

Effect of Organic and Inorganic Fertilizers on Growth and Yield of Sunflower (*Helianthus annuus* L.)

Objective:

To assess the influence of integrated application of FYM and vermicompost with different levels of RDF on yield attributes of sunflower.



Introduction

Sunflower (*Helianthus annuus* L.) is one of the most important oilseed crops cultivated in India due to its high oil quality, adaptability to diverse climatic conditions, and short duration. However, productivity of sunflower is often constrained by nutrient imbalances and improper fertilizer management. Indiscriminate use of chemical fertilizers has resulted in declining soil health, reducing productivity and sustainability over time.

Organic manures such as farmyard manure (FYM) and vermicompost improve soil physical structure, increase microbial activity, enhance nutrient availability, and improve moisture retention capacity. Vermicompost, in particular, is known to contain enzymes, plant growth regulators, and beneficial microbes, which promote root growth and nutrient uptake.

Integrated nutrient management, combining organic and inorganic sources of nutrients, has proved to be a viable strategy to enhance crop production while minimizing environmental hazards. Keeping these aspects in view, the present investigation was undertaken to study the effect of organic and inorganic fertilizers on growth and yield of sunflower under Palghar district conditions.

Experimental Details:

Crop	Sunflower	Treatments	Seven
------	-----------	------------	-------

Variety	Suryakiran	Spacing	45 X 30 cm
Season	<i>Rabi</i>	Sowing Date	11/12/2024
Design	RBD	Plot Size	4.5 x 3.0 m
Replications	Three	RDF	60:90:30 kg NPK ha ⁻¹

Treatment Details:

Treat. No.	Treatment Details
T1	Control (Without fertilizer)
T2	FYM @ 10t/ha + 50% RDF
T3	FYM @ 10t/ha + 75% RDF
T4	FYM @ 10t/ha + 100% RDF
T5	Vermicompost @ 5t/ha + 50% RDF
T6	Vermicompost @ 5t/ha + 75% RDF
T7	Vermicompost @ 5t/ha + 100% RDF

Methodology

The field experiment was conducted during the Rabi season of 2024–25 at the ASPEE Agricultural Research & Development Foundation Farm, Nare village, Taluka Wada, District Palghar, Maharashtra. The experiment was laid out in a Randomized Block Design (RBD) with three replications to minimize the experimental error and ensure valid comparison among treatments.

Sunflower (*Helianthus annuus* L.) variety ‘Suryakiran’ was used as the test crop. The crop was sown on 11 December 2024 at a spacing of 45 cm × 30 cm using a plot size of 4.5 m × 3.0 m. All recommended cultural practices were followed uniformly for raising a healthy crop throughout the growing period. The recommended dose of fertilizer (RDF) for sunflower was fixed at 60:90:30 kg N:P:K per hectare.

The experiment consisted of seven treatments involving different combinations of organic and inorganic nutrient sources. The treatments included a control without fertilizer, FYM @ 10 t ha⁻¹ combined with 50%, 75%, and 100% RDF, and vermicompost @ 5 t ha⁻¹ combined with 50%, 75%, and 100% RDF. Farmyard manure and vermicompost were applied as basal doses before sowing and were thoroughly incorporated into the soil.

Chemical fertilizers were applied as per RDF using urea, single super phosphate, and muriate of potash as the sources of nitrogen, phosphorus, and potassium, respectively. Nitrogen was applied

in split doses to improve uptake efficiency, while phosphorus and potassium were applied as basal doses.

Observations were recorded on important growth and yield parameters including plant height, number of filled and unfilled seeds per plant, seed yield per plant, test weight, seed yield per hectare, and stalk yield. The data collected were subjected to statistical analysis using analysis of variance (ANOVA) appropriate for the Randomized Block Design to test the significance of treatment effects at the prescribed level of significance.

Results

The results revealed that integrated nutrient management significantly improved growth and yield attributes of sunflower. Treatment T6 (Vermicompost @ 5 t ha⁻¹ + 75% RDF) recorded the tallest plants (160.40 cm), highest number of filled seeds (665.33), maximum seed yield per plant (38.37 g), superior test weight (47.61 g), and the highest seed (993.77 kg ha⁻¹) and stalk yield (4105.85 kg ha⁻¹), while the control showed the lowest values. The reduction in unfilled seeds under T6 indicated better seed set and nutrient balance. Enhanced performance under vermicompost-based integrated treatments may be attributed to improved soil physical condition, higher microbial activity, better nutrient availability, and efficient assimilate translocation. Overall, the combination of organic and inorganic fertilizers proved superior to sole application, confirming that integrated nutrient management is effective in improving sunflower growth, yield attributes, and productivity.

Conclusion

The present investigation clearly demonstrates that integrated use of organic and inorganic fertilizers significantly enhances sunflower growth and productivity. For sunflower cultivation under Palghar district conditions, application of **vermicompost @ 5 t ha⁻¹ + 75% RDF** is recommended for achieving higher productivity with reduced chemical fertilizer dependency.