Comparative Effects of Different Manure on Growth and Yield of Okra (*Abelmuscus esculentus L. Moench*)

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Abstract: **This study evaluated the comparative effects of the organic fertilizer (poultry manure, cow dung and composted manure) on okra (*Abeloamoschus exclulentus*) at Research Farm of Federal College of Forestry, Jericho, Ibadan, Nigeria, latitude 7°26N and longitude 3°36E. Three manures were used for this work (composted, cow dung and poultry manure), the manures were dried under intense sunlight and ground into powdery form and incorporated into topsoil in a polythene bag and watered to allow commencement of mineralization and germination fourteen (14) before planting. The experimental design was completely randomized design (CRD) with 4 treatments and 4 replicates. Composted manure gave the highest mean value of 35.6, 6.16, 0.67 and 15.713 for plant height, number of leaves, stem girth and fruit weight respectively. The control has the lowest mean value for all the experimental test carried out. The study revealed that okra responded well to the application of composted manure, cow dung and poultry manure and recommended to farmers in their cropping system for improved yields.**

I. INTRODUCTION

Okra (*Abelmoschus exculentus*) is an important vegetable grown in Nigeria and ranks third in production area following tomato and onion (Grubben, 1999). Okra contains vitamins A. B. Complex and C; it is rich in iron and Calcium and is higher than many vegetables in thiamin, riboflavin and niacin (Rice *et al.,* 1991). The stem can be used in making rope and paper, while the young pod is used in cooking soup (Raemakers 2001; George, 2005). The foliage provides a good source of fodder to livestock (Ahmed *et al.,* 2006). Okra is an important soup condiment in Nigeria and it forms part of the Nigerian curry dishes. It is rich in vitamins, minerals and research has revealed that it several medicinal values (Seran *et al.,* 2010). Okra is adaptable and will grow in most soils though it perform best in well-drained soil that is rich in organic matter and the soil should be ideally be on acidic side, with pH between 5.8 and 7.0.

Bush fallowing and shifting cultivation are efficient and sustainable agricultural system for soil productivity and restoration of soil fertility in the tropics over the years (Ayoola and Adeniran, 2006). However, due to increase in population which has led to reduction in land availability for farming, the fallowing period had reduced and this has had an adverse effect on the fertility restoration thus, leading to poor yields of crops (Eifediyi and Remison, 2010). Thence, the use of external inputs in the form of organic and inorganic fertilizer has become imperative. Farmyard manure which is a fertilizer composed of waste products has been used as a soil conditioner since ancient times and its benefit have not been fully harnessed due to large quantities required in order to satisfy the nutritional needs of crops (Makinde *et al.,* 2007). Organic fertilizer are being advocated for because of several reasons viz, Improvement in environmental conditions and public health (Ojeniyi, 2000), the need for renewable forms of energy and reduced cost of fertilizing crops (Ayoola and Adeniran, 2006), steady release of nutrients to the soil and activation of soil microbial biomass (Belay *et al.,* 2001). Furthermore, the constrains of unavailability of the right type of inorganic fertilizer at the right time, high cost, lack of technical know-how and lack of access to credit facilities (Chude, 1999) necessitated the adoption of organic manure in growing of crop in Nigeria. This is evident with the diverted attention of soil scientists towards making use of organic materials (both organic manures as well as organic wastes) for improving the physical properties of soils that allow profitable crop production (Somami and Totawat, 1996). The only constraints to its use by peasant farmers is the cost of transportation due to it is bulkiness. Cow dung and poultry manure are mostly used by farmers who engage in mixed farming so, in effect, there is no or little waste generated. Organic manure when efficiently and effectively used ensures sustainable crop productivity by immobilizing nutrients that are susceptible to leaching (Abou El-Magd *et al.,* 2006). In addition, the long term use of cow-dung increased aggregate stability, pore space, bulk density and available water range (Vanlauwe, 2001). This study was therefore conducted to investigate and compare the effects of poultry manure, cow dung and composted manure on the growth of okra.

II. MATERIALS AND METHODS

Field experiment was conducted at the Teaching and Research Farm of Federal College of Forestry Jericho, Ibadan, Oyo state, Nigeria. The area lies between latitude 7°26N and longitude 3°36E. The climate condition of the area is tropically dominated by rainfall pattern ranging from 1400mm-1500mm with the average temperature of 31.2°C and average relative humidity of about 80-85% with two

