Influence of Farm yard Manures and Saw Dust Mixture on the Growth and Yield of Okra (*Abelmoschus esculentus* (L.) Moench)

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Abstract- A ten (10) weeks polyethene sack experiment was conducted at National Biotechnology Development Agency, South West BIODEC Zonal Centre Owode Yewa South, Ogun state, Nigeria between November 2014 and January 2015 to evaluate the effect of chicken (layer) manure (CLM), cow dungs (CD) and saw dust (SD) mixture on the growth and yield of okra (A*belmoscus esculentus*) in a Completely Randomized Design (CRD) replicated three times. The experiment consisted of three treatments including the control, viz; T_1 (50g CLM + 30g (CD) +20g (SD), T_2 (30g (CLM) + 50g (CD) +20g (SD) and T_3 (no application) as control. Parameters measured included plant height, number of leaves, number of fruits, weight of pod, number of branches, stem girt per plant. Data collected were subjected to a one –way analysis of variance. F-protected Fisher's Least Significant Difference was used to separate the significant mean at 5percent level of confidence. From the results obtained, there was a significant ($P<0.05$) difference in the treatment effect on the number of leaves but no significant ($P>0.05$) difference was computed in all other parameters measured. Application of 30g (CLM) + 50g (CD) +20g (SD) mixture resulted in the highest okra growth and yield parameters among the treatment mixtures and could be demonstrated and disseminated by change agents for adoption by farmers in the study area to improve their okra yields.

Index Terms- Farm yard manure mixture, okra, synthetic fertilizer.

I. INTRODUCTION

Okra (*Abelmoschus esculentus* L. Moench) is a fruit vegetable crop belonging to the family Malvaceae. It is an important vegetable cultivated in the tropical and sub-tropical regions of the world and can be found in almost every market in African and Nigeria (Ahmed, *et al.*, 2006 and Schipper, 2000). Okra is usually grown in home gardens and fields both during the wet and dry seasons, with the dry season production being carried out under irrigation Majanbu *et al., (*1985) as cited in (Ibrahim *et al*,. 2014).

Okra production in Nigeria is predominantly carried out by peasant farmers and it is either cultivated as sole crop or in mixture with other crops. Over a total land area of about 1.5 million hectares was reported to produce about 27 million tons in 1998. Production constraints of okra in Nigeria have been attributed to low input supply system, where green fruit yields, in most instances, have been relatively low (Ibrahim *et al.*, 2014). Even in cases where high yielding cultivars have been grown, the inherently low fertility status of the soils, coupled with inadequate application of fertilizers, remain the principal limiting factors to okra production especially in Nigeria.

The scarcity of synthetic fertilizer associated with high cost has created a lot of problems in arable crop production in Nigeria. In the past, farm yard manure had been used to improve and supplement soil nutrients (Adeleye *et.al,* 2010). The advent of inorganic manure has reduced the use of organic manure by farmers as a source of plant nutrients and soil improvement because of its relative ease of application and quick results. Meanwhile, a lot of these organic manures lie as wastes in rural and urban centres. They are occasionally dumped around farmstead and sawmills. Periodically, they are burnt while others remain on the ground surface, causing problem of environmental pollution and health hazards.

In term of Medical benefit, Martin and Ruberte (1978) as reported by Antoinette *et al*., (2013) confirmed that okra leaves is an effective curative medicinal fruit against ulcers and haemorrhages. Nutritionally, as reported by Akinrinola *et al*, (2014), weaning and adult food (ogi) could be improved with the use of okra seed.

Many farmers in Nigeria rely on synthetic manure to better their crop performance; hence their productivity has not been so much profitable especially when these inorganic sources are neither readily available nor affordable. As reported by Ibrahim *et al* (2014), the result of manure analysis shows that the saw dust, goat manure, poultry manure and cow dung has an appreciable quantity of nitrogen, phosphorous and potassium. Alice *et al*,(2014) opined that organic fertilizer can be beneficial to carrot yield and quality within specific application rate.

