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Effect of integrated nutrient management on yield parameter of okra (*Abelmoschus esculentus* L.) under Chhattisgarh plains

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Abstract
A field experiment was conducted during the summer season of year 2024-25 at the Instructional farm Khudmudi, College of Horticulture and Research Station, Mahatma Gandhi University of Horticulture & Forestry, Durg (C.G.), to evaluate the "Effect of integrated nutrient management on yield parameter of Okra (*Abelmoschus esculentus* L.) under Chhattisgarh plains". The field experiment was laid out in Randomized Block Design with eleven treatments and three replications. The experiment included organic manures and inorganic fertilizers viz., NPK (Nitrogen, Phosphorus or Potassium), FYM, vermicompost and poultry manure along with a control treatment (T_0) involving only water. Among the treatments, it resulting in the maximum number of fruits per plant (16.10), longest fruit length (13.06), maximum fruit weight (13.84 g), highest fruit yield per plant (0.227 kg), fruit yield per plot (4.80 kg) and total yield (160.11 q/ha). Therefore, it can be suggested that the dose of 75% NPK + FYM (20 t/ha) + Vermicompost (10 t/ha) + Poultry manure (10 t/ha) suitable for the commercial cultivated of Okra in the Chhattisgarh plains. This treatment also achieved the highest economic return, demonstrating maximum net profit (Rs. 1,79,415.00) and an advantageous benefit-cost (B:C) ratio (2.95). These results indicate that use of nutrients can play a crucial role in increasing both the production and economic viability of Okra cultivation.

Keywords: INM, NPK, FYM, vermicompost, poultry manure, yield, okra

Introduction
Okra (*Abelmoschus esculentus* L.) is an annual herbaceous plant that belongs to the Malvaceae family and is often cross-pollinated crop. Okra originally comes from Africa and has spread to many tropical countries. The genus Abelmoschus (2n=130) includes around 30 species that are distributed across various parts of the world. Among them, Abelmoschus esculentus is the most widely grown species in Asia. It is popular because it is rich in nutrients. Okra is also called "Bhindi" or "Lady's finger." It is an important crop in tropical and subtropical areas. The ideal daytime temperature for okra is between 25 °C and 40 °C and above 22 °C temperature should stay in the night-time. Okra (also known as bhindi) is one of the most important vegetable crops grown in India. Okra is nutritionally rich-100 grams of unripe okra fruit contains about 89.6 g of moisture, 6.4 g carbohydrates, 1.9 g protein, 0.2 g fat, 1.2 g fiber, and 0.7 g minerals. It also provides 88 IU of vitamin A, 0.07 mg thiamine, 0.10mg riboflavin, 0.60 mg niacin, and 13 mg vitamin C. India leads the world in okra production, yielding approximately 6,466 thousand metric tons over an area of 531 thousand hectares, with an average productivity of 12.11 tons per hectare in 2020-21 (Department of Agriculture & Farmers Welfare). For optimal yield and quality, okra requires adequate amounts of both macro-and micronutrients. Key nutrients such as nitrogen, phosphorus, and potassium play a crucial role in its growth and development. These nutrients must be applied in the correct quantity and at the appropriate time. However, the indiscriminate use of inorganic fertilizers without a proper management system often leads to poor nutrient uptake, reduced crop quality, and long-term degradation of soil health.
The Integrated Nutrient Management (INM) system combines the use of both organic manures and chemical fertilizers to enhance crop growth and yield. This approach plays a crucial role in maintaining and improving soil fertility while boosting overall agricultural

productivity. INM is also valuable in identifying emerging nutrient deficiencies beyond the commonly addressed nitrogen (N), phosphorus (P), and potassium (K). This study identified the optimal combination of organic and inorganic nutrient sources for sustainable okra cultivation in the agro-climatic conditions of the Chhattisgarh plains. The primary goal of the research is to minimize the reliance on chemical fertilizers by evaluating the effects of different, integrated nutrient management levels on the growth and yield of okra.

