

## Influence of Different Organic Manures on Growth and Yield of Okra

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### ABSTRACT

Field experiment was conducted to study the influence of different organic manures on the growth and yield of okra at Agriculture Experimental Area, D.A.V College, Abohar. Five treatments were used in the experiment [ $T_1$  – Poultry Manure @  $5 \text{ t ha}^{-1}$ ,  $T_2$  – Vermi Compost @  $5 \text{ t ha}^{-1}$ ,  $T_3$  – Digested form of FYM @  $20 \text{ t ha}^{-1}$ ,  $T_4$  – Recommended dose of NPK @ (90: 0: 0)  $\text{kg ha}^{-1}$ ,  $T_5$  – No manure treatment (control treatment)]. The results obtained from the experiment showed that the digested FYM  $20 \text{ t ha}^{-1}$  recorded the maximum plant height, number of fruits per plant, number of branches, fruit length and yield i.e. 131.64 cm, 38.16, 2.54, 16.19 cm and  $5.12 \text{ t ha}^{-1}$  respectively. The amount of dry matter accumulation under the treatment of digested FYM was also recorded maximum as compared to other manure treatments and no manure control.

**Keywords:** Digested FYM, Growth, Okra, Organic Manures, Poultry Manure, Vermi Compost And Yield

### I. INTRODUCTION

Okra is one of the most important vegetable crop grown in tropical and sub-tropical region and is said to be native of South Africa and Asia. In India, it is cultivated almost in all states throughout the year and consumed by bulk of the people. Major okra growing states in India are Uttar Pradesh, Bihar and Orissa (Lakra *et al* [1]). Okra belongs to Malvaceae family. It is related to cotton, hibiscus and hollyhock. It is an annual tropical herb cultivated for its edible green seed pod (there is also a red pod variety, which turns green when cooked). It has heart shaped leaves and large, yellow, hibiscus like flowers. The seed pods are 3-10 inches long, tapering, usually with ribs down its length. These tender, unripe seed pods are used as a vegetable, have a unique texture and sweet flavour. Okra is a good source of vitamins, calcium, potassium and other minerals. Due to its high iodine content, consumption of okra is good for the control of goiter. The root and stem are useful for cleaning cane juice while preparing jaggery. 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 gm of okra (Dhaliwal, [2]). A fertilizer is any material of natural or synthetic origin (other than liming materials) that is applied to soil or to plant tissues (usually leaves) to supply one or more plant nutrients essential to the growth of plants. Fertilizers enhance the growth of plants. This goal is met in two ways, the traditional one being additives that provide nutrients. The second mode by which some fertilizers act is to enhance the effectiveness of the soil by modifying its water retention and aeration. Fertilizers provide different nutrients, one of them are three main macronutrients i.e. nitrogen N (leaf growth), phosphorus P (development of roots, flower, seed, fruit), potassium K (strong stem growth, movement of water in plants), second are three secondary macronutrients i.e. calcium

(Ca), magnesium (Mg) and sulfur (S), others are micronutrients. 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 is rich in nutrients. In India, FYM contains about 0.32 % nitrogen (N), 0.05 % phosphorus (P), 0.25 % potassium (K), 1.20 % calcium (Ca) and 0.33 % magnesium (Mg). A small portion of N is directly available to the plants while a larger portion is made available as and when the FYM decomposes. Application of well-rotten FYM improves the soil structure. It increases the soil fertility and adds humus to the soil. It also improves the soil productivity. Vermicompost is organic manure (bio-fertilizer) produced as the vermicast by earth worm feeding on biological waste material, plant residues. This compost is an odorless, clean, organic material containing adequate quantities of N, P, K and several micronutrients essential for plant growth. Vermicompost contain organic carbon (9.5 - 17.98 %), nitrogen (0.5 – 1.50 %), phosphorus (0.1 – 0.30 %), potassium (0.15 - 0.56 %), calcium and magnesium (22.67 – 47.60 meq/100g), copper (2 – 9.50 mg kg<sup>-1</sup>), zinc (5.70 – 11.50 mg kg<sup>-1</sup>) and sulphur (128 – 548 mg kg<sup>-1</sup>). Poultry manure is the organic waste from poultry composed of mainly feces and urine of chickens. The mixture of poultry manure with spilled feed, feathers and bedding materials like wood shavings or saw dust is referred as poultry litter. Fresh poultry manure contains 0.8% potassium, 0.4% to 0.5% phosphorus and 0.9% to 1.5% nitrogen. It act as good soil amendment, as it adds organic matter and increases the water holding capacity of soil and beneficial biota in soil. The experiment was performed to study the comparison of organic manures and inorganic fertilizers on morphological parameters of okra and yield and yield attributes of okra.

