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Influence of integrated nutrient management on growth, yield and economics of okra

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Abstract
The present experiment was conducted at Horticulture Research Farm, R.A.K. College of Agriculture, Sehore (M.P.) during *kharif* season of 2019 to study about the "influence of integrated nutrient management on growth, yield and economics of okra [*Abelmoschus esculentus* (L.) Moench]" were divided into distinct plots. In practically all of the characters, the treatment T8 was shown to be much better than all other treatments at all growth, yield and economics stages. Like that growth characters; number of branches per plant (4.60), number of node per plant (17.04), internodal length (6.40) and yield characters; fruit length (14.33), fruit girth (17.01), fruit yield per plot (4.222), fruit yield per hectare (130.31) and economics analysis; cost of cultivation (80,417.32₹/ha), gross income (2,60,620₹/ha), net income (1,80,202.68₹/ha), benefit cost ratio (3.02) while the treatment T_1 (control) showed minimum least response in terms of growth, yield and economics of okra.

Keywords: *Abelmoschus esculentus* (L.) moench, economics, growth, okra, RDF and yield

Introduction
Okra [*Abelmoschus esculentus* (L.) Moench], often known as "lady finger" or "bhindi," is a Malvaceae family crop with chromosome number (2n=2x=130). Okra is originated from Tropical Africa; okra has established itself as one of the most popular vegetables. Okra is a famous vegetable produced for its immature green seed pods, which are used in a variety of ways.

Okra seeds have a protein content of 20-30% and a high oil content of 40%. (Selvakumar, 2014). It's also high in iodine and can help with goitre treatment. Vitamins, calcium, potassium, and other minerals abound in it. It's easy to fry and cook with the right ingredients. In the paper industry, mature fruit and stems containing crude fibre are used. To make jaggery, the root and stem are used to clarify the cane liquid.

A lot of research has been done in okra for optimum fruit yield production due to the availability of better okra varieties and hybrids, climatic circumstances, and the incidence of pest diseases through standardization of crop nutrition. We can currently produce a big crop throughout the year, but there are some major issues to contend with, such as the introduction of viral infections, fruit borer attacks, and economic losses owing to reduced plant viability.

Inorganic fertilizers like nitrogen, phosphorus, and potassium have long-term effects and are fixed in the soil. However, as things become more expensive that reason farming costs rise. Secondly, increased use of inorganic fertilizers degrades soil productivity on a daily basis, boosting output temporarily but destroying the environment and harming human health.

Organic manures such as vermicompost, poultry manure and neem cake are abundant in organic matter and provide essential nutrients. Cation exchange capacity, water retention capacity and organic matters in the soil are all improved by organic manure. As a result, using organic manure in integrated nutrient management is crucial to maintaining productivity. Efficiency has improved since then.

To achieve improved yields using an integrated nutrient management system, standardizing fertilizer doses is crucial. Field trials to combine various types of organic manures with inorganic fertilizer, with the goal of promoting INM in sustainable vegetable production.

Materials and Methods
During the *kharif* season of 2019, the experiment was done at the Horticulture Research Farm, R.A.K. College of Agriculture, Sehore (MP). The experiment work used a randomized block design with eight treatments that were replicated three times. The treatments was that T_1 (100%RDF-100:75:75 kg N_2:P_2O_5:K_2O/ha), T_2 (100%RDF + Vermicompost @ 5 t/ha), T_3

(100%RDF + Poultry manure @ 2 t/ha), T_4 (100%RDF + Neem cake @ 2 t/ha), T_5 (50%RDF + Vermicompost @ 5 t/ha), T_6 (50%RDF + Poultry manure @ 2 t/ha), T_7 (50%RDF + Neem cake @ 2 t/ha), T_8 (100%RDF + Vermicompost @ 5 t/ha + Poultry manure @ 2 t/ha + Neem cake @ 2 t/ha), where RDF is recommended dose of fertilizer. To achieve a well tilth state, the land was prepared by ploughing and tillage operations. Each plot was (3 x 2.4 m^2) in size, with a planting distance of (60 x 15 cm^2). Irrigation channels and bunds were also installed in accordance with the plan. The seeds were manually sown in the field and covered with fine soil at a depth of 2-3 cm. To ensure proper germination, a mild watering is used shortly after seeding. Organic manure was applied prior to sowing, and the complete treatment dose of NPK was administered right before sowing, not in divided doses. During crop growing phases, all cultural operations and plant protection measures were carried out on a regular basis. The observations were recorded on growth characters; number of branches per plant, number of node per plant, internodal length and yield characters; fruit length, fruit girth, fruit yield per plot, fruit yield per hectare and economics analysis; cost of cultivation, gross income, net income, benefit cost ratio. Observations with respect to following characters were recorded on five plants selected at randomly and tagged in each plot excluding the border plant and their means were worked out for statistical analysis through RBD.