Materials and Methods

The present investigation entitled "Effect of integrated nutrient management on yield parameter of Okra (*Abelmoschus esculentus* L.) under Chhattisgarh plains." was carried out at summer season of year 2024-25 at the research farm Village-Khudmudi under College of Horticulture and Research Station, Mahatma Gandhi University of Horticulture & Forestry, Durg (C.G.), The experimental area is located in the central part of the Chhattisgarh Plains, between 20°54′ to 21°32′ N latitude and 81°10′ to 81°36′ E longitude at an altitude of 317 meters above mean sea level. The entitled experiment was conducted in Randomized Block Design (RBD) with three replications. In all there were different eleven treatments viz., T_0: control, T_1: 100% NPK (100:50:50 kg/ha), T_2: 100% FYM (20 t/ha), T_3: 100% Vermicompost (10 t/ha), T_4: Poultry manure (10 t/ha), T_5 : 75% NPK + 12.5% FYM + 12.5% Vermicompost, T_6: 75% NPK + Vermicompost 12.5% + Poultry manure 12.5%, T_7 : 75% NPK + FYM 9% + Vermicompost 8% + Poultry manure 8%, T_8: 50% NPK + FYM 25% + Vermicompost 25%, T_9: 50% NPK + Vermicompost 25% + Poultry manure 25%, T_{10}: 50% NPK + FYM 18% + Vermicompost 16% + Poultry manure 16%. The seeds of the Okra var. Arka Anamika were directly sown in soil on March 30, 2025, maintaining a spacing of 45 cm x 30 cm (Row to Row and Plant to Plant). The plot size for each treatment was 2 m × 1.5 m. The field okra crop was analyzed in various treatments for key characters i.e. number of fruits per plant, average fruit length (cm), average fruit weight (g), average fruit yield per plot (kg), total yield (q/ha).

Results and Discussion

Number of fruits per plant

The findings of the present study indicate that the combined application of organic and inorganic, sources of nutrients had a positive effect on the number of fruits per plant compared to the control. The highest number of fruits per plant (16.10) was recorded with the treatment of 75% NPK + FYM (20 t/ha) + Vermicompost (10 t/ha) + Poultry manure (10 t/ha), while the lowest number (9.93) was observed in the control at the harvest stage. The increase in number fruits can be attributed to the beneficial effects of FYM, vermicompost, which improves soil water retention; poultry manure, which helps address nitrogen deficiency, which enhances crop yield by making phosphorus more readily available to plants. These results are in agreement with the findings reported by Singh *et al*. (2020) [13] and Sachan *et al*. (2017) [12].

Average fruit length (cm)

Among all the treatments, the highest length of fruit (13.06) was observed with the application of 75% NPK + FYM (20 t/ha) + Vermicompost (10 t/ha) + Poultry manure (10 t/ha). In contrast, the control plants recorded the lowest length of fruit (8.06). The notable increase in fruit length can be attributed to the balanced nutrient availability provided by this integrated nutrient management (INM) treatment, which likely enhanced the plant's internal metabolic functions. These findings are in close agreement with the results reported by Patel *et al*. (2024) [10] and Sachan *et al*. (2017) [12].

Average fruit weight (g)

The highest fruit weight (13.84) was recorded with the application of 75% NPK + FYM (20 t/ha) + Vermicompost (10 t/ha) + Poultry manure (10 t/ha), while the lowest fruit weight was noted in the control treatment (10.06). This increase can be attributed to the enhanced plant growth resulting from the balanced supply of essential nutrients-namely NPK along with organic inputs like FYM, vermicompost and poultry manure. Phosphorus, in particular, plays a crucial role in fruit weight and root development. The readily available nutrients from inorganic sources, along with improved nitrogen fixation, balanced carbohydrate-to-nitrogen ratio, likely contributed to the increase in fruit weight. The beneficial effects of vermicompost in enhancing fruit weight are also supported by earlier studies by Kumar *et al*. (2017) [9] and Patel *et al*. (2024) [10].

