Journal of Agripreneurship and Sustainable Development (JASD)
www.jasd.daee.atbu.edu.ng; Volume 5, Number 2, 2022
ISSN (Print): 2651-6144; ISSN (Online): 2651-6365

EFFECT OF COW DUNG ON GROWTH AND YIELD OF OKRA (*Abilmuscus esculentus L.*) IN GAYA, KANO STATE, NIGERIA

[1]Adamu, U. K. and [2]Musa, A.
[1]Department of Soil Science, Federal University Dutse, Jigawa-Nigeria.
[2]Department of Crop and Soil Science,
Faculty of Agricultural Sciences, National Open of Nigeria University, Kaduna.
Corresponding Author's E-mail: aliyugusau2020@gmail.com **Tel.:** 08062246917

ABSTRACT
Field experiment was conducted in 2017 wet season at Kano State University of Science and Technology, Wudil (KUST) research farm at Gaya Local Government Area of Kano State, Nigeria. It was to evaluate the effect of different levels of organic manure (cow dung) on Okra fruit varieties. The treatments consisted of two okra varieties (Clemson and local varieties) and three conducing levels of cow dung (0, 5, and 10 kg/ha). The treatments were laid out in a randomized complete block design (RCBD) with three replications. Data were recorded on fruits yield, and growth parameters (Days at 50% flowering, plant height, number of fruits, numbers of leaves, branch numbers, leave area, fruits length, fruit-diameter, fruit-weight and plant leaves number). Results obtained indicated that growth showed that the organic manures influenced the growth performance and yield of okra in the study area. It was suggested that, the use of organic manure (Cow dung) in crop production is desirable as at it has variable impacts on the growth and yield of okra and will improve soil organic matter status in the study area.

Keywords: Okra, Gaya, Plant height, Organic manure, Fruits.

INTRODUCTION
Okra (*Abelmosmuscus esulentus L.*), is an important vegetable crop native to West Africa whose productivity could reach 7.74 ton (Anonymous, 2004). The word Okra is of African origin and called by many names "lady's finger" in Igbo language of Nigeria. It is a good source of vitamin, mineral, calories and amino acid, found in seeds (Thompson, 1949) (Schipper, 2000). In spite of the potential of Okra as a food security vegetable crop, yields are generally low in the tropic. A major cause of low yield in this region is the growing Ekwu (2012) reported low organic matter, low reserves of essential plant nutrients and high soil acidity in major agricultural land of the region it is one of most important vegetable grown in Nigeria.

The use of inorganic chemical fertilizer is expensive and hazardous to the soil environment. Chemical fertilizers could course problems not only to the health but also to the human health and physical environment. However, several attempts to use inorganic fertilizer to replenish the soil nutrient have not been successful because of high cost, sometimes, the adulterate nature of the product has adverse effect on the soil, water, and plant hence, there is need to look for other source(s) of maintaining the soil fertility in order to enhance optimum yield. Most importantly, the chemical fertilizer is not affordable to local farms and so the use of organic manure has been found to increase soil pH Abam *et al.* (2006). Organic manure is essential constitutes of soil; they are present in variety of forms, ranging from plants and livestock materials. Akande (2003) while describing the components of organic manure noted that organic manure comprises of waste and residue from crops and livestock. He further reported that farm-yard manure alone is not really capable of returning more than 50% of the

nitrogen, phosphorous and potassium to soil. The use of organic manure when properly applied, benefits fruiting in plant like Maize and generally enhances sizes, height and number of leafs.

Application of cow dung also sustain cropping systems through better nutrient recycling, improved soil structure, increase infiltration rate and increase soil water holding capacity. Since inorganic fertilizers are usually available to farmer & are expensive, farm yard manure is used as an alternative or complements the use of inorganic fertilizers. It releases nutrient slowly and steadily over a large period of time and also improves the soil fertility status by microbial activities. Considering these facts, the present study was undertaken to determine the effect of cow dung as organic manure on the growth and yield of okra fruit grown at Kano University of Science and Technology (KUST) farm in Gaya.