Deep litter poultry beddings collected from pens are commonly used by vegetable farmers with a resultant improvement in the yield of vegetable crops. Senjobi, (2010) opined that judicious use of organic fertilisers would improve the growth and yield parameters of agricultural crops. The beneficial effects of organic manure on soil properties such as water holding capacity, bulk density, soil moisture content, and other properties has also been reported by (Adeleye *et al.*, 2010).

According to Premsekhar and Rajashree (2009), farm yard manure influences the growth and yield of okra.

As confirmed by Uka *et al.*, (2013), both mineral (NPK) and organic manure (cow dung and poultry droppings improved the growth performance of *Abelmoschus esculentus* seedlings, but to varying degrees. Many of the wastes such as saw dust, cow dungs and poultry dung can be of benefit to peasant farmers who cannot afford to purchase inorganic manure when combined to boost their crop performance.

Numerous researchers have worked on the combination of organic and inorganic fertilizer with a resultant increase in crop yield and improvement in soil physico-chemical properties. According to Akinde *et al.*, (2003), significant yield increase in okra (*A. esculentus*) has been obtained with the combination of ground rock phosphate and poultry manure rather than sole application of each separately. It is on this background that poultry manure, cow dungs and saw dust are combined to assess their combine effect on crop yield. The objective of this trial therefore is to evaluate the growth and yield response of okra to the mixture of chicken layer manure, cow dung and saw dust as a common waste to facilitate their effective combine usage in crop production as well as boosting their crop yield.

II. MATERIALS AND METHODS

A. Experimental area

Geographically, Owode - Yewa lies between latitude 6^0 48^1 N, 2^0 57^1 E and longitude 6.8^0 N 2.95^1 E (Wikipedia, 2014). Specifically the Biodec centre has a geospatial coordinate of N 06^0 43.712^1 E 002^0 59.531^1, obtained from field survey 2015 via the use of hand-held GPS receiver, (model etrex, legend H, Germin). Ecologically, the area lies in the rain forest zone with two raining seasons from February to July and September to November. The rest months are characterized by dry season and hamattan.

B. Source of seed and seed test.

Improved variety of okra seed *Abelmuscus esculentus* L. Moench was collected from the head quarter of Ado-odo farm settlement secretariat office along Ado - Odo town in Ado- odo /ota Local Government area of Ogun state, Nigeria. Seed viability test was done by (floating method). The floated seeds were separated and thrown away while the rest seeds were used for the trial

C. Organic manures and soil used for the trial.

Chicken layers manure (CLM) were collected from Kuntus farm along Ado-odo town, while cow dung (CD) and saw dust (SD) were gotten from a nearby kraal and saw mail industry in Owode -Yewa town, ogun state. Thirty six (36) polyethene sacks of 46 cm diameter and 50 cm height were purchased from owode-yewa market. The sacks were perforated at the bottom to allow easy water drainage. Soil samples used for study were collected by auger from 0-20cm depth around BioDec compound and used to fill the nylon sacks to an equal weight and height of 25kg and 30cm per sack.

D. Treatment and experimental design

The trial consisted of two (2) treatment mixtures in gramme viz; (T_1) 50 (CLM) + 30 (CD) + 20 (SD), (T_2); 30 (CLM) + 50 (CD) + 20 (SD). While, (T_3) no treatment served as (control). The sacks filled with soil were arranged 0.5 m apart with four (4) sacks per experimental unit and 1 m x 1m between each row. Treatment application was done at four (4cm) depth and ten (10 cm) away from the stem using ring method at three (3) weeks after planting (WAP). The whole arrangement was laid out in a Completely Randomised Design (CRD) and replicated three times making a total of thirty six (36) sacks for the whole trial.

E. Management practices

Four (4) seeds of the okra seeds were planted 1.5 cm depth per sack at the centre of each polysack. The germinated seeds were then tinned to one seed per bag before the application of the treatment mixture. Watering and hand weeding was done when necessary. Two (2) potted plants were randomly selected for data collection from each experimental unit.

