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Effect of Organic and Inorganic Manures on Growth and Yield of Okra (*Abelmoschus esculentus* L. Moench) cv. Arka Anamika

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The field experiment was conducted at the Horticulture Research CRC Farm – 1 of the Department of Horticulture, School of Agriculture, ITM University Gwalior (M.P.) during the year 2022 to study the effect of organic and inorganic manure on growth, yield and quality of okra. The experiment was laid out in the randomized block design with three replications and twelve treatments viz. FYM, Vermicompost, FYM + Vermicompost, 50% RDF + FYM, 50 % RDF + Vermicompost, 50 % RDF +FYM + Vermicompost, 75% RDF +FYM), 75% RDF + Vermicompost, 75% RDF +FYM +Vermicompost, 100% RDF +FYM), 100% RDF + Vermicompost, 100 % RDF +FYM +

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Vermicompost. A single standard variety (Arka Anamika) is sown with the different treatment combination with the plant to plant and row to row spacing maintained at 45 cm x 60 cm respectively. On the basis of the study, the results indicated that the application of 100% RDF +FYM + Vermicompost in Arka Anamika recorded significantly higher plant height (80.20 cm), number of branches per plant (8.58), number of leaves per plant at 90 DAS (68.83). However, higher yield (5.89q /ha) was recorded with the application of the 100% RDF +FYM + Vermicompost. Thus, integrated application of organic and inorganic manures improves the growth and yield of okra crop.

Keywords: Okra; growth; yield; quality; organic; inorganic; manures.

1. INTRODUCTION

"Okra (*Abelmoshcus esculentus L. moench*) is a vegetable crop growing in tropical and subtropical regions of the world that is significant economically. It is generally an annual plant which belongs to genus *abelmoshcus* and species *esculentus* of family *Malvaceae*. It is also known as lady's finger or bhindi, orginated in tropical Africa" [1]. Okra is one of the most well- liked vegetables among all demographic groups due to its abundance in nutrients, flavour, therapeutic benefits, and industrial use. It is cultivated for its fibres, fruits or pods. The immature fruits are collected and consumed as vegetables. Okra is propagated by seeds and has duration of 90-100 days. Okra needs a protected, warm, and humid growing season. Okra is good source of vitamins, minerals, calories and amino acid found in seeds and compares favourably with those in poultry, eggs and soybean, [2] all parts of okra like fresh leaves, flowers, pods, stem and seeds can be used for different purpose and hence it is multi-purpose crop in term of its use [3]. Okra's mucilage can be used as a blood thinner or to substitute plasma [4].

"The demand of the crop is significantly increasing with the increase in population, which emphasises the use of chemical fertilzers; as a result growers indiscriminately use the inorganic sources of plant nutrients" [1]. "Moreover, the use of expensive commercial fertilizers as per the requirement of the crop is not much affordable to the average farmers. The application of high input technologies such as chemical fertilizers, pesticides, herbicides improved the production but there is growing concern over the adverse effects of the use of chemicals on soil productivity and environment quality. So there is need of shifting towards INM approach. Integrated Nutrient Management (INM) is a sustainable approach, which aims at maintaining the soil fertility and plant nutrient supply, by incorporating all the possible sources of nutrients like organic manures, inorganic manures in an integrated and judicious manner to get higher crop yield without hampering the soil health and the environment" [5]. Considering all these aspects, a research study was carried out to study the effect of organic and inorganic manures on growth, yield and quality attributes of okra.

2. MATERIALS AND METHODS

An experiment was conducted at horticulture research CRC Farm-1, Department of horticulture, School of agriculture, ITM University Gwalior (M.P.) during March to June of 2022. The experimental site is located situated at 26°23 N latitude and 74°11´ E longitude at an elevation of 211.52 m above mean sea level falling in the sub-tropical region of India. The climate of this place is bestowed with hot and dry early summers followed by hot and humid monsoon season and cold and dry winters. The soil of the experimental field was sandy clay loam in texture, slightly alkaline (pH 7.73) in reaction, low in organic carbon (4.3 g/kg) and available nitrogen (196.6 kg/ha) but medium in available phosphorus (15.85 kg/ha) and potassium (229.6 kg/ha) with electrical conductivity in the safer range. The experiment comprises of twelve treatments were replicated three times in randomised block design. The treatment details involve FYM, Vermicompost, FYM+Vermicompost, 50% RDF + FYM, 50 % RDF + Vermicompost, 50 % RDF +FYM + Vermicompost, 75% RDF +FYM), 75% RDF + Vermicompost, 75% RDF +FYM +Vermicompost, 100% RDF +FYM), 100% RDF + Vermicompost, 100 % RDF +FYM + Vermicompost. The row to row and plant to plant distance of the experiment was maintained respectively 60 cm and 45 cm. The land was brought to a fine tilth through ploughing and tillage. Irrigation channels and bunds were maintained properly. Direct sowing of the seeds was done in the field. Light irrigation was given after sowing. The organic, manures

