JOURNAL OF AGRICULTURAL ECONOMICS, EXTENSION & SCIENCES
Official Journal of the College of Agricultural Economics and Extension
www.jaees.org
www.uam.edu.ng
Jaees Vol. 12 No.2 2025, Page 01-11
ISSN (Print) 2545-5179, ISSN (Online) 2714-5018

RESULT DEMONSTRATION OF INFLUENCE OF CATTLE MANURE APPLICATION RATES ON OKRA (*Abelmoschus esculentus*) VARIETIES PRODUCTIVITY FOR SMALL SCALE FARMERS IN WUKARI, TARABA STATE, NIGERIA.

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Abstract

A result demonstration *was carried out to evaluate p*roductivity of okra [*Albelmoschus esculentus*] (l) moench] varieties using cattle manure for small scale farmers. Farm demonstration was carried out at *the Teaching and Research Farm of the Faculty of Agriculture and Life Sciences of Federal University Wukari, Taraba State, during the 2024 growing season for small scale okra farmers to see and learn. Data were collected on growth and yield parameters (Plant height, number of leaves per plant, stem girth, number of branches and fruit yield per plant). ANOVA results obtained showed that growth and yield of okra were lowest in control treatments, which showed that the cattle manures used in the study area positively influenced the performance and yield of okra. Cattle manure positively increased okra plant height and less effect on number of leaves. There was no significant effect on number of leaves in 2024 cropping season. Stem girth was significantly increased with cattle manure compared to control treatments. However,* number of okra fruits was significantly small. *Based on the findings of the experiments, it could be confirmed that cattle manure seems to promote higher growth of okra. Thus, prerana variety is recommended for small scale okra farmers to grow in the study area.*

Keywords: Result, Demonstration, Influence, Cattle Manure, Okra Productivity

1.0 Introduction

Okra [*Abelmoschus esculentus* (L.) Moench], a member in the family of Malvaceae is an important fruit vegetable, widely consumed and found in every market in Nigeria (Adekunle, 2011; Schippers, 2000). The crop plays an important role in human diet due to its supply of carbohydrates, proteins, fats, minerals and vitamins (Ojo *et al.,* 2012; Abd Elkader *et al*., 2010). Its young leaves can be used as cattle feed (Siemonsma and Kouame, 2004). The pods have been used as plasma replacement and blood volume expander treatment (Haque *et al.*, 2015). Okra mucilage has been utilized in the production of glace paper production and confectioneries (Katyal and Randhawa, 2020; Aliyu and Ajala, 2016).

Okra is a widely grown crop in Africa. Although the commercial needs and uses may change over time, okra will remain a basic staple food for many rural communities. The top okra producing countries in the world are the United States (US), Nigeria, Mexico and India, with the United States and Nigeria having 17 % and 14 % of the world total production, respectively. World production figures of okra in 2010 was 20.949 million mrtric tonnes with Nigeria having 4.784 million metric tonnes (Akintoye *et al.,* 2011; FAO, 2010).

In Africa, two most important vegetable crops after amaranthus are okra and tomatoes and though their total production is far less than onion, carrots and sweet peeper, they play a vital role for farmers in dry areas, where little else can grow (Anonymous, 2012, Adelakun *et al.,* 2010). Okra is hard and very dependable in yields under adverse soil conditions. It is more tolerant of wet soils and flooding than most vegetable crops and legumes. In addition to tolerating high temperature up to 40 ^{0}c and water stresses, okra adapts well to different soil types e.g. saline and alkaline soils, with pH range of 4.0 - 8.5 (Agbo *et al.,*2008). These factors collectively make it an ideal crop for growing in abiotically stressful environment (Farinde *et al.,* 2007; Anonymous, 2012).

Production of okra in Nigeria is large, with the majority of domestic production used for household consumption. Okra is produced in virtually all the States in Nigeria, though some States produce more than others. Taraba, Plateau, Kano, Kaduna, Sokoto, Gombe, Bauchi, Zamfara, Benue, Kogi and Nasarawa States are the major okra producing States in Nigeria (Kumar *et al.,* 2009; Gautam, 2004).