F. Treatment analysis

The chicken layers manure, cow dungs, saw dust (treatment mixtures) and soil used for the experiment were dried, crushed and analysed for their physico-chemical properties (Table 1).

G. Data collection an statistical analysis

Agronomic and yield parameters measured were the plant height, number of branches, weight of pod, number of leaves and stem girth. The plant height was measured in centimetre using meter rule, number of branches was done by physical count, weight of fruit were measured in grammes with the use of digital sensitive balance (CAMRY, Model EK 5055). The number of leaves was obtained by counting and tagging to avoid repeated counting. The stem girth was gotten by measuring the circumference of the stem. Data collected were subjected to one-way analysis of variance and significant differences in the mean were separated using F- protected Least significant difference (LSD) at 5 percent confidential level.

III. RESULTS AND DISCUSSION

The treatment mixture had variable effect on the plant height with the highest (71.02) cm from treatment T_1 and the least (49.30) cm from treatment T_3 (Control), but there was no significant ($P>0.05$) difference in the treatment effect on the plant height (Table 2). This is in line with the report of Ogunbanjo *et al*,. (2007) on maize that poultry manure gave the best performance for the two cropping seasons compared to the cow dung. This may be as a result of the high proportion of chicken layers manure which is frequently reported to contain high proportion of nitrogen needed for plant growth in the treatment T_1 in this study.

Statistical analysis of the result (Table 2) showed that there was significant ($P<0.05$) difference in the effect of the treatment mixtures on the number of leaves. Treatment T_2 has the highest (38.17) while treatment T_3 (control) has the least number of leaves (23.00). This may also be related with the findings of Mogapi *et al.,*(2013) who also observed an increase in leaf number of jute mallow (*Corchorus olitorius*) when treated with chicken manure and NPK fertilizer.

There was no significant ($P>0.05$) differences in the effect of treatment mixture on number of fruits, weight of pod, number of branches and stem girth. However, the highest effect was

recorded on treatment T_2 in term of the number of fruits, weight of pods, number of branches and stem girth with the recorder values of (4.83), (97.33g),(4.67) and (5.44cm) . This may have been as a result of high content of phosphorous which is a macro nutrient necessary for seed and fruit formation in plant, while the list of the these parameters (2.83), (33.83g), (2.33) and (3.77cm) were recorded on treatment T_3 (control).

IV. CONCLUSION AND RECOMMENDATION

From the results obtained in this trial it can be concluded that the application of the mixture of chicken (layer) manure, cow dung and saw dust could increase the growth and yield of okra. The best treatment combination was discovered to be 30 Chicken Layers Manure (CLM) + 50 cow dungs (CD) + 20 saw dust (SD) mixture in gramme as it has resulted to highest growth and yield parameters among the organic manures mixtures used and thus recommended for dissemination by change agents for use by okra farmers in and around the study area.

Table 1- Physico-chemical Properties of soil and treatment mixture before the trial.

Composition values	Soil	Trt $_1$	Trt $_2$
Sand g/kg	78.12	-	-
Silt g/kg	12.83	-	-
Clay g/kg	9.05	-	-
Textural classification	Loamy sand	-	-
PH	6.14	6.22	6.37
% O.C	1.53	7.35	8.21
Available P (ppm)	1.10	53.98	55.11
Total N %	0.22	0.74	0.66

Table 2: Data on mean of parameters measured tenth 10th weeks after planting (WAP)

TREATMENT (mixture) (g)	Plant height (cm)	Number of leaves	Number of fruits	Weight of pod (g)	Number of branches	Stem girth (cm)
Trt_1	71.02	33.67	4.83	53.15	3.83	5.18
Trt_2	63.30	38.17*	4.83	97.33	4.67	5.44
Trt_3 (Control)	49.30	23.00	2.83	33.83	2.33	3.77
LSD (0.05)	ns	13.90	ns	ns	ns	ns

LSD (0.05), ns-No significant difference, * = significant at 0.05.

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