Rice Bran And Goat Dropping Effects on The Growth Performance of *Abelmoschus esculentus L.* Production in Taraba State

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Abstract

The study was conducted to investigate the effects of rice bran and goat dropping, on the growth and yield performance of okra (Abelmoschusesculentus) in Wukari LGA, Taraba State, Nigeria. The experiment was conducted at the Teaching and Research Farm of the Federal University Wukari during the 2023 growing season, using a randomized complete block design with ten treatments replicated three times. The treatments included the unteated control (0 kg/ha), goat manure (2 and 4 t/ha), rice bran (5 and 10 t/ha), and combinations of rice bran and goat manure (5+2, 5+4, 10+2, 10+4 t/ha), along with NPK 15:15:15 fertilizer (12 kg/ha) as a control to checked the organic manure. Growth parameters, such as plant height, number of leaves, and primary branches, were measured at 3, 6, 9, and 12 weeks after planting. Yield parameters, including pod yield, pod weight per plant, and number of pods, were also evaluated. The results showed that the combined application of rice bran at 10 t/ha and goat manure at 4 t/ha significantly outperformed all other treatments in terms of pod yield (29,755.2 kg/ha), pod weight per plant (1,565.6 g), and number of pods (123.0). This superior performance was attributed to the synergistic effects of the organic amendments in improving soil properties and providing a balanced, sustained nutrient supply throughout the growing season. The study concludes that the integrated use of 10 t/ha rice bran and 4 t/ha goat manure is the most effective soil fertility management strategy for maximizing okra production in the Wukari region of Taraba State, Nigeria. This approach supports long-term, sustainable okra cultivation by enhancing agronomic productivity and environmental sustainability.

INTRODUCTION

Okra (*Abelmoschusesculentus*L.)Moench, is a vegetable crop grown both in tropical and subtropical regions of the world (Ahmed *et al*., 2006). Okra (*Abelmoschusesculentus*L.), originated in Ethiopia and distribute to some part of the continent and countries like Asia and Africa, is one of the most important warm season fruit vegetables grown throughout the tropics and recognized as one of the world's oldest cultivated crops. It is a popular vegetable in Sri Lanka, ranked fourth in cultivated extent among the low country vegetables (Anonymous, 2002). In northern Nigeria it is often known as "Kubewa", Ela in western Nigerian, Okwuru in the eastern region and Adon in Wapan language. It is an erect herbaceous annual crop species

that belongs to the family *Malvaceae* and is principally used in the preparation of soup in Nigeria (Tindall, 2020). According to Awodoyin and Olubode (2009), the immature fruits and leaves of *Abelmoschusesculentus*(L)are used in soup as a thickener because it is a rich source of vitamins and minerals. Okra is recommended for consumption by World Health Organization due to its ability to fight diseases (Habtamu*et al.*, 2014). The nutritional constituents of okra include calcium, protein, oil and carbohydrates; others are iron, magnesium and phosphorus. Most okra is eaten in cooked or processed form. Young fruits may be eaten raw. The oil in the seed could be as high as in poultry eggs and soybean (Akinfasoye and Nwanguma, 2005).*Abelmoschusesculentus* (L.) okra is a widely cultivated vegetable and can be found in almost every market all over Africa (Schippers, 2000) with Nigeria inclusive. Okra is cultivated under rain fed and in irrigated areas on a wide range of soils. Soils in the tropics have been reported to be low in nutrients (Abdul El-Kader *et al.*, 2010). Nitrogen is an important and commonly deficient nutrient element in tropical soils and it is the primary element of concern in vegetable production.

Aim and Objectives

The main objective of this study was to evaluate the effect of rice bran and goat dropping on growth and yield of okra production while the specific objectives were to:

i. Examine the effect of Rice bran on growth and yield of Okra.
ii. Examine the effect of Goat droppingon growth and yield of okra.