Organic manure, normally derived from animal or plant by products sources can

improve soil fertility by activating soil microbial biomass. Applying organic manure (cattle manure) can enhance root growth and development, promote good soil structure, increase the water holding capacity of the soil and biologically it can enhance the growth of useful soil organisms (Ahmadu and Abe, 2023; Fahramand *et al.*, 2014). Previous studies revealed that cattle manure application increases the yield components, yield and quality of okra, improve the soil physical condition, nutrient and organic matter (Hirose *et al.,* 2024; Benjawan *et al.* 2007).

According to Kumar *et al.* (2010), cattle manure can increase pod weight and number of pods, whereas cattle manure and poultry dung increase plant height, pod length, number of leaves, pod weight, and pod number in okra plants. Okra is grown on about 5.6 million ha in Nigeria and the current annual production is estimated to be only about 2.8 million metric tonnes. It has multifarious usage which span across production for home use, herbal medicine, pharmaceutical use, home meal soup, and Livestock feed among others. The whole okra fruit may be grounded and used in various traditional foods (Ayto, 2002, Varmudy, 2011).

However, despite the importance of okra, its productivity in Nigeria seems to be low yield. The low yield has been attributed mainly to poor soil fertility, use of unimproved variety, obsolete cultural practices among other. Therefore, appropriate emphasis had to be given to higher productivity of the crop through the selection of variety and nutrient supplementation to improve soil fertility. Most farmers often depend on planting materials from neighboring farms rather than seek improved and certified seeds for their production (Sanjeet *et al.*, 2010; Kahlon *et al.,* 2007).

Okra is one of the most important vegetable crop in the world. It yields multiple products depending on the variety. The production and supply of okra by traditional farmers has not been able to equate the demand for consumption of okra in Nigeria in recent time. This is due to the ever expanding population and geometrical increase in the demand for the consumption of okra fruit vegetable in Nigeria. This has been responsible for the short fall in the production and market supply of okra as a mainstay vegetable, whose leaves are used for human food and other special varieties are used for edible syrup. The short fall in the production of okra has also been attributed to poor farming methods, poor varieties of okra seeds, inadequate selection site for okra production, and decline in soil fertility and over use or abuse of inorganic fertilizers and herbicides

application by farmers. These among other factors, have constituted a major challenge in the production of enough okra to meet up with the demand and supply chain in Nigeria (Tomoda *et al.,* 1998; Tiwari, 1989). Hence, these factors are become a recurring decimal in the production and supply of okra. However, more efforts should be geared towards finding lasting solution to the production and supply of quantitative and qualitative varieties of okra for human consumption, especially among small scale farmers in Nigeria and beyond (Alabi *et al.,* 2023).

2.0 Objectives of the Study: The broad objective was to evaluate the productivity of Okra varieties using Cattle measure for small scale farmers.

3.0 Materials and methods

3.1 The Study Area

Result demonstration was carried out at the Teaching and Research Farm of the Faculty of Agriculture and Life Sciences, Federal University Wukari, Taraba State, during the 2024 cropping season. The Teaching and Research Farm site is located at an elevation of about 189 meters above sea level sin Wukari Local Government Area of Taraba State. Wukari lies between latitudes 7˚51 N' to 7˚85' N and longitudes 9˚46' E to 9˚78 E' of the Greenwich meridian; rainy season of 200 to 220 days per annum; the rain fall varies from about 1015 – 1270 mm; temperature ranges from 27 ^{0}C to 37 ^{0}C **(**Kehinde, 2015**)**. Wukari Local Government Area is located in the Southern part of Taraba State, which falls within the Southern Guinea Savanna Agro-ecological Zone of Nigeria.

Methods of data Collection and analysis

Experimental Design and Treatments

The farm demonstration involved three okra varieties (local, Prerana, and maha) and four cattle manure application rates (0, 10, 15, and 20 t/ha) which are laid in 3 x 4 factorial arrangements, fitted into a Randomized Complete Block Design (RCBD) and replicated three times. Each plot was measured 2 m x 2 m (4 m^{2}) with a spacing of 0.5 m apart between plots and 1m space between blocks. The total plot size was 23 m x 9.5 m (218.5 m^{2}).