MATERIALS AND METHODS

The Study Area

The research area is Kano University of Sciences and Technology Wudil, Research and Commercial farm which is situated in Gaya local Government of Kano State Nigeria. It's at the latitude $1^0$52 N" and longitude of $9^0$20 E" and was 65 km away from Kano city, the temperature is warm to hot with cold period from November to February. Soil of the area is dominated mainly by sandy loam, is dark and brown to light color. The annual rainfall for Kano which is located at a height of 470 m (1539 feet) above sea level is 864 mm (Kabiru, 1992). The rain season normally begins in May and last until September. The annual temperature ranges 22-31^{0}C.

Treatments, experimental design and layout

The experiment consisted of two factors; two okra varieties and three level of cow dung, making a total of six treatments combination, these were laid out in randomized complete block design (RCBD) and replicated three times. The land was cleared, harrowed and ridged to create a favorable condition for seeding growth. A total plot of 18 with four ridges each were laid out with gross plot size of 140.4m^2 (7.18 m x 18 m) and spaces of 1m between plots and 1m between replication were created to border row effect, each gross plot measure 3 x 2.6 m with 7.8 m ≅8 m^2 comprising of four ridges per plot.

Sowing

Seeds of okra varieties were obtained from two different places, local variety was obtained at Six Sigma Agribiz Limited, Katsina Road along Bichi Road, and the improved variety (Clemson Spineless) was obtained at Greenspore Agric. Limited No. 110 ITF, Hadejia Road, Kano State, respectively. The seeds were sown on 26th July, 2017 at Kano University of Science and Technology Research farm Gaya, two per hole while local variety 3 per hole, and thinned to two stand per hole at 2 WAS, the plant spacing was 75 cm between rows and 25 cm within rows. 3-4 okra seeds were sown per hole at spacing of 60 cm part on ridges.

Weeding, manure application and harvesting

Weeds were controlled manually, using hand hoes. Three weeding interval of two weeks at 2, 4 and 6 WAS kept the plot weed free. The ridges were drilled open by the sides and organic manure were applied base on the experiments rate and covered with soil for one week before planting. The seeds were sown on 26th July, 2017. The harvesting was done with a knife, when fruit are fully matured at 11th week after sowing. Matured okra was harvested from the two middle rows being data collection plots and measured for final evaluation.

Data Collection and Analysis

The two inner ridges were used as plot for yield assessment and for data sampling purposes. Three random plants per plot were tagged for data collection, plant height was measured from the base of the plant to the apex at 9 weeks after sowing, using meter rule or

Journal of Agripreneurship and Sustainable Development (JASD)
www.jasd.daee.atbu.edu.ng; Volume 5, Number 2, 2022
ISSN (Print): 2651-6144; ISSN (Online): 2651-6365

tape and average calculated to represent height per plant, the total number of leaves ware counted and the mean obtained after which number of fruit was taken which the average was calculated to represent the number of fruit per plant, in each plot, fruits weighted using scale, and were counted and recorded which was converted to yield/ha. Fruits need to be harvested at 11th weeks after sowing by cutting off the fresh fruit from the plant and harvesting could be four days interval.

Data collected have been subjected to analysis of variance and least significance differences will be used to separate the means, if possible, for soil properties. All the data obtained had been subjected to statistical analysis of variance, using LSD procedure to test for the significance of treatment effects – by F test.

RESULTS AND DISCUSSION

Particle Size Distribution

Table 1 shows the particle size distribution (%) in soil of the study area. The soil texture was generally loamy sand. The nature of these soils could be attributed to the sandy nature of their parent materials from which they developed.