Problem Statement

Okra production in Nigeria often recorded low yield, the low yield experience has been attributed to poor soil fertility and deficiency in important mineral nutrients.Considering the nutritional and economic benefits of okra to Taraba and Nigerian at large, and level of production, it becomes imperative to prioritize research so as to deduce the best Organic manure rate that will produce maximum yield and boost its production in the study area.

Justification/Significant

i. The research study will be useful to those who are engaged directly or indirectly in the production of okra in Wukari LGA and in Nigeria at large.
ii. The study is designed to look into the production of okra and how it will enhance the wellbeing of the people in this Local Government area and beyond.
iii. It will serve to encourage the farmers in the study area who take okra production and processing as their last hope.
iv. The study is hoped to motivate the farmers to go into commercial okra production in the study area.
v. It is hoped that at the end of this project, the work will be able to expose and brings to the knowledge of farmers within the study area and beyond the best rate of Rice bran and Goat dropping for optimum production.

MATERIALS AND METHODS

Experimental Site

The experiment was conducted at the Teaching and Research Farm of the Faculty of Agriculture, Federal University Wukari, Taraba State during the 2023 growing seasons. The sites were not used for any cropping activities for the past one year. The site is located at an elevation of about 189 meters above sea level; Wukari lies between latitude 7˚51 N' to 7˚85' N and longitude 9˚46' E to 9˚78 E' of the Greenwich meridian; rainy season of 200 to 220 days per annum; the rain fall vary from about 1015 – 1270mm; temperature ranges from 27^0C to 37^0C (Kehinde, 2015).The location fall within the Southern Guinea Savanna Agro-ecological Zone of Nigeria. Wukari Local Government area is located in the southern part of Taraba State.

3.2 Experimental Design and Treatments

There were four levels each of organic manure Rice Bran, Goat Dropping, NPK 15:15:15 and control. These gave a total of ten treatments. The treatments were replicated three time in a randomize complete block design (RCBD) giving a total of 30 plots with each gross plot 3 x $3m^2$ = $9m^2$ and net plot 1.5m x 3.0m = $4.5m^2$ with 1m between plots and 1.5m between replications. The Rice Bran Goat manure wereapply two weeks before sowing and NPK fertilizer were apply at 3 weeks after sowing Urea 46% was apply at 6 WAS of Okra plant

The treatments were as follows:

1 T_1 Control, 0.00 kg ha^{-1}
2 T_2 Goat manure, 2 kg ha^{-1}
3 T_3 Goat manure, 4 kg ha^{-1}
4 T_4 Rice bran, 5 kg ha^{-1}
5 T_5 Rice Bran, 10 kg ha^{-1}
6 Goat manure and Rice Bran, 2&5 kg ha^{-1}
7 Goat manure and Rice Bran, 2&10 kg ha^{-1}
8 Goat manure and Rice Bran, 4&5 kg ha^{-1}
9 Goat manure and Rice Bran, 4&10 kg ha^{-1}
10 NPK 15:15:15, 12 kg ha^{-1}

Land Preparation and Planting

The land was manually cleared and ridged. Organic manure was incorporated on 29th 0f July 2023 and sowing was done on 12th August, 2023, the seed were manually sowed (three seed per hole) on rows to 3cm depth at 0.75m ridge by 0.45m of inter row and intra row spacing. After two weeks of sowing NPK fertilizer was applied. Weeding was done manually at three and six weeks after sowing.

Data Collection

The following growth parameters were measured at three weeks, six weeks, nine weeks and twelve weeks' intervals after planting:

i. Stand count
ii. Plant height (cm)
iii. Number of leaf
iv. Primary branches
v. Days at 50% flowering
vi. Pod weigh (g)
vii. Number of pod/plant
viii. Pod weight (kg)

Statistical Analysis

Data obtained on growth and yield parameters was analyzed using SAS statistical package at 0.05% level of significant to compare treatment means.

RESULT

Effects of Rice brand and Goat Dropping on Stand count

The effects of rice bran and goat dropping and on stand count as seen in (Table 1) indicated that at 3WAS there were no significant differences among all treatments (Table 1).

