INFLUENCE OF POULTRY MANURE RATES ON THE GROWTH AND YIELD OF OKRA *(Abelmochusesculentus(L.)Moench)* IN RIVERS STATE

Abstract

Knowledge of optimum rates of poultry manure application is of immense significance in the correction of the soil nutrient deficiencies for crop production. Manure application is of importance to both the soil amendment and in the growth and yield of crops. Leaching, pattern of cropping, use of non-certified seeds and non-improved varieties have hampered the efficient growth and yield of okra. The study was conducted to examine the growth and yield responses of okra (*Abelmochusesculentus (L) moench*) to poultry manure rates in Rivers State. The research study became imperative to examine how rate of poultry manure could affect the production of okra. The experiment utilized three rates of poultry manure, 0-tons (control), 5-tonsha^{-1} and 10-tonha^{-1}and the treatment combination arranged in a Completely Randomized Block Design (CRBD) replicated three times. Growth characteristics measured were, plant height, stem thickness, leaf area and number of leaves per plant while yield parameters measured were pod length, seeds per pod, total number of pods, pod yield per hectare. The results revealed that appropriate rate of poultry manure application in the production of okra has the capacity to increase okra growth and yield in Rivers State. The use of 10-tonha^{-1}of poultry manure performed better than other poultry manure rates and so its recommended that okra farmers in the study area should apply 10-tonha^{-1}for high quality and quantity production of okra in Rivers State.

Keywords: Influence, Poultry manure, Rates, Okra (*Abelmoschusesculentus*), Growth, Fruit yield, Rivers State.

Introduction

Okra (*Abelmoschusescalentus L.*) is a vegetable crop of immense benefit to man. It is a widely cultivated vegetable and is found in almost every market all over Africa (Schippers, 2000). The nutritional composition of okra includes calcium, oil, protein and carbohydrate, vitamins, phosphorus, magnesium and iron. Most okra is eaten in cooked or processed form. Young fruits can also be eaten raw. The oil in the okra seed could be as high as in poultry eggs and soybean (Akinfasoye and Nwanguma, 2005). The pods and the leaves are consumed in Rivers State. The essential and non-essential amino –acids that okra possesses are comparable to that of cucumber, hence it plays a vital role in human diets. Akende*et al.,* (2006) described okra as

a very important vegetable food item in human nutrition supplying minerals, vitamins, certain types of hormones in addition to protein and energy.

Major factors influencing the production of okra include lack of appropriate spacing, weed infestation, poor soil fertility, etc. Adejonwo*et al.,* (1989) reported that yield loss as a result of uncontrolled weeds in okra was up to 90% in the Northern Guinea Savanna. In Nigeria, okra is produced mostly by peasant farmers usually in home gardens or intercropped with other cereal crops (Lombin, *et al.,* 2008). Weeds are described as plants growing out of place. There are over 150 plant species that are troublesome worldwide and regarded as weeds (Akobundu, 2007). Although, some of these troublesome plants (weeds) could be planted for the production of vital produce. Ansa*et al.,* (2019) reported that elephant grass could be grown for its sustainability as forage (animal feed) and for ethanol production.

Poultry manure is an adequate soil amender that provides nutrient for growing crops and promotes soil quality when applied because it has high organic matter contents combined with nutrients for plant growth. Poultry manure can be combined into other fertilizer programmes because it is an excellent source of plant nutrient (Grandy *et al.,* 2002). The availability of poultry manure helps in reducing the cost of fertilizer in vegetable crop production (Ferguson and Ziegler, 2004). Unlike mineral fertilizer, poultry manure adds organic matter to the soil which improves soil structure, nutrient retention, aeration, soil moisture holding capacity and water infiltration (Deksissa, *et al.,* 2009). The use of 10-tons ha^{-1} inorganic manure to promote crop productivity has been known to be effective only within few years, requiring consistent use on long-term basis (Ojeniyi, 2000).

Poultry manure greatly favours crop production in organic farming and they are vital in increasing the uniformity in the infiltration of rain water into the soil, reducing direct evaporation of water from the soil surface and thereby conserving soil moisture, soil aeration, controlling and reducing weed interference (Edwards and Daniel, 2002). Poultry manure is considered better amongst other animal waste because of its high concentration of micronutrients like calcium, phosphorus, nitrogen, etc. (Duncan, 2005).

The production of okra has to be made sustainable in Rivers State. The soil type, varieties sown, planting distance, weed control, soil fertilityandadequate cropping system; must all be considered to achieve a high sustainability in okra production. In any crop production, the level of yield acts as a motivator to the farmers. Wiro and Ansa (2019) stated that for the peasant farmer, the food crop yields and financial earnings realized are sufficient to attract their

participation. Thus, research on the rate of poultry manure, okra is needed to provide high productivity of the crop with a view to increasing their income earnings.

To encourage, improve, and increase okra production, there is the need for the knowledge of the poultry manure rate in Rivers State, hence, this study. The research study will add to available data on the influence of rate of poultry manure application on the growth and yield of okra in Rivers State.

Materials and Methods

The research study was conducted at the Teaching and Research Farm of the Department of Crop and Soil Science, Ignatius Ajuru University of Education, Ndele Campus, Rives State, Nigeria which is $4^{O}58N$ and longitude $6^{O}48N$. The site was covered with different weeds such as Giant star grass (*Cynodonplactostachus*), Guinea grass (*Panicum maximum*), Elephant grass (*Pennisetumpurpureum*), Spear grass (*Imperata cylindrical*), Bull grass (*Eleusinindica*) etc. These weeds were removed before setting up the experiment.

