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Farm Demonstration of Influence of Cattle Manure Rates on the Agronomic Parameters of Three Okra (*Abelmoschus esculentus*) Varieties for Small Scale Farmers in Wukari, Taraba State, Nigeria

Gamfe, P. W.*, Loto, O. and Ojukwu, M. N.

Department of Agricultural Economics and Extension, Faculty of Agriculture and Life Sciences, Federal University Wukari, Taraba State, Nigeria

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***CORRESPONDING AUTHOR:**
williamsgamfe@gmail.com

ABSTRACT

Field experiments to investigate the influence of Cattle manure on Okra (Abelmoschus esculentus) Varieties 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. Treatment consists; 0t/ha,10t/ha, 15t/ha and 20t/ha rates of cattle manure and varieties were Clemson, prerana Fi and local variety and laid out in a split plot design with three replications. Data were collected on growth and yield parameters (Plant height, number of leaves per plant, and fresh pod weight). Results obtained indicated that growth and yield of okra was lowest in control treatments which showed that the cattle manure used in the study positively influenced the performance and yield of okra. Cattle manure positively increased okra plant height and number of leaves compared to control treatments. There was significant effect with in respect to number of leaves in 2024 growing season. Stem girth was significantly increased with cattle manure compared to control treatments. According to this research the experiments it could be deduced that 20t/ha cattle manure and prerana Fi seems to promote higher growth and yield of okra. Thus, it should be recommended for farmers growing okra in this zone.

INTRODUCTION

Okra *(Abelmoschus esculentus)* originated in Ethiopia (Sathis and Eswar, 2013) and was then propagated in North Africa, in the Mediterranean, in Arabia and India by the 12th century BC (Nzikou *et al.,* 2006). It is also known as ladies' fingers or bhendi, is cultivated in tropical, subtropical and warm temperate regions around the world. Okra is a warm-season crop (Rao, 1989), and it is a traditional vegetable crop commercially cultivated in West Africa, India, Southeast Asia, Southern United States, Brazil, Turkey and Northern Australia (Priya *et al.,*2014). Okra is one of the most widely known and utilized species of the family Malvaceae (Andra *et al.,* 2005 and Saifullah and Rabbani, 2009 Naveed *et al.,* 2009,).

Okra yields multiple products depending on the variety in relation to the quantity and quality of nutrients applied by the farmers. Okra fruits and leaves are in high demand but the production of okra has remained low due to many factors among which is inefficient application of organic manure fertilizer. This problem has been responsible for the poor quality and quantity of different okra varieties produced and consumed by human as food and other special varieties used as medicinal syrup **(**Ahmadu, 2023). In fact, the chemical fertilizer is usually beyond the reach of most average okra farmers in most communities in Nigeria including Wukari local government area of Taraba State (Farinde *et al.*, 2007).

The increase demand for Okra can only be satisfied with high supply of okra produced through the use of modern farming methods (FAOUN, 2010). The modern Clemson Spineless method required the choice

of effective farming inputs such as organic fertilizer. Organic fertilizer such as cattle manure can be sourced in most communities in Nigeria. The sourcing and application of organic cattle manure has be experimented by Abou *et al. (*2005) in relation to okra production, growth and yield. This is in agreement with FAOUN, (2010) view of various okra crops varieties cultivated in Brazil and China, which are the most sustainable to organic cattle manure with increased growth rate and yield. It provided the most efficient nitrogen and phosphorus and other essential macro and micro nutrients for crop production (FAOUN, 2010).

According to About *et al.*, (2005) Animal wastes that result in organic manure will serve as a better alternative for high crop productivity in Nigeria. Cattle manure when efficiently and effectively utilized ensure sustainable okra crop productivity by mobilizing nutrients that are susceptible to leaching. Nutrient content in organic manure is released more slowly and are stored for a longer time in the soil, ensuring longer residual effect, improve root development and high okra crop yield.

Thus, Ahmadu (2023) opined that okra has been considered as one of mainstay food crop in Nigeria and farmers and researcher hands are all on desk seeking possible means and mechanism of improving its yield and supply to the ever-expanding consumers demand for okra vegetable is rapidly increasing due to the growing human population. Based on the forgoing, this research seeks to evaluate the influence of cattle mature rate on growth and yield of okra varieties as widely cultivated by small scale farmers in Wukari, Taraba State, Nigeria.

