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Influence of different organic manure combinations on growth and yield of okra (*Abelmoschus esculents* L.) in Bundelkhand region

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Abstract

The present study was undertaken to study the “Influence of Different Organic Manure Combinations on Growth and yield of Okra (*Abelmoschus esculents* L.) cv. Kashi Mangli in Bundelkhand region” conducted at organic research Farm, Kargua ji, Department of horticulture, Institute of Agricultural Sciences, Bundelkhand University, Jhansi, U.P., situated at Bundelkhand region of Uttar Pradesh during *kharif*, 2025. The experiment was laid out in randomized block design with three replications. The experiment consisted 8 treatments; Control (T₀), 100% RDN through FYM (T₁), 100% RDN through Vermicompost (T₂), 100% RDN through poultry manure (T₃), 100% RDN through goat manure (T₄), 100% RDN through mustard oil cake (T₅), 100% RDN through neem cake (T₆) and 100% RDN through castor cake (T₇). The results clearly revealed that application of organic manures significantly increased plant height (cm), number of leaves, stem diameter (cm), days taken to first flower initiation (Days), days taken to 50% flowers (Days), number branches and pod yield (178.01 q ha⁻¹) found in 100% RDN through mustard cake (T₅) treatment. Therefore, it can be summarized that addition of 100% RDN through mustard cake (T₅) recommendation significantly increase in okra production.

Keywords: Vermicompost, RDN, okra, Vermicompost, Neem cake, goat manure and poultry manure

1. Introduction

Okra (*Abelmoschus esculentus* L. Moench) belongs to the family of Malvaceae being economically important vegetable crop grown in subtropical and tropical parts of the world. It is also known as lady's finger or bhindi originate in tropical Africa. Okra is one of the most popular vegetable in all sections of people. Okra is cultivated for its fibrous fruits or pods containing round and circular seeds. Okra is a good source of vitamins, minerals calories and amino acids found in seeds (Schipper, 2000) [11]. It is a multipurpose crop due to its various uses of the fresh leaves, buds, flowers, pods, stems and seeds (Mihretu *et al.*, 2014) [6]. Because of its richness in nutrition, taste medicinal and industrial value, it is one of the most important consumable crops of the India. Immature and tender pods can be consumed as the boiled and fried vegetables or could be utilized as it may be added to soups and stews. Okra, which is currently grown mainly as a vegetable crop, has potential for cultivation as an essential oilseed crop because okra seeds contain high amount of oil (20-40%). Dried fruit contain 10-12% protein and used for refined edible oil. Dry fruit skin and fibers are used in manufacture of paper, card board and fibers. The seed cake is also used as an animal feed. Fresh okra fruits contain 89.6 g moisture, 6.4 g carbohydrates, 1.9 g protein, 0.2 g fat, 0.07 mg thiamine, 13 g vitamin C, 0.1 mg riboflavin, 66 mg calcium and 1.5 mg iron per 100 g of okra (Thamburaj, 2014) [14].

India is the largest producer of okra in the world. The major okra growing states are Uttar Pradesh, Odisha, Bihar, Andhra Pradesh and West Bengal. According to National Horticulture Board's Statistical Report 2023 (First Advance Estimate), the area of okra cultivation is 523 thousand ha and has a production of 6416 thousand MT across India. Among the states, in Uttar Pradesh okra produced on an area of 2.419 thousand hectares with a production of 32.59 thousand tonnes. (DA&FW 2022) [4].

Organic agriculture is a holistic production management system which promote and enhances agro-ecosystem health, including biodiversity, biological cycles and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. Use of organic manures to meet the nutrient requirement of crop would be an inevitable practice in the years to come for sustainable agriculture since, organic manures generally improves the soil physical, chemical and biological properties along with enhancing the moisture holding capacity of soil and thus resulting in enhanced crop productivity along with maintaining the quality of crop produce.

Organic manure has been identified as one of the potential processes in managing waste, since it is a natural process, cost effective and required only shorter duration. Farm yard Manure (FYM) is a decomposed mixture of cattle dung and urine with straw and litter used as bedding material and residues from the fodder fed to the cattle. FYM contains about 0.5% nitrogen (N), 0.25% phosphorus (P), 0.5% potassium (K).

Vermicomposting is a process of recycling of organic wastes in an environmentally safe method with the help of earthworms. The worm casts apart from increasing the density of microbes also provide the required nutrients of plants. It contains plant growth promoting substances such as NAA, cytokinins, gibberellins, etc. It helps in lowering C-N ratio, increasing humic acid content, action exchange capacity and water soluble carbohydrates. Average vermicompost contains 0.9 to 1.5 percent N, 0.3 to 0.64 percent P_2O_5 and 0.54 to 1.72 percent K_2O , 2.00 to 37.7 ppm Cu, 5.7 to 120 ppm Zn and 10.0 to 161.0 ppm Fe. Vermicompost is a byproduct of non-thermophillic biodegradation of organic materials through correlation between earthworms and microorganism (Sallaku *et al.*, 2009) [10].

