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The effect of organic manure on growth and yield of okra (*Abelmoschus esculentus L.*)

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Abstract

Field experiments to investigate the effect of different sources of organic manure (poultry manure (3 kg), Cattle manure (3 kg), Swine manure (3 kg), Rabbit urine (1lit)) on growth and yield of okra were carried out. The soil pH was checked and analyzed for pH 6.8 and the soil fertility is 6.

The experimental site was cleared and cultivated (tilled and fertilized). Treatments were laid out before planting at once, there was no re-application of treatment.

Data were collected on growth and yield parameters (plant height, foliage and fruit weight).

There was a significant difference in the height of okra plant treated with poultry manure, cattle manure, swine manure, rabbit urine when compared with the control group.

Poultry manure and Cattle manure significantly increase the foliage of okra plant when compared with Swine manure, Rabbit urine and the control.

There was significant difference in the fruit weight of okra fertilized with Poultry manure and Rabbit urine when compared with the control but there was no significant difference in swine and cattle manure when compared with the control.

From this experimental study, poultry manure and rabbit urine increased the growth and yield of okra and it is recommended for both subsistence farming and commercial production of okra.

Keywords: Okra; Organic Manure; Yield; Plant height

1. Introduction

Okra (*Abelmoschus esculentus L.*) is one of the most important vegetables grown in Nigeria. It is an annual crop grown mainly as fruits and leafy vegetables in both green and dried state in the tropics [1]. The crop is used as soup thickener which may also be served with rice and other food types. The fresh fruit is a good source of vitamins, minerals and plant protein [2]. Rehn and Espig [3] stated that okra contain about 20% edible oil and protein, while its mucilage is utilized for medicinal purposes. The mature stem contains crude fiber which is used in paper industries and for making ropes. K, Na, Mg and Ca are the principal elements in pods, which contain about 17% seeds. Presence of Fe, Zn, Mn and Ni also has been reported [4].

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Okra seed is mainly composed of oligomeric catechins (2.5 mg/g of seeds) and flavanol derivatives (3.4 mg/g of seeds), while the mesocarp is mainly composed of hydroxycinnamic and quercetin derivatives (0.2 and 0.3 mg/g of skins). Pods and seeds are rich in phenolic compounds [6]. These properties, along with the high content of carbohydrates, proteins, glycol-protein, and other dietary elements enhance the importance of okra in the human diet [5,6]. However, fresh okra pods are the most important vegetable source of viscous fiber, an important dietary component to lower cholesterol [7].

Okra mucilage has potential for use as food, non-food products, and medicine. Food applications include use as a whipping agent for reconstituted egg whites, as an additive in the formulation of flour-based adhesives, and as an additive in India for clarifying sugarcane juice. Non-food applications include brightening agents in electro deposition of metals, as a deflocculant in paper and fabric production, and as a protectant to reduce friction in pipe-flow [8,9]. Potential of mucilage for medicinal applications includes uses as an extender of serum albumin [8], as tablet binder [10] and as suspending agent in formulations [11]. Okra mucilage is used in Asian medicine as a protective food additive against irritating and inflammatory gastric diseases [12].

Okra is cultivated under rainfed and in irrigated areas on a wide range of soils. The production is seriously affected having low yielding rate in Nigeria due to poor soil fertility, and the use of inorganic fertilizer has not been helpful either in subsistence or intensive farming because it is often associated with reduced crop yield, soil acidity and nutrients imbalance [13,14,15].

Furthermore, the extent to which farmers can depend on this input is constrained by unavailability of the right type of inorganic fertilizers at the right time, high cost, lack of technical know-how and lack of access to credit [16]. This has encouraged scientists towards making use of organic manures (as well as composts) for improving the physical properties of soils that allow profitable crop production [17].

This study was carried out to elucidate the effect of different sources of organic manure (Poultry manure, Cattle manure, Swine manure and Rabbit urine) on growth and yield of okra.

2. Material and methods

The experiment was conducted at the research farm of the department of crop production, Peace House Agricultural Training Institute, Isarun, Ondo state, South-Western part of Nigeria.

