dung on growth, flowering, and yield of okra in arid regions. *J. Plant Nutri.*, 46(2), 225-234. <https://doi.org/10.1080/01904167.2023.2152821>