Experimental Materials

The materials used for the farm demonstration included: Pegs, Twine, Soil auger,

Measuring tape, Big hoe, Small hoe, Cattle manure, Okra seeds.

Soil Sample and Analysis

Prior to sowing, soil samples were collected from the farm demonstration site at the depth of 0-15cm using soil auger and bulked to form a composite sample. The composite soil sample was air dried and sieved through a 2 mm mesh and analysed for its physical and chemical properties. The soil sample was analysed at the Soil Science Laboratory of Federal University Wukari.

Organic Manure and Analysis

The organic manure was obtained from cattle pen of the Department of Animal Production and Health of the Teaching and Research Farm of Federal University Wukari, while the analysis was carried out at the Soil Science Laboratory of Federal University Wukari.

Cultural practices

Land Preparation and Layout

The farm demonstration plot was manually cleared and ploughed. Organic manure was incorporated.

Sowing

The seeds were manually sown (two seeds per hole) on rows to 3 cm depth at 50 cm x 40 cm of inter row and intra row spacing, respectively. Each plot had 20 stand of okra plant

Weeds Control

Weeds were controlled at 3 and 6 WAS by manual hoe weeding.

Harvesting

Harvesting was done when the okra crop started producing pods (fruits).

Data Collection

Data were collected on vegetative characters and at harvest on yield components. The following growth parameters were taken at 4, 6, 8 and 10 weeks after sowing.

Vegetative Characters. The vegetative features considered during the farm demonstration included Plants heights (cm), Number of leaves, Stem girth (cm), and Number of branches.

Yield Components. The data on yield component were collected on Number of fruits per plant. Fruit weight per plant and total fresh fruit yields (t/ha).

Statistical Analysis

Data obtained on growth and yield parameters were subjected to statistical Analysis of Variance (ANOVA) at 5 % (0.05) level of probability, where the mean was separated using the Least Significant difference (LSD).

4.0 Results and Discussion

4.1 Farm demonstration of Vegetative characteristics of okra as influenced by varieties and cattle Manure rates

All of the varieties and cattle manure had significant effect or influenced on plant height. It was observed prerana variety produced the tallest plants (31.31 cm), followed by the Local variety (29.71 cm) and Maha variety produced the shortest plants (28.31cm) at 6 week after sowing. Plants without cattle manure application had the shortest plants. The tallest plants were observed on plants treated with 20 t/ha of cattle manure. At 10 week after sowing, prerana produced the tallest plants (47.56cm), while Maha variety gave shortest plants height (37.11cm). Among the cattle manure, plants on plots treated with cattle manure applied at 20 t/ha produced the tallest plants. Plants without Cattle manure application had the shortest plants, but were comparable with 10t/ha and 0t/ha at 10 week after sowing.

Local variety produced plants with the highest number of Leaves (16.99), while Maha variety had plants with the least number of Leaves (8.49) at 6 week after sowing. Number of Leaves produced by plants treated with 20t/ha cattle manure had highest number of Leaves 0 t/ha, the control had the least number of Leaves. Prerana variety had the thickest stems girth, while Local variety had the thinnest stem but not thinner than the stem of the Maha variety at 6 and 10 week after sowing. Only plants supplied with 15 and 20 t/ha of cattle manure rates had the thicker stems girth than the control plants 0 t/ha at 6 and 10 week after sowing.