2.1. Experimental treatment

The site which measures 50x50ft (sq.) was subdivided into five plots. Each manure used was allocated a plot each of six (6) ridges. Group A was for Control (No manure was applied), Group B (3 kg of Swine manure) and Group C (1litre of Rabbit urine manure to 5liters of water), Group D (3kg of Poultry manure), Group E (3 kg of Cattle manure). The manure application method used is direct broadcasting; this involves the spreading of the manure on the surface of the ridges /plots to be planted and there was no replication.

Table 1 NPK Values of Animal manures

Nutrient	Cattle manure	Poultry manure	Swine manure	Rabbit urine
N (%)	0.6	1.1	0.8	2.4
P (%)	0.4	0.8	0.7	1.4
K (%)	0.5	0.5	0.5	0.6

https://www.allotmentment-garden.org/composts-fertilizers/npk-nutritional-values-animal-manures-compost/.

2.2. Planting of seeds

The seeds were planted at the rate of three seeds per hole and a planting space of 60cm by 45cm and 2.5cm depth very early in the day before sunset. Each plot contains 112 stands of okra plants, and the plots were separated with demarcating ropes and was labeled accordingly.

2.3. Thinning and Weeding

The thinning of the plants was carried out through manual process of directly using hand to gradually uproot the unwanted plants to avoid effect on the other tender plants when the plants were 15days old. First weeding was carried out when the plants was 22days old. The second weeding was done on 44days old. The weeding was done through the use of local weeding hole and mulching of each plant was done to prevent falling or being washed off by erosion.

2.4. Data Collection

All data collection began from the first week after planting. Data were collected from 40 randomly selected plants in each plot. Data collected includes:

Number of leaves (foliage) per plant per plot of manure: this was done on the 40 tagged plants by counting the number of leaves on each of them from week one to week 12.

Weight of fruits per plot of manure: this was done by weighing the fruits harvested per day and it was recorded for 15 times of harvesting.

Plants height per plot of manure: the height of the plants was taken from week 1 to week 12 for each treatment.

2.5. Data Analysis

The means and standard error of mean (SEM) of the data were calculated. The results were analyzed by one-way analysis of variance (ANOVA) with Tukey-Kramer Multiple Comparisons Test using GraphPad prism to determine significant differences between means and where applicable, least significant difference (LSD) was used to determine significant results. The differences between groups were considered significant at $P < 0.05$.

3. Results

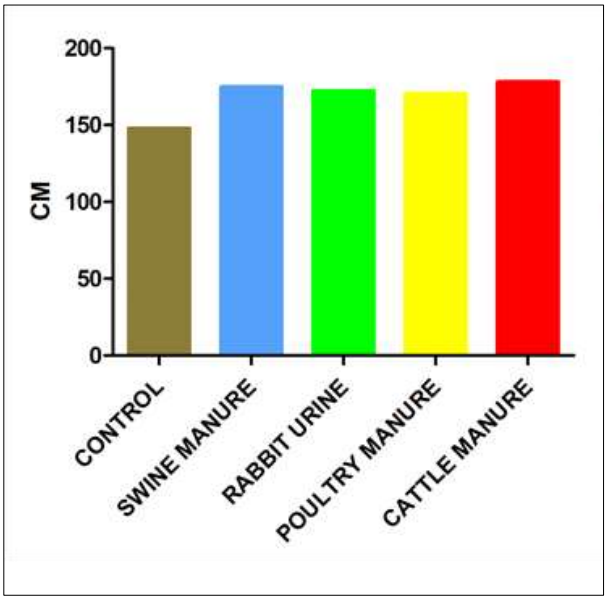

Figure 1 Plant Height (Cm)