Table 1: Particle size Distribution of soils at study area

Parameter	Values
Sand (%)	85.6
Silt (%)	9.28
Clay (%)	5.12
Textural class	Loamy sand

Soil Chemical Properties

Considering the pH range obtained in both water and calcium chloride are non-acidic soil in the study area The value of E.C obtained in Table 2 indicates that the soil is non-saline as the value of 0.015 ds/m was recorded with the average standard of < 4 for any plant to absorb nutrient from the soil. The OC content of all soil was low (Table 2). This may be due to the prevalence of tropical condition where the degradation of organic matter occurs at faster rates coupled with low vegetation cover, thereby leaving less organic carbon in the soils. The available N has a mean value of 0.115 low amount of organic carbon could be significant factor affecting the amount of available nitrogen The available phosphorus in the study area has a value of 7.07 mg/kg. low available P content might be possibly be due to low organic matter contents of the soil. Available K was 0.28 Cmol/kg, this suggest that soil contain was low amount of K.

Journal of Agripreneurship and Sustainable Development (JASD)
www.jasd.daee.atbu.edu.ng; Volume 5, Number 2, 2022
ISSN (Print): 2651-6144; ISSN (Online): 2651-6365

Table 2: Some soil's chemical properties at study farm

Parameter	Values
pH (H_2o)	6.58
pH ($Cacl_2$)	6.29
Ec (d Sm^{-1})	0.015
TN (%)	0.11
P (mg/kg)	7.07
OC (%)	0.18
Ca Cmol(+)/kg	3.00
Mg Cmol(+)/kg	1.59
Na Cmol(+)/kg	0.17
K Cmol(+)/kg	0.28

Growth Parameters

The results from the study indicate that, 50% flowering period of Okra was significantly influenced by the different levels of cow dung and okra varieties as (P<0.05) as presented in Table 3. Clemson variety with 10 kg (V2 l00) of cow dung had the highest plant growth with a mean value of (41.33) compared to all other treatment (about 499% growth increase compared to the control treatment) and then followed by (V_2 15) 8 (V_2 10) and then have the same mean value. The results from the study indicate that, plant height of the Okra there were significant different influenced by the different levels cow dung applied (P<0.05) as presented in Table 1. (V_2 L_5) and (V_2 L_{10}) had the highest plant growth with mean value (35.22 cm) and (36.42 cm) as compared to all other treatments, and then followed by (V_1L_5), (V_1 L_{10}) & (V_2 1_0) which were found to be statistically similar. The result of this study also corroborated the finding of (Akande, 2003) in Okra production, who reported that organic manure, especially poultry manure could increase plant height of crops. The overage plant height decreased with decreasing quantities of manure. These results are attributed with to the additive nutrient supply and to a better synchrony of nutrient availability with crop demand, lay immediate availability of nutrients from mineral fertilizers and slow release from manure.

The result from the study increases that, there were significant defenses (P<0.05), in number of fruits among treatments throughout the study period as presented in Table 3. Plant treated with Clemson variety and 10kg level of (V_2 100) cow dung recorded the highest number of Fruit compared to all other (which was about 60% of control plants). The least number of fruits was recorded from control (V_1 L_0), followed by (V_2 L_5) then, (V_1 L_5) 8 (V_2 L_0) which was found to be statistically similar with the other treatments (V1 L10). Increase in the number of fruits are common occurrence in plant that are provided with improved variety (Clemson) and increase level of cow dung which also improve leaf number & leaf area for photosynthetic activity of the plants. The increase of fruit of Okra due to organic manure application could be attributed to easy solubilization effect of released plant nutrient leaving to improve nutrient.status. The result obtained were in agreement with the findings of Sanwal *et al*. (2007) in turmetic (curcuma longa). AyoubzeAfrah (2014) in Okra, in which they reported that higher yield response of crops due to organic manure application could by attributed improved better supply of nutrients to the plants. Flower of fruit is important stage in plant growth which have an active role in growth and development. In the finding in Table 3 indicate that these were significant different (V2 L1) Clemson variety with 10kg level of cow dung recorded the highest number of lower compared to all other. The least number of flowers was control (V1 L0), followed by (V1 L10) and then (V1 L5) 8 (V2 L0) which was recorded to be similar in mean

Journal of Agripreneurship and Sustainable Development (JASD)
www.jasd.daee.atbu.edu.ng; Volume 5, Number 2, 2022
ISSN (Print): 2651-6144; ISSN (Online): 2651-6365

value. The number of flowers decreased as the amount of organic manure decreased. These results show the complement any role of organic manure.