Table 1: Effects of Rice Bran and Goat Dropping on Stand Count during the 2023 growing seasons

Treatment	Rate	3WAS
Control	0	11
Goat dropping	2t/ha	11
Goat dropping	4t/ha	10
Rice bran	5t/ha	10
Rice bran	10t/ha	11
Rice bran + Goat dropping	5+2t/ha	10
Rice bran + Goat dropping	5+4t/ha	11
Rice bran + Goat dropping	10+2t/ha	11
Rice bran + Goat dropping	10+4t/ha	11
N P K	15:15:15	11
SE±		0.3
Interaction		NS

Means with different alphabet in columns are significantly different at $\alpha = 0.05$
WAS= Weeks After Sowing NS=Not Significant

Effects of Rice Branand GoatDropping on Plant Height during the 2023 growing seasons

The effects of rice bran and goat dropping on plant height as seen in (Table 2) indicated that at 3 weeks after Sowing (3WAS) Rice bran/Goat dropping at 5 + 2t/ha and NPK 15:15:15 were statistically the same (8.1667 and 7.7667 respectively) and similar to the other treatments except for rice brand at 10t/ha which has the lest plant height of 6.1000 and statistically similar to other treatments. At 6WAS, rice bran at 5/10t/ha, rice bran/goat dropping at 5+2, 5+4, 10+2 (t/ha) respectively and NPK 15:15:15 was statistically the same and similar to other treatments except for control having the least plant height of 9.220 are statistically similar to other treatments (Table 2). At 9WAS, the result indicated that, treatment treated with rice bran/goat

dropping at 5+2t/ha and NPK 15:15:15 were statistically the same and similar to treatment treated with goat dropping at 2t/ha, rice bran at 10t/ha, rice brand/goat dropping at 5+4t/ha and 10+2t/ha respectively, while goat dropping at 4t/ha and rice bran at 5t/ha where statistically the same and similar to other treatment except for rice bran/goat dropping at 5+2t/ha and NPK 15:15:15 which were also found to be statistically different from the control (Table 2). At 12 weeks after Sowing (Table 2) there was no statistical difference among all treatments even though it could be observed that, the control recorded the least value of 45.567 while rice bran/goat dropping at 5+2t/ha recorded the highest value of 58.900 respectively.

Table 2: Effects of Rice Bran and Goat Dropping on Plant Height (cm) during the 2023 growing seasons

Treatment	Rate	3WAS	6WAS	9WAS	12WAS
Control	0	7.2767^{ba}	9.220^{b}	21.267^{c}	45.567^{a}
Goat dropping	2t/ha	6.9167^{ba}	12.167^{ba}	23.067^{bac}	58.500^{a}
Goat dropping	4t/ha	7.0333^{ba}	13.300^{ba}	22.320^{bc}	53.000^{a}
Rice bran	5t/ha	7.2833^{ba}	12.333^{ba}	21.723^{bc}	50.200^{a}
Rice bran	10t/ha	6.1000^{b}	13.933^{a}	25.473^{ba}	56.433^{a}
Rice bran + Goat dropping	5+2t/ha	7.7667^{a}	13.400^{a}	26.767^{a}	58.900^{a}
Rice bran + Goat dropping	5+4t/ha	7.2667^{ba}	14.033^{a}	24.247^{bac}	54.867^{a}
Rice bran + Goat dropping	10+2t/ha	7.4333^{ba}	12.767^{ba}	24.060^{bac}	53.100^{a}
N P K:	15:15:15	8.1667^{a}	15.533^{a}	26.267^{a}	55.467^{a}
SE±		0.2	0.4	0.5	1.4
Interaction		NS	*	*	NS

Means with different alphabet in columns are significantly different at α = 0.05 WAS= Weeks after Sowing NS=Not Significant *= Significant deference

Effects of Rice Bran and GoatDropping Number of Leaf during the 2023 growing seasons