Results and Discussion

The present analysis is described in this chapter. The data collected on various parameters was statistically evaluated as per experiment randomized block design and results were presented in different tables. It explains the results obtained as follows:

Table 1: Effects of integrated nutrient management on okra growth characteristics

S.No	Treatments	Number of branches per plant			Number of nodes per plant	Internodal length (cm)
		40DAS	60DAS	80DAS		
T_1	Control :100 % RDF (100:75:75kg/ha)	1.17	1.70	2.06	7.00	3.06
T_2	100 % RDF + Vermicompost @ 5t/ha	2.41	2.93	3.46	12.63	4.83
T_3	100 % RDF + Poultry Manure @ 2t/ha	2.81	3.03	3.77	13.33	5.00
T_4	100 % RDF+ Neem Cake @ 2t/ha	3.04	3.36	4.18	14.10	5.43
T_5	50 % RDF + Vermicompost @ 5t/ha	1.23	2.00	3.02	9.33	3.56
T_6	50 % RDF + Poultry Manure @ 2t/ha	1.74	2.27	3.08	10.50	4.40
T_7	50 % RDF + Neem Cake @ 2t/ha	2.08	2.53	3.27	11.06	5.56
T_8	100%RDF + Vermicompost @5t/ha + Poultry Manure @ 2t/ha + Neem Cake @ 2t/ha	3.81	4.01	4.60	17.04	6.40
S. E±		0.39	0.48	0.52	1.40	0.62
C.D. (5%)		1.19	1.47	1.60	4.25	1.89

Number of branches per plant

The number of branches per plant at 40DAS (3.81), 60DAS (4.01), 80DAS (4.60) were considerably highest in the treatment T_8 (100%RDF + Vermicompost @5t/ha + Poultry Manure @ 2t/ha + Neem Cake @ 2t/ha), the treatment T_1 yielded the minimum values (control) found for all of the above. At 20 DAS the okra plant was mono-stem, it means that in any treatments no branches were displayed the number of branches per plant at 40, 60 and 80 DAS was greatly influenced by the different treatments. Probable region for increased branch numbers due to higher photosynthesis rates and photosynthesis provides maximum branch growth or improvements in endogenous auxin in response to apical dominance. The findings of this study agree with those of Sharma *et al.* (2014) [14], Ghuge *et al.* (2015) [7], Sachan *et al.* (2017) [12] and Meena *et al.* (2018) [10].

Number of nodes per plant and internodal length

The mean number of nodes per plant (17.04) and internodal length (6.40 cm) were substantially higher in treatment (100%RDF + Vermicompost @5t/ha + Poultry Manure @ 2t/ha + Neem Cake @ 2t/ha). In the T_1 therapy, the minimum values for all of the above were discovered (control). Using RDF, vermicompost, poultry manure and neem cake the treatment grew greater vegetative growth to nutrient influences per plant were pursued to increase the number of nodes showing that pattern of growth in nodes was due to nitrogen absorption. This may be because the application of nitrogen via. organic and inorganic fertilizer has increased plant growth which could increase the length of internodes. The findings of this study agree with those of Kumar *et al.* (2013) [8], Ghuge *et al.* (2015) [7] and Dwivedi *et al.* (2018) [6].

Table 2: Effects of integrated nutrient management on okra yield characteristics

S. No	Treatments	Fruit length (cm)	Fruit girth (mm)	Fruit yield per plot (kg)	Fruit yield per hectare (q)
T_1	Control :100 % RDF (100:75:75kg/ha)	7.50	11.83	2.085	64.37
T_2	100 % RDF + Vermicompost @ 5t/ha	9.70	14.00	3.257	100.54
T_3	100 % RDF + Poultry Manure @ 2t/ha	10.16	14.63	3.565	110.05
T_4	100 % RDF+ Neem Cake @ 2t/ha	11.33	15.20	3.765	116.23
T_5	50 % RDF + Vermicompost @ 5t/ha	8.23	12.66	2.604	80.49
T_6	50 % RDF + Poultry Manure @ 2t/ha	8.80	13.18	2.842	87.72
T_7	50 % RDF + Neem Cake @ 2t/ha	9.36	13.83	3.053	94.23
T_8	100%RDF + Vermicompost @5t/ha + Poultry Manure @ 2t/ha + Neem Cake @ 2t/ha	14.33	17.01	4.222	130.31
S. E±		1.16	1.46	0.474	3.568
C.D. (5%)		3.53	4.45	1.439	10.824