## **II. MATERIAL AND METHODS**

Field experiment was conducted at the Agriculture Experimental Area, D.A.V College, Abohar to study the influence of different organic manures on growth and yield of okra. There were five treatments involving different organic manures along with no manure control. The different organic manure treatments were –T<sub>1</sub> (Poultry Manure @ 5 t ha<sup>-1</sup>), T<sub>2</sub> (Vermi Compost @ 5 t ha<sup>-1</sup>), T<sub>3</sub> (Digested form of FYM @ 20 t ha<sup>-1</sup>), T<sub>4</sub> (Recommended dose of NPK @ (90: 0: 0) kg ha<sup>-1</sup>) and T<sub>5</sub> (control treatment). The experimental plots were of size 5 x 2 m<sup>2</sup> and each plot consisted of three ridges with 45cm spacing. The sowing of okra was done on March 1, 2017. The seeds were sown at seed rate of 23 kg ha<sup>-1</sup>. All the organic manures as per treatments were applied and incorporated into the soil 3 days before sowing. Recommended dose of nitrogen (90 g/plot) was given in two split doses. First half dose of N (45 g/plot) was applied during sowing and second half dose (45 g/plot) was applied after first picking of okra fruits.

Research was done to find the effect of different organic manures on plant height, number of fruits per plant, number of branches, average fruit length and yield. Plant height was observed by selecting five plants at random from each plot and then plant height of these plants was measured with the help of measuring tape from ground level up to top of the plant at an interval of 15 days. Numbers of fruits per plant were recorded by selecting five plants at random from each plot and then leaves per plant were counted manually. Numbers of branches per plant were observed by selecting five plants at random from each plot and then branches of these okra plants were counted manually. Fruit length was recorded by selecting five plants at random from each plot and then

length of each fruit of selected plants was measured with the help of vernier calliper. Yield was calculated by using weighing machine.

### **III. RESULTS AND DISCUSSION**

#### **3.1 Plant height**

Treatment of okra with different organic manures has good results. Among the different organic manure treatments, application of digested FYM @ 20 t ha<sup>-1</sup> performed better than other treatments. Data regarding plant height of okra plant has been presented in Table 4.1. From the table 4.1, it has been found that application of digested FYM @ 20 t ha<sup>-1</sup> resulted in maximum plant height 131.64 cm followed by vermi compost (129.22 cm) and recommended dose of inorganic fertilizer (125.56 cm) respectively. The observation of this research is similar with that of Premsekhar and Rajashree [3], and Tiamiyu *et al* [4] who observed that the organic manures recorded the maximum plant height.

#### **3.2 Number of fruits per plant**

From the data presented in Table 4.2, it has been concluded that the plants treated with digested FYM @ 20 t ha<sup>-1</sup> have maximum number of fruits per plant (38.16) followed by the plants treated with recommended dose of nitrogen (35.32). Minimum no. of fruits per plant (21.89) was recorded in control treatment. Akande *et al* [5], and Olaniyi *et al* [6] were in agreement with this research in which it had been observed that organic manures had significantly better results. The number of fruits per plant increased with organic manures as compared to inorganic manures.

#### **3.3 Number of branches per plant**

Organic manures have significantly good results on number of branches per plant. Table 4.3 shows the data treatment T<sub>3</sub> (digested FYM @ 20 t ha<sup>-1</sup>) recorded the maximum number of branches (2.54) as followed by poultry manure (2.18) and recommended dose of inorganic fertilizers. Treatment T<sub>5</sub> recorded least number of branches per plant (1.51). Similar results had been found by Nweke *et al* [7] also gave similar results who showed that the poultry manure recorded the highest value in number of branches per plant i.e. 4.67 in okra and was significantly different from other treatments viz. Goat manure, Pig manure and control treatment. As they were not used FYM in their experiment, it was the only reason poultry manure followed the digested FYM in above observation.

#### **3.4 Fruit length**

From Table 4.4, it has been concluded that organic manures have great impact on the fruit length of okra. It has been observed from the table that treatment T<sub>5</sub> (no manure control) recorded the minimum length of fruit (11.61cm) among all other treatments. Whereas T<sub>3</sub> (digested FYM @ 20 t ha<sup>-1</sup>) has significant good results for fruit length (16.19 cm) of okra than other treatments i.e. T<sub>1</sub>, T<sub>2</sub>, T<sub>4</sub> and T<sub>5</sub>. Sarhan *et al* [8] also showed that the application of 1.5 tons/dunam organic fertilizer (sheep residues) resulted in maximum fruit length (14.23 cm) in case of Mullah Ahmed variety of summer squash and least length of fruits were observed in control treatment (12.60 cm), when no biofertilizer was applied in field.