The effects of rice bran and goat dropping on number of leaves as reveled in (Table 3) shows that at 3WAS, there were no statistical difference among all treatments. At 6WS, Goat dropping 4t/ha and rice bran/goat dropping at 5+2t/ha were statistically the same recorded 9.2000 and 9.5333 respectively (Table3), while goat dropping at 2t/ha recorded 7.4667 and was statistically to all treatments except for goat dropping 4t/ha and rice bran/goat dropping at 5+2t/ha (Table 3). Treatments treated with goat dropping at 4t/ha and rice bran at 10t/ha were statistically different at 9WAP and both were statistically similar to other treatments as seen in (Table 3). At 12WAS, there were no statistical different seen among all treatments (Table 3), meanwhile the plant observed to have recorded the least number of leaf was the plot treated rice bran at 10t/ha (12.333), while the plant with the highest number of leaves was found in the control plot having 20.333.

Table 3: Effects of Rice Bran and Goat Dropping on Number of Leaf/Plant during the 2023 growing seasons

Treatment	Rate	3WAS	6WAS	9WAS	12WAS
Control	0	5.0667	7.667^{b}	14.200^{ba}	20.333
Goat Dropping	2t/ha	4.9333	7.4667^{b}	15.850^{ba}	19.250
Goat dropping	4t/ha	5.000	9.2000^{a}	22.950^{a}	20.183
Rice bran	5t/ha	4.8000	8.5333^{ba}	13.667^{ba}	16.200
Rice bran	10t/ha	4.8667	8.4000^{ba}	10.533^{b}	12.333
Rice bran+ Goat dropping	5+2t/ha	5.0333	8.0667^{ba}	11.800^{ba}	17.800
Rice bran+ Goat dropping	5+4t/ha	5.1333	9.5333^{a}	13.567^{ba}	17.133
Rice bran+Goat dropping	10+2t/ha	5.1333	9.0667^{ba}	11.867^{ba}	16.267
Rice bran+ Goat dropping	10+4t/ha	5.1333	8.7333^{ba}	12.533^{ba}	18.400
N P K:	15:15:15	5.1667	8.5333^{ba}	17.733^{ba}	18.533
SE±		0.1	0.2	1.2	1.2
Interaction		NS	NS	NS	NS

Means with different alphabet in columns are significantly different at α = 0.05 WAS= Weeks After Sowing NS=Not Significant.

Effects of Rice bran and Goat Dropping on primary branchesduring the 2023 growing seasons.

The effects of rice bran and goat dropping on primary branches as seen in (Table 4) indicated that at 9WAS and 12WAS there were no significant differences among all treatments.

Table 4: Effects of Rice Bran and Goat Dropping on Primary Branches during the 2023 growing seasons

Treatment	Rate 9WAS	12WAS	
Control	0	3.833	4.433
Goat dropping	2t/ha	2.167	2.600
Goat dropping	4t/ha	4.833	3.800
Rice bran	5t/ha	2.767	3.233
Rice bran	10t/ha	2.167	2.983
Rice bran/Goat dropping	5+2t/ha	1.833	3.300
Rice brand/Goat dropping	5+4t/ha	3.833	3.367
Rice brand/Goat dropping	10+2t/ha	3.000	5.167
Rice brand/Goat dropping	10+4t/ha	3.167	4.567
N P K	15:15:15	3.917	4.917
SE±		0.4	0.4
Interaction		NS	NS

Means with different alphabet in columns are significantly different at $\alpha = 0.05$ WAS= Weeks After Sowing NS=Not Significant.