The result on effect of cow dung on okra branches numbers showed a significant variation in yield among the treatments (P<0.05) as presented in Table 3. The result showed that V1 L0, V1 L5, and V1 V10 produced statistically identical number of branches although numerically different. It was found that (V2 10) give the highest branch number, followed by C2 15 & V_2 L_{10} which are recorded statically smiling. The result showed reducing branching as reduce of organic manure for vegetable growth and development. The slow mineralization of some of the organic may be responsible for its low performance. Thus, result to lower mean value of both growth and yield of okra.

Leaves are important organ which have an active role in phetrosynmesis, increase in leaf area and leaf number should result to higher rate of photosynthesis have increase plant growth. The finding in Table 3 indicates that there was significant difference in leaf is among the treatments (P<0.05) as presented in table 1. V1 L0 & V1 V0 are statically the same followed by V1 V5 & V2 V10 were found to be statistically similar, V2 L5 were found to give the highest leaf area. Increase in the number of leaves. Leaf area is common occurrence in plant that are provided with proper manure application. Senjobi *et al.* (2007) reported that more readily nutrients are available to a crop, the higher performance of the crop and vice-versa.

Yield Parameters

Fruit length of Okra can vary due to increase levels of manure applied as the result showed in Table 3 there were significant differences among, the treatments (P>0.05). The plants treated with V_2 15 recorded the highest length compared to all treatments. (P>0.05) as presented in Table 3. The plant treated have higher number with V_2 15 of fruit length than V1 l_0, V_1 l_5, are statistically similar followed by V2 10 and V2 V10. It could be due to increase activities of other microbes of other microbes facilitated by the organic amendments, stated by (AyoubzeAfrah, 2014).

Table 3: Effect of Cow Dung on Growth of Okra (*Abelmuscuss escussntus L.*)

Parameters	**Treatments**					
	1	**2**	**3**	**4**	**5**	**6**
50% Day	21.00	27.30	27.00	29.70	32.67	41.33
Plant Height (cm)	25.22	25.22	30.22	28.22	35.22	36.43
No. flower	12.77a	30.28b	22.11c	34.84c	50.73d	60.08e
Branches number	2.167a	2.233a	2.567a	4.010ab	2.761ab	3.167b
Leaf Area	40.10a	71.90a	46.80ab	89.0ab	104.1b	78.40b
leaves Number	7.55a	8.66a	8.55a	6.77a	7.44a	0.11a

Means with the same letter(s) in the rows are not significantly different at 5% level of probability (DMRT)

The result showed in Table 3 indicated that the fruit diameter increases in all the treatments throughout the experimental period. However, there were no significance differences (P>0.05). Among treatment, the difference in diameter leaf numbers between the treatments means is due to other focus not the treatment applied. Even though, plants treated with V15 had the higher leaf area. Increase in leaf number and leaves ultra should result to higher rates of photosynthesis hence increased in growth.

Journal of Agripreneurship and Sustainable Development (JASD)
www.jasd.daee.atbu.edu.ng; Volume 5, Number 2, 2022
ISSN (Print): 2651-6144; ISSN (Online): 2651-6365

There was significant variation in weight of fruits among the treatments (P>0.05) as presented in Table 4. The result showed that cow dung at 10 kg with Clemson variety was found the highest weighted which was about 57.5% of other treatment plants. V1 l0 8 V2 15 were similar followed by V1 15, weight although numerical different.