Fruit length and fruit girth

The mean fruit length (14.33cm) and fruit girth plant (17.01mm) were substantially higher in treatment (100%RDF + Vermicompost @5t/ha + Poultry Manure @ 2t/ha + Neem Cake @ 2t/ha). In the T_1 therapy, the minimum values for all of the above were discovered (control). The explanation for the increased fruit length and fruit girth may be due to better photosynthesis that translocation. The abundance of nutrient at the crucial stage of crop growth resulted in early development, rapid plant growth and development leading to longer and broader fruit production. The findings of this study agree with those of Patil *et al*. (2000) [11], Deshpande *et al*. (2006) [5], Kumar *et al*. (2013) [8], Mal *et al*. (2013) [9], Sharma *et al*. (2014) [14] and Amiry *et al*. (2017) [1].

Fruit yield per plot and per hectare

As demonstrated in table 2, the fruit yield per plot and per hectare. The relevant fruit yield per plot (4.222) and fruit yield per hectare T_8 (130.31) were substantially highest in the treatment (100%RDF + Vermicompost @ 5 t/ha + Poultry manure @ 2 t/ha + Neem cake @ 2 t/ha). For all of the following yield characteristics, the treatment T_1 yielded the lowest results (control). Increased plant growth, number of nodes, length of fruit branches, girth of fruit, weight of fruit, and volume of fruit per plant could all be contributing to the high fruit yield per plot and per hectare. The findings of this study agree with those Bairwa *et al*. (2009) [2], Tripathy and Maity (2009) [17], Sharma *et al*. (2009) [15], Sharma *et al*. (2014) [14], Yadav *et al*. (2015) [19] and Ballal and Kadam (2016) [3].

Table 3: Economics of various treatments for okra

S. No	Treatments	Gross income (₹/ha)	Expenditure (₹/ha)	Net income (₹/ha)	B:C ratio
T_1	Control :100 % RDF (100:75:75kg/ha)	1,28,740	34,357.32	94,382.68	2.74
T_2	100 % RDF + Vermicompost @ 5t/ha	2,01,080	74,357.32	1,26,722.68	1.70
T_3	100 % RDF + Poultry Manure @ 2t/ha	2,28,100	54,357.32	1,73,742.68	3.02
T_4	100 % RDF+ Neem Cake @ 2t/ha	2,32,460	70,357.32	1,62,102.68	2.30
T_5	50 % RDF + Vermicompost @ 5t/ha	1,60,980	73,148.66	87,831.34	1.20
T_6	50 % RDF + Poultry Manure @ 2t/ha	1,75,440	53,148.66	1,22,291.34	2.30
T_7	50 % RDF + Neem Cake @ 2t/ha	1,88,460	69,148.66	1,19,311.34	1.72
T_8	100%RDF + Vermicompost @5t/ha + Poultry Manure @ 2t/ha + Neem Cake @ 2t/ha	2,60,620	80,417.32	1,80,202.68	2.24

Economics analysis

Great value for capital and lower crop prices is attractive qualities for better yields. Therefore, the results of the treatments have been figured out. Data concerning the economics of different treatments as seen in table 3.

Gross income

The prevailing market price for okra was considered @ 2000₹ per quintal. Data showed that a significant maximum yield of fruit of 130.31q/ha, net income of 1,80,202.68 ₹/ha and benefit cost ratio of 2.24 was achieved in okra variety Varsha uphar in the T_8 (100%RDF + Vermicompost @5t/ha+ Poultry Manure @ 2t/ha + Neem Cake @ 2t/ha). T_5 (50% RDF + Vermicompost @ 5t/ha) has the lowest net income (87,831.34/ha) and the lowest benefit cost ratio (1.20). T_3 (100% RDF + Poultry Manure @ 2t/ha) likewise has a substantial maximum benefit cost ratio of 3.02, whereas T_1 (Control: 100% RDF (100:75:75kg/ha) has a minimum fruit yield of 64.37q/ha. The findings of this study agree with those Mal *et al*. (2014), Yadav *et al*. (2016) [18], Bharthy *et al*. (2017) [4], Mishra *et al*. (2019) and Singh and Tiwari *et al*. (2019) [16].