The experiment was laid out in a Completely Randomized Block Design (CRBD), replicated three times. The plant data obtained from the treatment combination were subjected to statistical analysis using the Analysis of Variance (ANOVA). Significant means were separated using the Duncan's New Multiple Range Test (DMRT) at 5% level of significance.

Soil Analysis

The soil analysis result (Table 1) showed that the soil was predominantly sandy loam, an indication of a good water and nutrient holding capacity. The soil was acidic with pH of 6.2. The available phosphorous (mg kg^{-1}) was 8.9%. The experimental site showed nitrogen content of 0.9 and the organic carbon and organic matter contents were 0.5% and 1.4%, respectively.

Table 1: Physico-chemical properties of the experimental site

Physical characteristics	**2019**
Sand (%)	83.20
Silt (%)	11.40
Clay (%)	5.40
Textural class	Loamy sand
Chemical properties	**2019**
pH (H_2O)	6.2
Organic carbon (%)	0.5
Total nitrogen (%)	0.9
Available potassium (mg kg^{-1})	8.9
Exchangeable K ($cmol_c$ kg^{-1})	0.2
Exchangeable Ca ($cmol_c$ kg^{-1})	1.4
Exchangeable Mg ($cmol_c$ kg^{-1})	0.7
Effective cation exchange capacity ($cmol_c$ kg^{-1})	2.5
Base saturation (g/kg)	92.30

Source: Department of Agronomy University of Ibadan, May, 2019.

Results:

Table 2: Impact of poultry manure on the growth characteristics of okra

Treatment Level (ton ha^{-1})	**Plant height**	**Stem thickness**	**Leaf Area**	**Number of leaves**
0	23.5	2.00	177.33	6.23
5	29.7	3.70	223.72	7.14
10	35.3	4.97	358.62	9.45
Mean	**29.5**	**3.56**	**253.22**	**7.61**
SE±	**17.03**	**2.06**	**146.20**	**4.40**

Table 3: Impact of poultry manure on the yield characteristics of okra

Treatment Level (ton ha^{-1})	**Seed Weight (g)**	**Pod length (cm)**	**Seed per pod**	**Total No. of pod**
0	3.18	2.4	45.72	60.76
5	4.62	4.8	55.34	80.50
10	5.73	7.3	90.17	100.57
Mean	**4.51**	**4.83**	**63.74**	**80.61**
SE±	**2.60**	**2.79**	**36.80**	**46.54**

Discussion

Table 2: Impact of poultry manure on the growth characteristics of okra.

The results on Table 2 revealed that the application of 10-tons ha^{-1}performed better than 5-tons $ha^{-1}$and 0-tonha^{-1} in all the growth characteristics measured. In plant height, the application of

10-ton ha^{-1} gave 35.3cm, while 5-ton ha^{-1} gave 29.7cm and 0-tonha^{-1} gave 23.5cm. There is difference obtained here. In stem thickness, 0-tons gave 2.00, 5-tons gave 3.70, 10-tons gave 4.97. There is also difference here. In the area of leaf area, the application of 10-tons ha^{-1} resulted in 358.62, 5-ton ha^{-1} gave rise to 223.72cm^3 and 0tonha^{-1} gave rise to only 177.33cm^3. The superiority of 10-ton ha^{-1} over the others was expressed. Finally, in the number of leaves, the tread repeated. Application of 10-ton ha^{-1} produced 9.45, application of 5tonha^{-1} produced 7.14; while zero application produced only 6.23. There is difference as 10-ton ha^{-1} produced better parameters in the growth characteristics of okra. This is in line with the findings of John *et al.,* (2004) who reported that the addition of poultry manure is essential for the photosynthetic process and promotes root and vegetative growth of crops. The result is also in consonance with the finding of Garg and Bahla (2008) who reported the importance of poultry manure on the performance of vegetable crops as it promotes plant growth and development.

Table 3: Impact of poultry manure on the yield characteristics of okra.

Table 3 revealed that the application of 10-ton ha^{-1} of poultry manure expressed positivity in the yield characteristics of okra. In seed weight (g), 0-ton ha^{-1} gave rise to 3.18g, 5-ton ha^{-1} gave rise to 4.62g; while 10-ton ha^{-1} gave rise to 5.73g. Here, 10-ton ha^{-1} produced higher seed weight than the application of 5-ton and 0-ton. In seed per pod, the application of 0-ton yielded 45.72, 5-ton yielded 55.34; while 10-ton yield 90.17. There is difference in the yield of seed per pod. In total number of pod, 0ton produced 60.76, 5-ton produced 80.50, 10ton produced the highest 100.57. Finally, in pod length, 0-ton ha^{-1} application produced 2.4cm, 5-ton ha^{-1} produced 4.8cm and 10-ton ha^{-1} produced 7.3cm. The application of 10-ton ha^{-1} also caused a difference in the length of pod. The result agreed with the finding of Deksissa *et al.,* (2008) that observed that poultry manure provides plants with nutrients which promotes the increase in the growth and yield of vegetable crops. These results are in conformity with the report of Anon (2000), who reported that the application of poultry manure helps to improve the soil which assists in making soil better environment for plant growth yield.

Conclusion

The rate of poultry manure application has impact on the growth and yield of okra. The study further showed that the application of 10tonha^{-1} of poultry manure has more positive impact on the growth and yield of okra in Rivers State and so the farmers of okra in the study area are advised to apply 10-tons ha^{-1} of poultry manure for optional productivity.

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