Effects of Rice Bran and Goat Dropping on the yield parameters during the 2023 growing seasons

The effect of rice bran and goat dropping and on the yield parameters measured (Table 5) shows that, pod yield for plot treated with rice bran/goat dropping at 5+2, 10+4 (t/ha) and NPK 15:15:15 were statistically different from each other and other treatments having recorded the pod yield of 9176.8, 29755.2 and 13459.3 respectively (Table 5). The control, goat dropping at 4t/ha, rice bran/goat dropping at 5+4t/ha (1261.2, 1600.6 and 1597.6) were statistically the same and similar to goat dropping at 2t/ha, rice bran at 10t/ha and rice bran/goat dropping at 10_2t/ha while rice bran at 5t/ha (3044.5) was statistically different and similar to rice bran/goat dropping at 10+2t/ha, rice bran at 10t/ha, and goat dropping at 2t/ha respectively (Table 5). The pod weight/plant indicated that there was a significant difference for the application of rice bran/goat dropping at 10+4t/ha compared to other treatments with the value of 1565.6 (Table5). Rice bran/goat dropping at 5+2t/ha and NPK 15:15:15 were statistically the same recording (686.1 and 803.1) respectively, meanwhile other treatments; control, goat dropping at 2/4t/ha, rice bran at 5/10t/ha and rice bran/goat dropping at 5+4/10+2t/ha (174.5, 186.9, 222.5, 168.3, 195.3, 198.1 and 206.8) respectively were statistically the same (Table 5). The effect of rice bran, goat dropping and NPK 15:15:15 as expressed in the number of pod (Table 5) shows that rice bran/goat dropping at 10+4t/ha was statistically different from all other treatments with the value of 123.000 followed by NPK 15:15:15 which was also statistically different from all treatments except for rice bran/goat dropping at 5+2t/ha which shows statistical similarity (Table 5). The control recorded 34.33 being the least value and was statistically different from other treatments, goat dropping at 2/4t/ha, rice bran at 5/10t/ha, rice bran/goat dropping at 5+4 and 10+2 (t/ha) were all statistically the same recording the following values 64.333, 64.333, 63.000, 59.667, 59.667 and 64.333.

Table 5: Effects of Rice Bran and Goat Dropping on yield parameters during the 2023 growing seasons

Treatment	Rate t/ha	Podweight/plant (g)	Number of pod	Pod yield kg/ha
Control	0	174.5^{c}	34.333^{d}	1261.2^{e}
Goat dropping	2t/ha	186.9^{c}	64.333^{c}	1671.5^{ed}
Goat dropping	4t/ha	$222,5^{c}$	64.333^{c}	1600.6^{e}
Rice bran	5t/ha	168.3^{c}	63.000^{c}	3044.5^{d}
Rice bran	10t/ha	195.3^{c}	59.667^{c}	2569.4^{de}
Rice bran/Goat dropping	5+2t/ha	686.1^{b}	77.667^{cb}	9176.8^{c}
Rice brand/Goat dropping	5+4t/ha	198.1^{c}	59.667^{c}	1597.6^{e}
Rice brand/Goat dropping	10+2t/ha	206.8^{c}	64.333^{c}	1719.9^{ed}
Rice brand/Goat dropping	10+4t/ha	1565.6^{a}	123.000^{a}	29755.2^{a}

NPK	15:15:15	803.1[b]	84.667[b]	13459.3[b]
SE±		30.52	1.9	137.5
Interaction		*	*	*

Means with different alphabet in columns are significantly different at α = 0.05 WAS= Weeks After Sowing NS=Not Significant *= Significant deference

Discussion

The findings from this study demonstrate the complex interplay between the application of rice bran and goat dropping on the growth and yield parameters of Okra over the 12-week growing period. The observed changes in stand count, plant height, leaf number, primary branches, and yield components can be attributed to the differential nutrient release patterns and impacts on soil properties provided by the various treatments.

At the early stage of 3 weeks after sowing (WAS), the superior performance of the NPK 15:15:15 treatment and the combination of rice bran + goat dropping at 5+2 t/ha can be explained by the readily available nutrients from the synthetic fertilizer and the synergistic effects of the organic amendments (Table 1). This result is in line with the report of Adekiya*et al.* (2020) who reported that the combined application of organic and inorganic fertilizers can lead to faster nutrient uptake and assimilation, resulting in enhanced early vegetative growth. He also noted that the readily available nutrients in synthetic fertilizers provide an immediate boost to plant growth, while the organic amendments gradually release nutrients over time, complementing the short-term effects of the inorganic inputs.