Conclusion

Based on the data, treatment T_8 (100 percent RDF + Vermicompost @5t/ha+ Poultry Manure @ 2t/ha + Neem Cake @ 2t/ha) produced the best growth, yield and economics in the varsha uphar variety of okra grown in the Vindhya Plateau region.

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. Int. J Pure App. Biosci. 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. Ballal Anand, Kadam AS. Okra crop growth and yield responses to different organic sources of nitrogen. International Journal of Agriculture Sciences. 2016;8(48):2042-2044.
4. Bharthy, Bhu R, Sankaran M, Subramani T. Effect of integrated nutrient management on nutrient uptake and yield of okra [*Abelmoschus esculentus* (L.) Moench] under islands conditions. Adv. Res. J Crop Improv. 2017;8(1):24-30.
5. Deshpande A, Warade SD, Anarse SA, Bhoge Rashmi, Amolic VL. Effect of organic manures on growth, yield and keeping quality of okra (*Abelmoschus esculentus* L.) cv. Phule Kirti. Ann. Plant Phys. 2006;20:65-68.
6. Dwivedi M, Patel S, Dubey A, Mishra P, Sengupta SK. Response of vermiwash, vermicompost and NPK on growth and yield of okra (*Abelmoschus esculentus* L.) cv. VRO 6. International Journal of Chemical Studies. 2018;6(3):3001-3007.
7. Ghuge MB, Lekhi R, Karcho S, Kumar A. Influence of integrated nutrient management on growth and seed yield of okra (*Abelmoschus esculentus* (L.) Monech) cv. VRO-6. Environment and Ecology. 2015;33(3):1073-1076.
8. Kumar T, Kumar M, Singh M, Kumar A, Kumar S, Singh B. Impact of integrated nutrient management (INM) on growth and economic yield of okra. Annals of Hort. 2013;6(1-6):114-118.
9. Mal B, Mahapatra P, Mohanty S, Mishra HN. Growth and yield parameters of okra (*Abelmoschus esculentus*) influenced by diazotrophs and chemical fertilizers. Journal of Crop and Weed. 2013;9(2):109-112.
10. Meena DC, Meena ML. Effect of integrated nutrient

management on growth parameters of okra (*Abelmoschus esculentus* (L). Moench). Chem Sci Rev Lett. 2018;7(26):582-585.
11. Patil MB, Jogdand SD, Jadhav AS. Effect of organic and bio-fertilizers on yield and quantity of okra. Journal of Maharashtra Agricultural Universities. 2000;25(2):213-214.
12. Sachan S, Singh D, Kasera S, Mishra S, Tripathi Y, Mishra V *et al*. Integrated nutrient management in okra (*Abelmoschus esculentus* (L.) Moench) for better growth and higher yield. Journal of Pharmacognosy and Photochemistry. 2017;6(5):1854-1856.
13. Selvakuamr R. A textbook of glaustas olericulture. Okra. New Vishal Publications New Delhi, Edn 2014;1:506-508.
14. Sharma IJ, Samnotra RK, Kumar V. Influence of biofertilizer application methods and inorganic fertilizers on growth, seed yield and economics cost of okra [*Abelmoschus esculentus* (L.) Moench] under sub-tropical irrigated area of Jammu. Internat. J Agric. Sci. 2014;10(1):322-328.
15. Sharma RP, Datt N, Chander G. Effect of vermicompost, FYM and chemical fertilizers on yield, nutrient uptake and soil fertility in okra [*Abelmoschus esculentus* (L.) Moench]. Journal of Indian Society of Soil Science. 2009;57(3):357-361.
16. Singh VB, Tiwari AK. Effect of integrated nutrient management on economics of okra (*Abelmoschus esculentus* L.) cultivation. International Journal of Farm Sciences. 2019;9(3):8-11.
17. Tripathy P, Maity TK. Impact of Integrated nutrient management on fruit quality and yield of okra hybrids. Crop Research Hisar. 2009;37(1/3):101-106.
18. Yadav SC, Yadav GL, Gupta G, Prasad PM, Bairwa M. Effect of integrated nutrient management on quality and economics of okra (*Abelmoschus esculentus* (L.) Moench). International Journal of Farm Sciences. 2016; 6(3):233-237.
19. Yadav SC, Prajapat OP. Effect of integrated nutrient management on growth and yield of Okra (*Abelmoschus esculentus* (L.) Moench). International Quarterly Journal of Environmental Sciences. 2015;7(2):297-300.