MATERIALS AND METHODS

The Study Area

The farm demonstration was carried out at the Teaching and Research Farm, Faculty of Agriculture and Life Sciences of Federal University Wukari, Taraba State during the farming season of 2024. The Research farm site located at an elevation of about 189 meters above sea level and in Wukari Local Government Area of Taraba State. Wukari lies between latitude 7˚51 N' to 7˚85' N and longitude 9˚46' E to 9˚78 E' of the Greenwich meridian. The site location experience rainy season of 200 to 220 days per annum; the rain fall vary from about 1015 – 1270 mm; temperature ranges from 27 ^{0}C to 37 ^{0}C. The location falls within the Southern Guinea Savanna Agro-ecological Zone of North East –Nigeria **(**Ahmadu, 2023).

Methods of data Collection and analysis

Experimental Design and Treatments

The farm demonstration experiment included three okra varieties (local, clemson and prerana) and four cattle manure application rates (0, 10, 15, and 20 t/h) which was laid out in 3 x 4 factorial arrangements, fitted into a Randomized Complete Block Design (RCBD) and replicated three times. Each plot was measured (4m^2) with a spacing of 0.5m apart between plots and 1m spaced between blocks.

Experimental Materials

The materials used for the farm demonstration research design were Cattle manure, Okra seeds, Pegs, Twine, Auger, Measuring tap, big hoe, small hoe, Hand globes

Soil Sample and Analysis

The soil samples for the farm demonstration experiment were collected and analysed at the Soil Science Laboratory of Federal University Wukari.

Organic Manure and Analysis

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

Cultural practices

Land Preparation: The farm demonstration field was manually cleared, ploughed and Cattle manure was incorporated into the farm field

Seed Sowing: Okra seed were annually sown (two seeds per hole) on rows to 3 cm depth at 50 cm x 50 cm of inter row and intra row spacing for planting and each plot stand had 16 stand of okra plants.

Weeding: Weeding was done at 3 and 6 weeks after sawing with the aid of a West African dwarf hoe.

Harvesting: Matured okra was carefully harvested using a sharp and clean harvesting knife.

Data Collection

Data from the farm demonstration experiment was collected on vegetative characters, days to flowering and yield. The vegetative characters and yield components parameters were measured at 4, 6, 8 and 10 weeks respectively.

Statistical Analysis

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

RESULTS AND DISCUSSION

Influence of Varieties and Cattle Manure Rates on Height and Leaves of Okra

The result shows that Prerana was the tallest variety while the local and Clemson were statistical the same in shortest plaint height at week 6 after sowing. Among the cattle manure rates 20t/ha has the tallest plant height, which 0t/ha 10t/ha had the shortest plant height. At week 8 after sowing, the result shows that Preranan was the tallest while the local and Clemson remained the same in plant height. Among the cattle manure rates 20t/ha had the tallest plant height while 0t/ha has the shortest plant height. On the number of leaves at 6 weeks after planting the result shows that Clemson has the highest number of leaves, while local has the lowest number of leaves. Among the cattle manure at 6 weeks after sowing 20t/ha has the highest number of leaves while 0t/ha had the lowest number of leaves. At week 8 after sowing the result shows that, Clemson has the highest number of leaves while local variety had the lowest. Among the cattle manure rates at 8 weeks after planting 20t/ha had the highest number of leaves compared to the 0t/ha rate of cattle manure application.

Farm Demonstration of Influence of Variety and cattle manure rates on stem girth and branch of Okra plant

The result shows that, at week 6 after sowing there was no significant difference on the stem girth among the varieties. Among the cattle manure rates at 6 after sowing there was also no significant diference on the stem girth among the varieties. At week 8 after sowing the ticker stem girth was found in local while Clemson had the thinner stem girth among the verities. Among the Cattle manure rates 15t, /20t/ha were statistically the same with thicker stem girth while 0t/ha had the thinnest stem girth. On the number of branches at week 6 after sowing the result shows that, there was no significant difference among the varieties. Among the cattle manure rate at week 6 after sowing the result shows that 15t, 20t/ha were

statistically the same with the higher number of branches while 0t/ha had the lowest number of branches. At week 8 after sowing, the result shows that there was no significant difference on the number of branches among the varieties. Among the cattle manure rates, 20t had the highest number of branches while 0t, 10t/h had the lowest number of branches.