2. Materials and Methods

2.1 Experimental site and soil

The experiment was carried out at organic research Farm, Kargua ji, Department of horticulture, Institute of Agricultural Sciences, Bundelkhand University, Jhansi, U.P., situated at Bundelkhand region of Uttar Pradesh at 25°31'07.1" N latitude and longitude of 78°33'47.4 E with 284 meters above from mean sea level (MSL). According to NARP, Bundelkhand falls in Agro climatic zone VI (Bundelkhand Zone of UP). The climate of the study area is tropical and subtropical climate with an average maximum temperature 35.0 °C. The mean annual rainfall of the region varies in between 884.6 mm. The soil of the experimental field was sandy loam to clay loam in texture. From the fertility point of view soil was medium in N, P, K and have sufficient level of DTPA extractable Fe, Mn, Zn and Cu.

2.2 Experimental design and treatments

The experiment was laid out in randomized block design and replicated thrice. The okra variety Kashi mangali was sown at the seed rate of 18 kg ha⁻¹ at inter row of 45 and

plant to plant spacing of 30 cm. The vermicompost, FYM, goat manure and poultry manures was applied in the field as per treatments and thoroughly mixed at the time of sowing.

2.3 Statistical Analysis

In order to test the significance of variation in experimental data obtained for various treatment effects, data will be statistically analyzed as per the method outlined by Panse and Sukhatme (1985), the value of test at 5 and 1 per cent level of significant was determined and the values of SEM, CV per cent were calculated.

3. Results and Discussion

3.1 Effect of different organic manures combination on growth parameters of okra

The application of organic manure enhanced the growth parameters of okra crop. Perusal of the data presented in table 1, 2 and 3 revealed that the significantly highest plant height (26.23 cm, 59.55 cm and 102.92 cm at 30 DAT, 60 DAT and harvest, respectively), number of leaves (8.0), number of branches (1.90), stem diameter (1.74 cm), minimum days taken to first flower initiation (45.0 days), minimum days taken to 50% flowering of plant (64.00 days after transplanting), number of flowers per plant (28.64) and fruit yield (178.01 q/ha) was recorded with the treatment T₅ (100% RDN through mustard cake) as compared to rest of the treatments and minimum recorded under control. This finding is in conformity with the results of Mohanta *et al.* (2018) [7] and Singh *et al.* (2020) [13], Akbar *et al.* (2009) [1]. It is possibly due to the regular supply of the major nutrients viz.; NPK to the plant in the form organic manures. As a result, the increment of plant height with huge foliage may be due to increases the photosynthetic activity and cell elongation in the presence of nitrogenous compounds as earlier cited by Naik and Gupta (2010) [8], and Shree *et al.* (2014) [12]. It is well known fact that organic manures enrich the soil by improving the physical and biological properties including supply of all the essential plant nutrients for the growth and development of plants. It encourages the production of beneficial microflora which helps in the breakdown of higher molecular weight compound into the lower one and by this way it provides all necessary nutrients to the plant. Thus, greater availability of photosynthates, metabolites and nutrients to develop reproductive structures seems to have resulted in increased productive plants, pod girth, pods length, size and pod weight with these nutrient management treatments. Similar trend was noticed if application of farm yard manure, vermicompost and Neem cake before the sowing of okra increases the vegetative growth by buildup the organic carbon in soil and increased the microorganism activity leading to increase the decomposition process. It also enhanced the nutrient assimilation rate in okra due to increase the availability of nutrient pool resultant that the high proliferation of plant growth and improved the yield attributing characters which ultimately effect on yield of okra. Similar result also showed by Pandey and Kumar (1989) [9], Chattoo *et al.* (1997) [3], Kanwar *et al.* (2002) [5] Bhusan *et al.* (2010) [2] and Mohanta *et al.* (2018) [7].

Table 1: Effect of different organic manures on growth parameters of okra

Treatments	Plant height (cm)		
	30 DAT	60 DAT	At harvesting
T ₀	20.00	45.67	78.33
T ₁	22.66	51.45	88.91
T ₂	24.06	54.62	94.39
T ₃	23.60	53.56	92.57
T ₄	22.97	52.15	90.13
T ₅	26.23	59.55	102.92
T ₆	25.61	58.14	100.48
T ₇	25.15	57.09	98.66
SEm ±	0.51	1.11	2.02
CD (P = 0.05)	1.53	3.37	6.12

Table 2: Effect of different organic manures on growth parameters of okra

Treatments	Number of branches	Number of leaves at harvest	Stem diameter (cm)
T ₀	1.42	6.00	1.30
T ₁	1.64	6.91	1.50
T ₂	1.74	7.34	1.59
T ₃	1.71	7.20	1.56
T ₄	1.66	7.01	1.52
T ₅	1.90	8.00	1.74
T ₆	1.85	7.81	1.69
T ₇	1.82	7.67	1.66
SEm ±	0.04	0.17	0.04
CD (P = 0.05)	0.13	0.51	0.11

Table 3: Effect of different organic manures on minimum days taken to first flower initiation (Days), minimum days taken to 50% flowering of plant (Days), No. of flowers per plant and yield of okra

Treatments	Minimum days taken to first flower initiation (Days)	Minimum days taken to 50% flowering of plant (Days)	No. of flowers per plant	Yield (q/ha)
T ₀	60.23	85.85	21.67	136.93
T ₁	58.81	83.82	24.74	153.79
T ₂	54.17	77.22	26.27	163.27
T ₃	55.24	78.74	25.76	160.11
T ₄	52.75	75.19	25.08	155.89
T ₅	45.00	64.00	28.64	178.01
T ₆	52.03	74.17	27.96	173.80
T ₇	52.75	75.19	27.46	170.64
SEm ±	1.42	2.03	0.61	3.37
CD (P = 0.05)	4.31	6.14	1.84	10.21

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