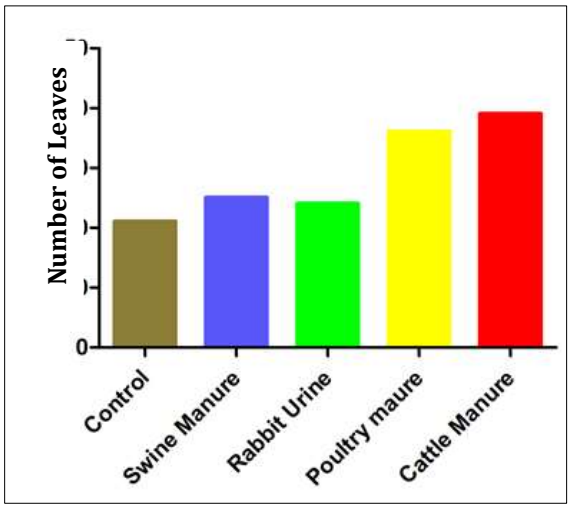

Figure 2 Number of Leaves Per Plant

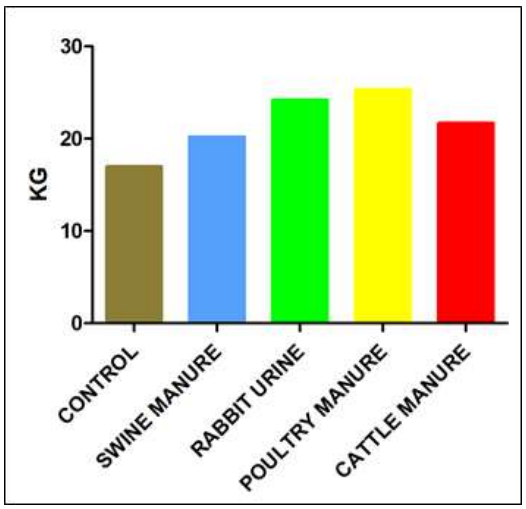

Figure 3 Total Fruit Weight (Kg)

4. Discussion

In the Figure 2 above, the foliage of okra with cattle manure and poultry manure treatment is significantly higher ($P<0.05$) than any other manure treatment and the control. This finding is in agreement with the findings of Okee [18] who reported that poultry manure at 10t/ha gave the highest number of leaves. Thus, indicating the importance of poultry manure on the vegetative growth of okra.

In this study, foliage and yield is directly proportional, the higher the foliage the higher the yield of okra. This finding was supported by Wonang et al., [19] who reported that the pod weight was highest at 0% level of defoliation with the lowest pod weight at 100% level of defoliation. According to Figure 1, there is no significant difference ($P>0.05$) in the plant height of the treatment groups but when compared to control, there is a significant difference ($P<0.05$). This finding is in agreement with that of Ajari et al., [20] who reported that organic manure especially poultry manure could increase plant height in crops.

Also, there is no significant difference in fruit weight (yield) of okra between all the treatment groups but there is significance increase in poultry manure and rabbit urine treatment groups when compared with the control. This result is also in accordance with the findings of Ofosu-Anim et al., [21].

The increase in okra yield apparently resulted from improved soil chemical and physical characteristics under poultry manure (N:1.1%, P:0.8%, K:0.5%) and rabbit urine application (N:2.4%, P:1.4%, K:0.6%). Plants responded to the improved conditions under manure, especially poultry manure, with an increased yield [21,22,23]. The significant increase in total yields in rabbit urine and poultry manure treatment might also be attributed to the increased branching. In okra, more branching accounts for increased yield as pod developed in the axil of every branch once flowering has begun [21].

5. Conclusion

From the findings in this study, poultry manure and rabbit urine increased the production of okra significantly and identified as a better source of organic manure for okra production. The use of poultry manure and rabbit urine as organic manure will help soil organic matter status, nutrient availability and good crop yield. They are cheap, easily accessible, available and good alternative to inorganic manure due to the reduction of health hazard that comes with the use of inorganic manure and the sustainability effects on soil. Therefore, poultry manure and rabbit urine are highly recommended for commercial production of okra.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare no conflict of interest.

References

[1] Gibbon, D. and Pain, A. (1984). Crops of the drier regions of the tropics. International Tropical Agriculture Science. Longman London. Pp. 137

[2] Eke, K.A., Essiens, B.A. and Ogbu, J.U. (2008). Determination of optimum planting time of okra in the derived savannah, Proc. of the 42nd Conf. of ASN at Abakaliki. Pp. 242 –245.

[3] Rehn, S. and Espig, G. (1991). The cultivated plants of the tropics and sub-tropics CTAD6992. Germany P. 552

[4] Moyin-Jesu E.I. (2007) Use of plant residues for improving soil fertility pod nutrients root growth and pod weight of okra Abelmoschus esculentum L. Bioresour. Tech. 98: 2057-2064

[5] Manach C., Williamson G., Morand C, Scalbert A. and Remesy C. (2005). Bioavailability and bioefficacy of polyphenols in humans. Review of 97 bioavailability studies. Amer. J. Clinical Nutrit.,

[6] Arapitsas P. (2008). Identification and quantification of polyphenolic compounds from okra seeds and skins. Food Chem. 110.