### 3.5 Yield

From the observation of yield per hectare in Table 4.5, it has been analyzed significantly that highest yield (5.22 t ha<sup>-1</sup>) has been obtained from the plot treated with digested FYM followed by recommended dose of inorganic fertilizers (4.16 t ha<sup>-1</sup>), poultry manure (2.66 t ha<sup>-1</sup>), vermi compost (2.64 t ha<sup>-1</sup>) and the least yield (2.19 t ha<sup>-1</sup>) was observed with control treatment. Hiraguli and Allolli [9], and Pushpavalli *et al* [10] showed that the yield of chilli and okra respectively was found highest when treated with organic manures.

## IV. OBSERVATIONS AND TABLES

**Table 4.1: Effect of different organic manures on plant height of okra:**

Treatments	Plant height (in cm)				
	30 DAS	45 DAS	60 DAS	75 DAS	90 DAS
T <sub>1</sub>	17.52	40.76	70.32	104.56	125.45
T <sub>2</sub>	16.91	40.54	75.24	110.34	129.22
T <sub>3</sub>	19.75	48.1	76.5	107.90	131.64
T <sub>4</sub>	16.40	45.32	70.46	101.98	125.56
T <sub>5</sub>	14.64	35.78	69.24	97.66	113.9

**Table 4.2: Effect of different organic manures on number of fruits per plant:**

Treatments	Number of Fruits per plant					
	1 <sup>st</sup> picking	2 <sup>nd</sup> picking	3 <sup>rd</sup> picking	4 <sup>th</sup> picking	5 <sup>th</sup> picking	Total
T <sub>1</sub>	4.56	5.25	5.68	4.95	4.40	24.84
T <sub>2</sub>	5.75	6.67	6.45	6.32	5.50	30.69
T <sub>3</sub>	6.90	8.04	8.85	7.89	6.48	38.16
T <sub>4</sub>	5.43	7.78	8.07	7.34	6.70	35.32
T <sub>5</sub>	3.95	4.55	4.78	4.36	4.25	21.89

**Table 4.3: Effect of different organic manures on number of branches per plant of okra:**

Treatments	Number of branches per plant					
	30 DAS	45 DAS	60 DAS	75 DAS	90 DAS	Average
T <sub>1</sub>	1.20	1.50	2.24	3.0	3.00	2.18
T <sub>2</sub>	1.00	1.20	1.90	2.40	2.40	1.78
T <sub>3</sub>	1.40	1.90	2.80	3.30	3.30	2.54
T <sub>4</sub>	1.00	1.50	2.50	2.90	2.90	2.16
T <sub>5</sub>	1.00	1.00	1.56	2.00	2.00	1.51

**Table 4.4: Effect of different organic manures on Average fruit length of okra:**

Treatments	Fruit length (in cm)					
	1 <sup>st</sup> picking	2 <sup>nd</sup> picking	3 <sup>rd</sup> picking	4 <sup>th</sup> picking	5 <sup>th</sup> picking	Average length
T <sub>1</sub>	10.62	12.68	16.48	14.24	14.46	13.69
T <sub>2</sub>	12.38	12.42	16.34	12.45	15.94	13.91
T <sub>3</sub>	12.84	13.94	18.69	19.36	16.14	16.19
T <sub>4</sub>	11.91	13.48	18.76	19.06	15.68	15.78
T <sub>5</sub>	9.63	10.37	13.43	12.08	12.56	11.61

Table 4.5: Effect of different organic manures on yield of okra:

Treatments	Yield per hectare (in tons)					
	1 <sup>st</sup> picking	2 <sup>nd</sup> picking	3 <sup>rd</sup> picking	4 <sup>th</sup> picking	5 <sup>th</sup> picking	Total yield
T <sub>1</sub>	0.25	0.34	0.96	0.57	0.54	2.66
T <sub>2</sub>	0.33	0.32	0.88	0.67	0.44	2.64
T <sub>3</sub>	0.54	0.96	1.76	1.16	0.80	5.22
T <sub>4</sub>	0.48	0.68	1.43	0.94	0.63	4.16
T <sub>5</sub>	0.22	0.32	0.76	0.38	0.51	2.19

## V. CONCLUSION

The research was carried out to evaluate the effect of different organic manures on growth and yield of okra. A conclusion can be made that application of organic manure had positive effect on growth and yield of okra. Application of digested Farm Yard Manure in the soil enhanced all the characters of okra such as plant height, number of fruits plant, number of branches per plant, number, length of fruit and yield. Application of recommended inorganic fertiizers gave second best results after digested FYM. The least results were obtained from control treatment. This research will solve some of the problems faced by modern day farmers.

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