Table 1: Influence of Varieties and Cattle Manure Rates on Height and Leaves of Okra

Treatment	Plant height (cm)		Number of leaves	
	6 WAS	8 WAS	6 WAS	8 WAS
Variety (V)				
Clemson	21.84[b]	40.39[b]	14.63[a]	21.84[a]
Prerana	26.90[a]	46.29[a]	13.37[b]	20.91[b]
Local	22.39[b]	43.90[a]	12.40[c]	18.89[c]
S.E	0.86	0.84	0.33	0.31
Cattle Manure (CM) rates (t/ ha)				
0	18.80[c]	32.87[d]	10.56[d]	15.72[d]
10	21.03[c]	40.14[c]	13.03[c]	18.78[c]
15	24.28[b]	47.49[b]	14.46[b]	21.43[b]
20	30.73[a]	53.61[a]	15.82[a]	26.25[a]
S.E±	0.99	0.97	0.37	0.36
Vx CM	NS	NS	NS	NS

***Source**: Field Experiment, 2025. Means in a column with similar alphabets are not significantly different from one another at 5 % level of probability, Ns-not significant at 0.05 level of probability*

Table 2: Farm Demonstration of Influence of Variety and cattle manure rates on stem girth and branch of Okra plant

Treatment	Stem girth (cm)		Number of branches	
	6 WAS	8 WAS	6 WAS	8 WAS
Variety (V)				
Clemson	1.45	1.01[c]	2.36	3.00
Prerana	0.88	1.15[b]	2.52	3.46
Local	0.86	1.25[a]	2.83	3.57
S.E±	0.41	0.03	0..32	0.27
Cattle Manure (CM) rates (t/ ha)				
0	0.60	0.85[c]	1.62[b]	2.73[b]
10	0.73	1.05[b]	2.58[ab]	3.09[b]
15	0.90	1.32[a]	2.78[a]	3.48[ab]
20	2.03	1.31[a]	3.29[a]	4.07[a]
S.E±	0.48	0.04	0.37	0.32
V x CM	NS	NS	NS	NS

***Source**: Field Experiment, 2025. 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*

Farm Demonstration of Effect of Variety and Cattle Manure rates on Okra yield

The result shows that among the varieties on the number of fruit, local and Prerana are statistically the same while Clemson had the least among the varieties. Among the cattle manure rates 20t, 15t, and 10t/ha as regard to number of fruit while 0 t/ha had the lowest among the varieties. On the weight of fruit, local variety was found with the higher weight of fruit while Clemson, Prerana were statistically the same with

a lower weight of fruit. Among the cattle manure rates 20t/ha had the highest weight of fruit while 0t/ha had the lowest weight which is the control. On the yield (t/ha) local was found among the varieties with the higher yield (t/ha) while Clemson and Prerana were statistically similar with lower yield (t/ha). Among the rates of cattle manure 20t/ha gave the highest yield while the 0t/ha gave the lowest yield (t/ha)

Table 3: Farm Demonstration of Effect of Variety and Cattle Manure rates on Okra yield

TRT	No. of fruit	Weight of fruit (g)	Fresh yield (t/ ha)
Variety (V)			
Clemson	4.92[b]	96.04[b]	3.85[b]
Prerana	6.33[a]	95.45[b]	3.82[b]
Local	7.42[a]	114.28[a]	4.57[a]
S.E±	0.46	3.05	0.12
Cattle Manure (CM) rates (t/ ha)			
0	4.67[b]	94.37[c]	3.77[c]
10	6.22[a]	99.70[b]	3.99[b]
15	6.44[a]	103.76[ab]	4.15[ab]
20	7.56[a]	109.88[a]	4.39[a]
S.E±	0.53	3.52	0.14
V x CM	NS	NS	NS

***Source**: Field Experiment, 2025. 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*

CONCLUSION

From the findings of this study, Prerana the tallest variety yield more okra fruits than the local and Clemson varieties which were statistically the same in terms of plaint height and yield. Also, the cattle manure rates, 20t had the highest number of branches as the rates of cattle manure 20t/ha gave the highest yield. The application of cattle manure has be experimented by several studies in relation to okra production. This study conclude that the prerana variety is the best most sustainable to cattle manure rates of 20t application rates for Small-scale farmers in Wukari local government Area, Taraba State

RECOMMENDATIONS

Based on the findings, the following recommendation are made:

i. Small-scale farmers in Wukari local government area are recommended to adopt the cultivation of Prerana variety using cattle manure against Local variety due to its moderate height and higher fruit yielding.

ii. Small-scale farmers should adopt 20 t/ha rate of Cattle manure application for profit maximization and sustainable okra production

iii. Small scale farmers should always carry out soil analysis to determine the nutrient content of the farm before embarking on okra production in the study area.

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