[7] Kendall C.W.C and Jenkins D. J.A (2004). A dietary portfolio: maximal reduction of low-density lipoprotein cholesterol with diet. Current Atherosclerosis Reports 6:492-4

[8] BeMiller J.N., Whistler R.L., Barkalow D.G., Chen C.C. (1993). Aloe, chia, flax seed, okra, psyllium seed, quince seed, and tamarin gums. In: Industrial Gums, Whistler RL, BeMiller JN (eds.), Academic Press, New York, pp. 227-256.

[9] Ndjouenkeu R, Goycoolea F.M, Morris E.R, Akingbala J.O (1996). Rheology of okra (Hibiscus esculentus L.) and dika nut (Irvinia gabonensis) polysaccharides. Carbohydrate Polymers 29: 263

[10] Ofoefule S.I, Chukwu A.N, Anayakoha A, Ebebe I.M (2001). Application of *Abelmoschus esculentus* in solid dosage forms 1: use as binder for poorly water-soluble drug. Indian J. Pharm. Sci 63;234-238.

[11] Kumar R, Patil M.B, Patil S.R, and Paschapur M.S (2009). Evaluation of *Abelmoschus esculentus* mucilage as suspending agent in paracetamol suspension. Intl. J. PharmTech Res. 1:658-665

[12] Lengsfeld C, Tietmeyer F, Faller G, Hensel A (2004). Glycosylated compounds from okra inhibit adhesion of Helicobacter pylori to human gastric mucosa. J. Agric. Food Chem., 52: 1495-1503.

[13] Kang B.T. and Juo A.S.R. (1980). Management of low activity clay soils in tropical Africa for Food Crops Production pp129- 133 In: Terry ER, KA

[14] Obi M.E and Ebo P.O (1995). The effect of different management practices and the soil physical properties and maize production in severely degraded soil in/ Southern Nigeria. Biol. Res Technol., 51:117 -123.

[15] Orluchukwu, J. A and Amadi, C. (2022) Effect of organic and inorganic fertilizers on the growth and yield of cucumber (Cucumis sativa L.) in South-South Nigeria. International Journal of Agricultural Policy and Research Vol.10 (2), pp. 31-37.

[16] Chude, V.O. (1999). Perspectives on fertilizer use in the 21st century. Book of abstracts, Soil Science Society of Nigeria Benin,1999 25thAnnual Conf. Held at Precious Palm Royal Hotel from 21st–25thNov. 1999.

[17] Somani, L.L. and Totawat, K.L. (1996). Soil Conditioners and Amendments. Agrotech Pub. Academy, Udaipur 1stEdition. Pp. 28 –160.

[18] Okee J.I., (2020) Evaluation of the effect of organic manure and inorganic fertilizer on the growth and yield of Okra (*Abelmoschus esculentus* L, moench) in Lokoja, Kogi State, Nigeria. International Journal of Agricultural Economics, Management and Development (IJAEMD): 8(2).

[19] Wonang, D.L., Deshi, S.N. and Goyit, I. (2021) Defoliation Effects on Growth, Development and Yield of Okra (*Abelmoschus esculentus*) Under an Irrigation Regime. Noble International Journal of Scientific Research. Vol. 05 (01): 01-04.

[20] Ajari, O., Tsado, L. E. K., Oladiran, J. A. and Salako, E. A. (2003). Plant height and fruit yield of okra as affected by field application of fertilizer and organic matter in Bida, Nigeria. The Nigerian Agricultural Journal, 34: 74-80.

[21] Ofosu-Anim J., Blay E.T., and Frempong M.E (2006). Effects of organic manure on okra (*Abelmoschus esculentus* (L.) Moench) production. Journal of Applied Horticulture, 8(2): 155-158.

[22] Bhangoo, M.S., Day K.S, Sudanagunta W.R and Petrucci V.E., (1988). Application of poultry manure: Influences Thompson seedless grape production and soil properties. HortSci., 23(6): 1010-1012.

[23] Howard, C.M. and Albregts E.E., (1981). Effect of poultry manure on strawberry fruiting response, soil nutrient changes and leaching. J. Amer. Soc. Hort. Sci., 106: 295-298.