distinct season which are dry season from November to March and raining season from April to October. (FRIN Meteorological station, 2013). The okra seed was obtained from the department of agricultural technology unit of Federal College of Forestry, Ibadan, while the cow dung and poultry manure were collected from Agricultural Extension and Management teaching and research farm unit of the Federal college of Forestry, Ibadan. Compost manure and topsoil were collected from the farm practical site of Federal College Forestry, Ibadan. The manures were taken to the laboratory for analysis after they have been dried under intense sunlight for two weeks and later grind into powdery form. The manure were measured and weighed into different levels of 5g, 10g, 15g, and 20g respectively at 5g interval using a sensitive weighing balance. The manures were incorporated into the soil in the polythene pot and watered to allow commencement of mineralization and germination fourteen (14) days before planting. Composted manure consist of cow dung, Gliricidia sepium and wood ash. Seed of Okra were sown in a polythene nylon filled up with top-soil, weighing 5kg in each polythene pot. The experimental design for this study was completely randomized design (CRD) with 4 treatments, replicated 4 times making it a total of 16 test samples of Okra (*Abelsomoschus esculentus*). The treatments are coded as follows; top soil (control test) -T1, Poultry manure-T2, Cow dung-T3, Compost manure-T4. Data collection commenced two weeks after planting and continued on weekly basis till the end of the experiment. The parameters assessed includes plant height (the height of Okra (*Abelmoschus esculentus*)) with the aid of meter rule, number of leaves which was counted with the aid of hand, fruit weight was assessed using weighing scale, Stem girth was measured with the aid of vernier caliper.

III. RESULTS AND DISCUSSION

Effects of the organic manure on the okra (Abelmoschus esculentus)

3.1 Influence of organic fertilizers on plant height

Table 1 shows the effects of top soil, poultry manure, cow dung and compost on the plant height of okra. The results of the height varied on weekly basis, the mean value at the end of the eight weeks of the experiments were reported with plants treated with composted manure (T4) has the highest plant height with mean value of (35.63cm), followed by (T3) cow dung with mean value of (31.36cm), and poultry manure (T2) with mean value of (29.69cm). While plant treated with top soil has the least performance with mean of (26.86cm). This is in accordance with the work of (Adeboye, 2010) reported on the height of okra.

Table 1: Influence of organic fertilizers on plant height

Treatment	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	MEAN
T_1	15.13a	20.25b	23.00b	26.13b	31.00b	39.70b	40.75b	43.00b	26.86b
T_2	17.5a	22.75ab	25.5ab	29.5ab	36.50ab	39.5ab	43.5ab	47.25b	29.69b
T3	16.88a	20.25b	23.5b	26.75b	38.75ab	37.75ab	42.75b	49.25b	31.36ab
T4	17.00a	21.25ab	26.5a	31.5a	39.5a	43.5a	49.5a	56.75a	35.6a
L.S.D	2.51	2.13	2.78	3.41	3.41	7.54	6.66	7.31	

3.2 Influence of organic fertilizers on numbers of leaves

The highest number of leave were gotten from treatment 4 while the control (treatment 1) gave the least number of leave. There was no significant difference in the result gotten from treatment 1-3 at 0.05 significant level (Table 2). However, the okra growth parameters were strongly influenced by the composted manure.

Table 2: Influence of organic fertilizers on numbers of Okra leaves

Treatment	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	MEAN
T_1	4.5Ab	4.25A	4.75A	4.5B	5B	5.75A	5.25B	6.25A	5.03Ab
T_2	4.25Ab	4.25A	4.75A	5.5Ab	5.75A	6.5A	6.25Ab	6.75A	5.50Ab
T3	5.25A	4.25A	4.75A	6Ab	6.2Ab	7A	6.25Ab	7.25A	5.87Ab
T4	4.75Ab	4.25A	5.5A	6.5A	7A	7.25A	7A	7A	6.16A
L.S.D	0.80	0.77	0.80	1.83	1.37	1.57	1.68	2.19	

3.3 Influence of organic fertilizers on stem girth

From table 3, Okra plants grown on treated soil with composted manure (T4) has the highest stem girth with mean value of (0.67) followed by (T3) cow dung with mean value of (0.61), and poultry manure (T2) with mean value of (0.59), while plant treated with top soil has the least performance with mean of (0.48). There was no significant difference in the stem girth of okra between treatment 4 and 3.

3.4 Influence of organic fertilizers on fruit weight

Table 4 shows the effects of top soil, poultry manure, cow dung and compost on fruit weight of okra. The result shows that fruit weight of the okra planted on soil treated with composted manure (T4) has the highest mean value of (157.13), followed by (T3) cow dung with mean value of (20.43), and poultry manure (T2) with mean value of (19.53), while fruit weight of the okra on the control soil has least performance with mean value of (17.53).

Table 4: Influence of organic fertilizers on fruit weight

Treatment	WK1	WK2	WK3	WH4	WK5	MEAN
T1	13.63b	16.75b	17.50c	18.75b	21.00b	17.53
T2	16.00b	18.75b	18.50c	20.75b	21.63b	19.13
T3	14.50b	19.75b	22.63b	22.38b	22.88b	20.43
T4	26.88a	28.75a	32.50a	34.00a	35.00a	15.713
G.M	17.7525	62.4375	22.7825	29.970	25.1275	30.42
L.S.D	2.2191	7.8047	2.8478	2.9963	3.1409	3.8017

IV. CONCLUSION

This study has clearly shown that okra responded well to the application of composted manure, cow dung and poultry manure, although, the good growth performance exhibited by okra planted with composted manure, cow dung, poultry manure and top soil are statistically different. Composted manure gave a better yield and result for all the test carried out and this implies that farmers should be encouraged to use composted manure in their cropping system to minimize the cost of production and to get a better yield as this research has revealed the use of composted manure improve soil organic matter and nutrient availability and crop high yield.

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