Table 4: Effect of Cow Dung on Yield of Okra (*Abelmuscuss escussntus L.*)

Parameters	**Treatments**					
	1	**2**	**3**	**4**	**5**	**6**
No. fruits	12.77a	30.28b	22.11c	34.84c	50.73d	60.08e
Fruit Length (cm)	6.257a	3.620ab	3.190b	10.740b	12.063c	7.143c
Fruit diameter (cm)	6.18a	7.00a	7.50a	8.80a	8.47a	7.27a
Fruit weight (g)	1.00a	0.35a	0.88ab	0.62ab	1.03ab	2.43b

Means with the same letter(s) in the rows are not significantly different at 5% level of probability (DMRT)

CONCLUSION AND RECOMMENDATIONS

An experiment was conducted at the crop production unit of teaching and research farm, Kano University of Science and Technology Wudil, Kano State, to evaluate the effect of cow dung on growth and yield of okra during the period of 2017 wet season. The experiment was laid in RCBD with six treatments (two okra varieties with their levels of cow dung and three replications. The result from the study indicates that; a significant effect on plant height, number of fruits, number of branches numbers of flower, fruit length, fruit weight and 50% days of flowering excepts fruit diameter and plant leaves number were not significant different of all treatment applied. The difference observed between the treatments mean is due to other factors not the treatment applied. Even though, plot treated with 10 kg had the highest leaf area with also the highest plant growth and yield compared to all treatments. Based on the finding of this study, it may be recommended that, the use of organic manure (Cow dung) in okra production is desirable as at it has variable impacts on the growth and yield of the okra and will improve soil organic matter status.

REFERENCES

Abam, P. O., Onyekwere, N. and Nwoso, K. I. (2006). *Properties and Management of Ogoj soil, Cross River State, Nigeria for increase Cassava yield.* Proceeding of the 40th conference of Agriculture society of Nigeria. Pp. 346 – 349.

Anonymous (2004). *District wise estimate area and production of horticultural crops.* Soil sciences sos Am proc. 26: 464 – 465.

Akande, M. O., Oluwatoyinbo, F. I., Adediran, J. A., Buari, K. W. and Yusuf, I. O. (2003). Soil Amendments Affect the Release of P form rock phosphate and the development and yield of okra. *Journal Vegetable Crop Production,* 19: 3-9.

AyoubzeAfrah, A. A. (2014). Effect of cultiva and sowing date on Okra seed yield. *Universal Journal of Applied Science,* 2(3), 64 – 67.

Ekwu, E. G. and Nwokwu, G. N. (2012). Effect of plant spacing and planting date on the growth and Ijoyah Mo. 2010 productivity of Okra to varying sowing date in Makurdi, Nigeria. *Journal of Vegetable Crop Production,* 18, 184 – 190.

Kabiru, A. G. (1992). *Chemical soil test University of Agric.* Station Bull 960.

Sanwal, S. K., Lakminarayana, K., Yadav, R. K., Rain, N., Yadav, D. S. and Mousumi, B. (2007). Effect of Organic Manure on Soil Fertility, Growth and Physiology, Yield and Quality of turmeric. *India journal of Horticulture*, 64(4) 444 – 449.

Schipper, P. R. (2000). *African indigenous vegetable: An overview of the cultivated spacies.* Chatham U.K National resources institute A.C.D.E.U. Technical centre for Agro culture and Rural co-opertion; Pp. 105-117.

Senjobi, B. A. (2007). *Comparative Assessment of the effect of land use and land type on soil degradation and productivity in Ogun State, Nigeria.* Published, PhD Thesis submitted to the Department of Agronomy, University of Ibadan, Nigeria.

Thompson, H. C. (1949). *Vegetable crops.* Mc Gram Hill Book Company, Inc. New York, Toronto, London. 1919 – 1949; 611Pp.