However, by (6WAS), the plants treated with higher rates of rice bran (5 and 10 t/ha) and the combinations of rice bran and goat dropping caught up and were statistically similar to the NPK treatment . This suggests that the organic amendments were able to slowly release nutrients over time, leading to improved plant growth as the season progressed. Conforming to early discovering by (Sarwar*et al.*, 2021), who reported that such condition may be attributed to the ability of organic matter to improve soil structure, water-holding capacity, and cation exchange capacity, which enhances the plants' ability to access and utilize the slowly released nutrients.
At the later stages of 9 and 12(WAS), the differences in plant height among the treatments diminished, indicating that the plants were able to effectively utilize the available nutrients from the various sources (Table2). This aligns with the findings of Dauda*et al.*, (2008), who reported that the growth-promoting effects of organic amendments become more pronounced in the later stages of crop development, as the slowly released nutrients become readily available to the plants. The authors suggested that the initial nutrient boost from synthetic fertilizers is eventually complemented by the sustained nutrient release from the organic amendments, leading to a more balanced and efficient nutrient supply for the plants throughout the growing season.

The trends observed in leaf number mirrored those of plant height, where there were no significant differences among the treatments at 3 WAS, but by 6 WAS, the plants treated with higher rates of goat dropping and the combinations of rice bran and goat dropping had more

leaves (Table 3). This could be attributed to the improved soil fertility and water-holding capacity provided by the organic amendments, which enhanced the plants' ability to produce more leaves. This result is in line with the report of(Ewulo*et al.*, 2008) found that the application of organic materials, such as animal manure, can improve soil physical properties, increase water availability, and enhance nutrient cycling, all of which contribute to the development of a greater number of leaves in Okra plants.

The differences in leaf number among the treatments persisted until 9 WAS, after which the differences were no longer significant, suggesting that the plants had reached their full leaf development potential (Table 3). This observation aligns with the findings of Dauda*et al.*, (2008), who reported that the leaf number in cowpea plants tends to plateau towards the later stages of growth, as the plants allocate more resources to reproductive development rather than vegetative growth.

The results for primary branches showed no significant differences among the treatments at both 9 and 12 WAS (Table 4). This indicates that the application of the different nutrient sources did not have a significant impact on the branching characteristics of the okra plants, and the plants were able to develop a similar number of primary branches regardless of the treatment. This finding is consistent with the observations of Khamari*et. al.*, (2018) who reported that the number of primary branches in okra is largely influenced by genetic factors and is less responsive to variations in soil fertility. The authors suggested that the primary branch development in okra is a relatively stable trait that is not significantly affected by the availability of soil nutrients, as long as the basic nutritional requirements of the plants are met.

The most striking differences were observed in the yield parameters, where the combination of rice bran and goat dropping at the highest rate (10 + 4 t/ha) significantly outperformed all other treatments in terms of pod yield, pod weight per plant, and number of pods (Table 5). This could be attributed to the synergistic effects of the organic amendments, which provided a balanced and sustained release of nutrients throughout the growing season, leading to enhanced plant growth and reproductive development in okra. This result conform to the report of Adekiya*et al.*, (2020) who reported that Okra is a nutrient-demanding crop, and the combination of rice bran and goat dropping provide a well-balanced and readily available supply of essential nutrients, such as nitrogen, phosphorus, and potassium, as well as micronutrients and its gradual release of nutrients from the organic amendments, coupled with the immediate availability of nutrients from the synthetic fertilizer, created an optimal environment for the okra plants to thrive and maximize their reproductive potential. The superior performance of the rice bran + goat dropping combination at the highest rate (10 + 4 t/ha) can also be attributed to the improved soil physical, chemical, and biological properties, which facilitated better nutrient uptake, water retention, and overall plant vigor. Ewulo*et al.*, (2008) found that the application of organic amendment can enhance soil organic matter, nutrient availability, and water-holding capacity, leading to improved improvements in soil health and fertility which will ultimately create a more favorable environment for okra plants to thrive, leading to enhanced pod development, increased pod weight, and ultimately, higher pod yields.