Average fruit yield per plot (kg)

The application of both organic and inorganic nutrient sources had a significant effect on fruit yield per plot compared to the control during the study period. The highest fruit yield per plot (4.80 kg) was achieved with the application of of 75% NPK + FYM (20 t/ha) + Vermicompost (10 t/ha) + Poultry manure (10 t/ha), whereas the lowest yield (2.18 kg) was recorded in the control treatment. fruit yield per plot increased notably with the gradual addition of inorganic nutrients and was further enhanced by the integrated use of poultry manure, FYM and vermicompost. This improvement in yield may be attributed to the balanced supply of NPK in combination with organic inputs, ensuring a slow and sustained release of nutrients that supports maximum productivity. These results are consistent with the findings of Singh *et al*. (2020) [13] Sachan *et al*. (2017) [12].

Total yield (q/ha)

The application of various combinations of organic and inorganic nutrient sources had a significant impact on fruit yield (q/ha). The highest fruit yield (160.11 q/ha) was observed with the treatment involving of 75% NPK + FYM (20 t/ha) + Vermicompost (10 t/ha) + Poultry manure (10 t/ha), while the lowest yield (72.56 q/ha) was recorded under the control. This improvement in yield may be attributed to balanced nutrient availability and improved nutrient uptake, which supported better fruit development and overall productivity. The superior yield in okra in this study can be linked to the synergistic effect of FYM, vermicompost, and poultry manure, when combined with inorganic fertilizers. These inputs likely enhanced photosynthate production through increased levels of growth hormones and amino acids, thereby contributing to improved fruit yield. These findings are supported by the results of Singh *et al*. (2020) [13], Patel *et al*. (2024) [10] and Sachan *et al*. (2017) [12].

Table 1: Effect of integrated nutrient management on various yield parameters

Symbol	Treatments	Number of fruits per plant	Average fruit weight (g)	Average fruit length (cm)	Average fruit yield per plot (kg)	Total yield (q/ha)
T_0	Control	9.93	10.06	8.06	2.180	72.56
T_1	100% NPK (RDF 100:50:50)	13.80	12.85	10.56	3.877	128.90
T_2	100% FYM (20 t/ha)	11.93	11.49	8.86	3.197	106.23
T_3	100% Vermicompost (10 t/ha)	12.60	11.77	9.10	3.333	111.00
T_4	100% Poultry manure (10 t/ha)	13.20	12.47	9.53	3.770	125.67
T_5	75% NPK + FYM 12.5% + VC 12.5%	14.83	13.38	11.66	4.367	145.33
T_6	75% NPK + VC 12.5% + PM 12.5%	15.20	13.54	11.90	4.533	151.00
T_7	75% NPK + FYM 9% + VC 8% + PM 8%	16.10	13.84	13.06	4.808	160.11
T_8	50% NPK + FYM 25% + VC 25%	14.03	12.95	11.33	4.133	137.77
T_9	50% NPK + VC 25% + PM 25%	14.43	13.26	11.56	4.277	142.33
T_{10}	50% NPK + FYM 18% + VC 16% + PM 16%	15.70	13.67	12.26	4.743	158.11
	SE(m)±	0.84	0.72	0.61	0.19	2.77
	C.D. at 5%	2.51	2.14	1.81	0.56	8.11

Note: NPK-Nitrogen, Phosphoros, Potash, FYM-Farm Yard Manure, VC-Vermicompost, PM-Poultry Manure

Conclusion

Based on the findings of the present study titled "Effect of integrated nutrient management on yield parameter of Okra (*Abelmoschus esculentus* L.) under Chhattisgarh plains." it can be concluded that the application of 75% NPK + FYM (20 t/ha) + Vermicompost (10 t/ha) + Poultry manure (10 t/ha) proved to be the most effective treatment for enhancing yield parameters. Therefore, this combination is recommended as a suitable nutrient management practice for the commercial cultivation of Okra in the Chhattisgarh plains.