were applied as basal dose before sowing, for proper decomposition, full dose of phosphorous and potassium and half dose of nitrogen as per treatment were applied just before the sowing. 30 days after sowing, the remaining half of the nitrogen dose was applied. All cultural practices were followed regularly during crop growth and observations were recorded on vegetative characters *i.e.,* plant height, number of branches per plant, number of nodes per plant, internodal length. Flowering, fruiting and yield characters *i.e*., days to first flowering, fruit weight, fruit length, fruit yield per plant, fruit yield per hectare and Analysis of variance was performed to determine the effect of organic and inorganic manures on growth and yield of Okra using Opstat. The interpretation of treatments effects was made on the basis of critical difference at 5 % probability level.

3. RESULTS AND DISCUSSION

3.1 Growth Attributes

The results revealed that growth parameters of Okra were significant influenced by integrated application of organic and inorganic manures (Table 1). Okra plants fertilized with 100% RDF + FYM + Vermi compost gave maximum plant height (80.20 cm) followed by 75% RDF + FYM + Vermi compost (77.58 cm), FYM + Vermi compost (60.25 cm) and Vermi compost (57.70). "This may be due to reason that application of nutrients in integration of organic and inorganic manures have created favourable conditions for proper growth of crop. The better efficiency of organic manures is due to the fact that they might have provided both macro and micro nutrients at their optimal levels which ultimately enhanced the early growth phases and encouraged reproductive growth as well" [6]. Further it is revealed that a full dose of organic and inorganic fertilisers outperforms a single application of fertiliser. Similar results were reported by Khetran *et al*., [7].

Maximum number of branches was recorded with the application of 100% RDF + FYM + Vermi compost and 75% RDF + FYM + Vermi compost. Further, maximum number of leaves at 90 days was observed with the application of 100% RDF + FYM + Vermi compost (68.83) followed by 75% RDF + FYM + Vermi compost (64.58) respectively. This may be due to the reason that increase dose of NPK and FYM resulted in better improvement, establishment and availability of nutrients that resulted in better growth and yield attributes of okra. These results were similar to the findings of Yadav *et al*., [8] and Bamboriya *et al*., [9].

Highest yield per plot, yield per hectare was recorded with the application of 100% RDF + FYM + Vermi compost. This may be due to availability of organic and inorganic manures which resulted in increased yield attributes of okra. Further, integrated application of FYM, Poultry manure and vermicompost application improves the yield as compared to single manure application [10-15].

Table 1. Effect of organic and inorganic manures growth attributes on okra

Treatment	Plant height(cm)	Number of branches	Number of leaves	Yield per plot(q/ha)	Yield (q/ha)
T_1	56.75	4.41	63.00	0.25	3.41
T_2	57.70	4.83	64.16	0.27	3.66
T_3	60.25	5.41	65.16	0.29	3.93
T_4	64.20	5.91	62.08	0.29	3.88
T_5	69.37	6.08	64.00	0.33	4.41
T6	65.75	6.16	63.75	0.36	4.79
T_7	70.87	6.58	64.25	0.44	5.89
T_8	73.87	7.00	64.91	0.40	0.25
T_9	77.58	7.91	64.58	0.47	0.27
T10	75.66	7.50	66.08	0.62	0.29
T11	78.16	8.25	66.58	0.60	0.29
T12	80.20	8.58	68.83	0.66	0.33
SE(m)±	2.12	0.07	0.78	0.002	0.344
CD at 5%	2.46	0.44	1.50	0.074	0.993

4. CONCLUSION

It is concluded that the application of the integrated application of organic and inorganic manures significantly influenced the different growth and yield in okra. The application of 100 % RDF + FYM + Vermi compost recorded highest plant height, number of branches, number leaves, fruit yield per plot and fruit yield per hectare in okra. Thus, integrated application of organic and inorganic manures improves the yield of okra crop.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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