Table 1: Farm demonstration of Vegetative characteristics of okra as influenced by varieties and cattle Manure rates

	Plant Height (cm)		Number of Leaves		Stem girth (cm)	
Treatment	**6 WAS**	**10 WAS**	**6 WAS**	**10 WAS**	**6 WAS**	**10 WAS**
Variety (V)						
Maha	28.31^{b}	37.11^{b}	8.49^{b}	10.96^{b}	0.82^{b}	1.187^{b}
Prerana	31.31^{a}	47.56^{a}	11.78^{ab}	13.63^{ab}	1.02^{a}	1.723^{a}
Local	29.71^{ab}	38.33^{b}	16.99^{a}	19.33^{a}	0.83^{b}	1.232^{b}
S.E±	0.77	1.15	1.80	0.81	0.04	0.05
Cattle manure (CM) rates (t/ ha^{-1})						
0	26.18^{c}	36.96^{c}	10.69^{c}	11.29^{c}	0.68^{d}	1.14^{c}
10	28.37^{bc}	38.76^{c}	10.64^{c}	13.38^{b}	0.81^{c}	1.36^{b}
15	30.41^{b}	42.34^{ab}	12.66^{b}	17.56^{a}	0.95^{b}	1.47^{ab}
20	34.14^{a}	45.97^{a}	15.70^{a}	18.67^{a}	1.11^{a}	1.55^{s}
S.E±	0.88	1.33	2.08	0.94	0.05	0.06
V X CM	NS	NS	NS	NS	NS	NS

Means in a column with similar alphabet are not significantly different from one another at 5 % level of probability, Ns-not significant at 0.05 level of probability

4.2 Farm demonstration of Okra Yield as influenced by varieties and cattle Manure Rates

The effects of variety and cattle manure application of okra varieties are significant. Table 2 revealed that, prerana variety produced higher number of fruits, than local variety and maha variety plants. Plants treated with 20 t/ha of cattle manure had the most number of fruits, the least was the control but were comparable with 10 t/ha. It was observed among the varieties, prerana variety had the highest weight of fruits, but comparable with Maha variety. All plants treated with cattle manure 20 t/ha of cattle manure had the higher plants weight, higher than control plants but were comparable with 10 t /ha.

On fresh yield, prerana variety plants produced the highest fruit yields, while Local variety gave least. Plants treated with 20 t/ ha cattle manure had the highest fruit yields and the least were control.

Table 2: Farm demonstration of Okra Yield as influenced by varieties and cattle Manure Rates

Treatment	No. of Fruit	Weight of Fruit (g)	Fresh yield (t ha^{-1})
Variety (V)			
Maha	5.76^{b}	94.10^{a}	4.66^{b}
Prerana	7.73^{a}	98.18^{a}	4.93^{a}
Local	6.35^{b}	86.18^{b}	4.31^{c}
S.E±	0.23	1.58	0.08
Cattle Manure rates (t ha^{-1})			
0	5.56^{c}	78.11^{c}	3.85^{d}
10	6.13^{c}	90.56^{c}	4.55^{c}
15	6.98^{b}	97.08^{b}	4.86^{b}
20	7.79^{a}	105.52^{a}	5.28^{a}
S.E±	0.27	1.83	0.09
V X CM	**NS**	**NS**	**NS**

Means in a column with similar alphabet are not significantly different from one another at 5 % level of probability, Ns-not significant at 0.05 level of probability

5.0 Conclusion and Recommendations

5.1 Conclusion

The Farm demonstration conducted for small scale okra farmers at the Teaching and Research Farm, Federal University Wukari during 2024 cropping season to evaluate the productivity of okra varieties as influenced by cattle manure rates in Wukari, Taraba State, Nigeria shows significant results. The growth and yield characters evaluated indicated that each variety responded differently in the same environment, where they

were grown. Prerana variety had the highest fruit yield, followed by Maha. Cattle manure application enhanced the growth and yield of okra. Growth and yield peaked at the highest application rate (20 t ha-1). Based on these findings, Prerana variety is thereby suggested for small scale okra farmers in Wukari as against local variety, due to its moderate height and higher fruit yielding. The rate of cattle manure application should be 20 t ha-1 for profit maximization and sustainable production of okra by small Scale farmers.

5.2 Recommendations

Based on the findings, the following recommendation were made:

1. There is need for small scale okra farmers in Wukari Local Government Area to adopt the cultivation of Prenara variety against local variety, due to its moderate height and higher fruit yielding and.
2. About 20 t/ha application rates of cattle manure for profit maximization and sustainable okra production is hereby recommended to small scale okra farmers in the study area.

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