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References

1. Amiry MN, Anjanappa M, Ibaad MH. Influence of integrated nutrient management on growth, yield and yield attributes of okra (*Abelmoschus esculentus* (L.) Moench) cv. Arka Anamika under drip irrigation. International Journal of Pure and Applied Biosciences. 2017;5(6):703-707.
2. Bairwa HL, Maheswar LN, Shukla AK, Kaushik RA, Mathur SR. Response of integrated nutrient management on growth, yield and quality of okra (*Abelmoschus esculentus*). Indian Journal of Agricultural Sciences. 2009;79(5):55-58.
3. Barani P, Anburani A. Influence of vermicomposting on major nutrients in bhendi (*Abelmoschus esculentus* L. Moench) cv. Arka Anamika. South Indian Horticulture. 2004;52(1-6):170-174.
4. Bharthy RM, Sankaran T, Subramani. Effect of integrated nutrient management on nutrient uptake and yield of okra (*Abelmoschus esculentus* (L.) Moench) under island conditions. Advance Research Journal of Crop Improvement. 2016;8(1):24-30.
5. Chaudhari SP, Patel GS, Acharya SK, Vadodaria JR, Chaudhary SB, Chaudhari MP. Effect of integrated nutrient management (INM) on growth and yield of okra (*Abelmoschus esculentus* (L.) Moench) cv. GAO 5 under North Gujarat condition. International Journal of Agriculture Sciences. 2018;10(20):7361-7363.
6. Gopalan C, Sastri SBV, Balasubramanian S. Nutritive value of Indian foods. Hyderabad (India): National Institute of Nutrition (ICMR); 2007.
7. Khandaker MM, Jusoh N, Hafiza NAAR, Ismail SZ. The effect of different types of organic fertilizers on growth and yield of *Abelmoschus esculentus* Moench (okra). Bulgarian Journal of Agricultural Science. 2017;23(1):119-125.
8. Kumar T, Kumar V, Kumar A, Singh M, Singh B. Impact of integrated nutrient management (INM) on growth and economic yield of okra. Annals of Horticulture. 2017;6(1):107-114.
9. Kumar V, Saikia J, Nath DJ. Effect of integrated nutrient management on growth, yield, and quality of okra (*Abelmoschus esculentus* L. Moench) cv. Arka Anamika. International Journal of Chemical Studies. 2017;5(5):2001-2003.
10. Patel PK, Satodiya BN, Raval CH. Influence of spacing and integrated nutrient management (INM) on yield and quality attributes of okra cv. Anand Komal. Plant Archives. 2024;24(2):1-6.
11. Prabhu T, Narwadkar PR, Sajindranath AK. Economics of integrated nutrient management in okra. Journal of Maharashtra Agricultural University. 2002;27(3):316-318.
12. Sachan S, Singh D, Kasera S, Mishra SK, Tripathi Y, Mishra V, Singh RK. Integrated nutrient management (INM) in okra (*Abelmoschus esculentus* (L.) Moench) for better growth and higher yield. Journal of Pharmacognosy and Phytochemistry. 2017;6(5):1854-1856.
13. Singh VB, Tiwari AK. Effect of integrated nutrient management (INM) on growth and yield of okra (*Abelmoschus esculentus* L.) cv. Arka Anamika. International Journal of Agri World. 2020;1(1):42-48.
14. Sonwani A, Choudhary AS, Raj S, Paswan A, Sonloi P. Effect of nutrient management on yield parameters of okra. International Journal of Agricultural Nutrition. 2022;4(1):28-33.
15. Vennila C, Jayanthi C. Effect of integrated nutrient management on yield and quality of okra. Research on Crops. 2008;9(1):73-75.