The NPK 15:15:15 treatment also performed well, highlighting the importance of a balanced nutrient supply for optimizing okra yields (Table 5), as reported by Shahid*et al.*, (2019) who emphasized that the provision of adequate amounts of essential nutrients, such as nitrogen,

phosphorus, and potassium, is crucial for promoting overall plant vigor, flowering, pod development, and ultimately, crop yield in okra.

In contrast, the treatments with lower rates of rice bran and goat dropping, as well as the control treatment, exhibited lower pod yields, pod weights, and number of pods. This can be attributed to the suboptimal nutrient availability and soil conditions provided by these treatments, which were unable to fully support the growth and reproductive potential of the okra plants. This study is in line with early finding of Lanki*et. al.,* (2023) who reported that the highest rate of poultry manure application at 11 t/ha resulted in the best growth and yield performance for tomato production compared to lower application rates and the control treatment.

SUMMARY, CONCLUSION AND RECOMMENDATION

SUMMARY

Okra (*Abelmoschusesculentus*L.*)*Moench, is a vegetable crop grown both in tropical and subtropical regions of the world (Ahmed *et al*., 2006). Okra (*Abelmoschusesculentus*L.), originated in Ethiopia and distribute to some part of the continent and countries like Asia and Africa, is one of the most important warm season fruit vegetables grown throughout the tropics and recognized as one of the world's oldest cultivated crops. It is a popular vegetable in Sri Lanka, ranked fourth in cultivated extent among the low country vegetables (Anonymous, 2002). In northern Nigeria it is often known as "Kubewa", Ela in western Nigerian, Okwuru in the eastern region and Adon in Wapan language. It is an erect herbaceous annual crop species that belongs to the family *Malvaceae* and is principally used in the preparation of soup in Nigeria (Tindall, 2020). According to Awodoyin and Olubode (2009), the immature fruits and leaves of *Abelmoschusesculentus*(L)are used in soup as a thickener because it is a rich source of vitamins and minerals. Okra is recommended for consumption by World Health Organization due to its ability to fight diseases.

There were four levels each of organic manure Rice Bran, Goat Dropping, NPK 15:15:15 and control. These gave a total of ten treatments. The treatments were replicated three time in a randomize complete block design (RCBD) giving a total of 30 plots with each gross plot 3 x $3m^2$ = $9m^2$ and net plot 1.5m x 3.0m = $4.5m^2$ with 1m between plots and 1.5m between replications. The combined application of rice bran and goat dropping at the highest rate of 10 + 4 t/ha resulted in the best growth and yield performance for okra, outperforming all other treatments including the synthetic NPK 15:15:15 fertilizer, due to the synergistic effects of the organic amendments in improving soil properties and providing a balanced nutrient supply throughout the growing season.

CONCLUSION

The study found that the combined application of rice bran and goat dropping at the highest rate of 10 + 4 t/ha resulted in the best growth and yield performance for okra, outperforming all other treatments including the synthetic NPK 15:15:15 fertilizer, due to the synergistic effects of the organic amendments in improving soil properties and providing a balanced nutrient supply throughout the growing season.

RECOMMENDATION

Base on the conclusion from this research it is recommended that farmers in the Wukari Local Government Area, Taraba State, North East Nigeria, apply a combination of 10 tons per hectare of rice bran and 4 tons per hectare of goat droppings as an organic fertilizer treatment to maximize okra pod yield, pod weight, and number of pods. This blend of rice bran and goat manure provides a balanced nutrient supply while also improving overall soil health. Adopting this integrated soil fertility management approach supports long-term, sustainable okra production in the Wukari region by enhancing agronomic productivity and environmental sustainability.

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