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Effect of Organic Manure (Poultry Droppings, Cow Manure and Pig Manure) and Inorganic Fertilizer (N. P.K. 15:15:15) on the Growth and Yield of Fluted Pumpkin (Telfairia Occidentalis)

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Abstract:
The study was conducted during rainy season between May and August 2019 at the Teaching and Research Farm of Crop Science and Horticulture, Faculty of Agriculture, Chukwuemeka Odumegwu Ojukwu University, Igbariam Campus. This experiment was carried out to test the effect of different organic manure viz; cow manure, poultry droppings and pig manure and inorganic fertilizer N.P.K 15:15:15 on the growth and yield of fluted pumpkin. There were five treatments: Control, 10t/ha Poultry droppings, 12t/ha Cow manure, 10t/ha Pig manure and N.P.K 15:15:15 which was replicated four times making it 20 plots. The experiment was laid in a Randomized Complete Block Design. Data were collected on Seedling Emergence Percentage, Number of Leaves, Number of Branches, Vine Length and Fresh Weight of Leaf. At 2WAP and 6WAP for Number of leaves cow manure gave the highest mean number while at 4WAP, pig manure came out highest. For Number of branches at 2WAP and 6WAP, Pig manure gave the highest mean value while at 4WAP, Cow manure performed best. For VIne Length, Pig manure gave the highest mean number at both 2WAP and 4WAP. While at 4WAP Poultry droppings performed highest. For Fresh Weight of Fluted pumpkin Cow manure performed the highest at both 8WAP and 11WAP.However, these parameters showed an increase with the application of the different organic manure (Poultry droppings, Cow manure and Pig manure) while N.P.K 15:15:15 and control (untreated plot) did not successfully show much increased on the growth and yield parameters measured. Based on the result of the study, the parameters suggests that Organic manure releases enough nutrient elements which are required for maximum growth and yield of fluted pumpkin and they are recommended as soil amendment for soil productivity and high crop yield

Keywords: *Fluted pumpkin, organic manure, inorganic fertilizer, growth and yield*

1. Introduction

Telfairia occidentialis commonly called fluted pumpkin grows in the forest zone of West and Central Africa most frequently in Benin, Nigeria and Cameroon. It is a popular vegetable all over. It is rare in Uganda and absent in the rest of east Africa. It has been suggested that it originated in the South East Nigeria and was distributed by the Igbo's who have cultivated this crop species since time immemorial (Adeniyan, and Ojeniyi, 2003).

In Nigeria the edible vegetable is known as 'Ugwu' in Igbo, Ubong, Nkong' in Effik Ubobio and 'Ireke' in Yoruba. Its succulent young shoots and tender leaves are used in preparing soup (Schippers, 2000) and it is usually cooked lightly with okra and fish or meat (Udoh *et al*, 2005).

The nutritional value of pumpkin seeds is different from the leaves, the protein content of seeds and leaves are 45.0g and 1.8:23.0 and 7-0g, respectively (Food and Agriculture Organization, 1988). *Telfairia occidentalis* contain high levels of Potassium and Iron, the leaves contain a high number of antioxidants and antimicrobial properties (Nwanna, Esther Enem, 2008).

Fluted pumpkin (*Telfairia occidentalis* Hook. F.) is an indigenous vegetable consumed in Nigeria and it prefers a loose, friable soil with ample humus and shade (Olaniyi & Odedere, 2009) Fluted pumpkin is able to ration with the highest degree of success in well-drained soils (Akoroda, 1990).

Despite the importance of fluted pumpkin in Nigerian diet, farmers are facing a lot of challenges concerning its production, especially on the soils of guinea savanna Agro ecological conditions of the savanna soils which constitute a strong limitation to crop production (Salako, 2003), Soil fertility depletion in small holder farm is the fundamental cause of declining per capital food production (Sanchez, *et al* 1996). Therefore, these soils must be supplemented with adequate

macro materials in other to keep them productive (Ndor *et al* 2012). In the Cultivation of fluted pumpkin, there is need for the application of different fertilizers, organic or inorganic to enhance the growth and yield.

Most famer use organic fertilizer or manure in complementing the nutrient of the soil and sometimes in organic fertilizers such as NPK is also used. But sometimes mineral fertilizers are very costly, so poor farmers can hardly afford them (McGuiness, 1993) most farmers make use of organic manure like poultry, cow and pig manure to increase yield and growth of fluted pumpkin to minimize cost of production.

Therefore, the objective of present study is to determine the effect of different Organic manure (Poultry, Pig and Cow manure) and Inorganic fertilizer (NPK 15:15:15) fertilizer on the growth and yield of fluted pumpkin.

2. Materials and Methods

2.1. Experimental Site

The field experiment was conducted at the Teaching and Research Farm of the Department of Crop Science and Horticulture, Faculty of Agriculture, Chukwuemeka Odumegwu Ojukwu University, Igbariam, Anambra State. Igbariam falls within the derived savannah zone of Nigeria and is located at Latitude of 06^0 and 45^0E (COOU Met. 2010).

2.2. Experimental Design and Field Layout

The experiment was laid out in a randomized complete block design (RCBD) and will be replicated four times to give a total of 20 plots. The five treatments that will be used in the experiments are shown below:

- Poultry Droppings (PD) 10t/ha
- Cow Manure(CM) 10 t/ha
- Pig Manure (PM) 10t/ha
- NPK 15:15:15(NPK) 200Kg/ha
- Control (CO

2.3. Cultural Practices

The field was prepared by clearing of the field with the use of cutlass and hoe. The field will be lined and pegged and it will be divided into 20 plots with plot size of 3m by 2m with pathway spacing of 0.5m. The total field area will be measured to be 20 x12 giving a total 240m which will be divided into 4 blocks. The pig manure, poultry droppings and cow manure will be applied two weeks before planting in order to enable proper decomposition and release of nutrients.

Weeding was done normally using hoe when required and NPK 15:15:15 was applied to the proper plots two weeks after planting.

2.4. Data Collection

The following data was collected:

- Seedling Emergence Percentage: this was measured using the equation below;

$$\text{SEP} = \frac{\text{No of emerged seed}}{\text{No of planted seed}} \times \frac{100}{1}$$

- Vine Length: this was measured using measuring tape.
- Number of Leaves: this was measured by counting at 2 weeks interval till the end of the experiment.
- Number of Branches: this was done by counting at 2 weeks interval till the end of the experiment.
- Marketable leaf Yield by Weight: This was weighed on weekly basis from two middle row plants to avoid border effect from three weeks after planting.

2.5. Statistical Analysis

The data collected were subjected to Analysis of Variance (ANOVA) using GenStat Release 10.3 statistical software. The means will be compared using Fisher's least Significance Difference (F-LSD) as described by (Obi, 2002).

3. Results

Treatment	Seedling Emergence Percentage
Pig Manure	78.10
Poultry Droppings	71.90
Control	75.00
Cow Manure	78.10
NPK 15:15:15	78.10
LSD(0.05)	NS

Table 1: Effect of Organic Manure and Inorganic Fertilizer on the Seed Emergence Percentage

The effect of soil amendments on the seedling emergence percentage of fluted pumpkin is presented in table 1. The table showed that pig manure, cow manure and NPK fertilizer had the highest seedling emergence percentage at

78.1%, while poultry droppings had the lowest seedling emergence percentage at 71.9%, then control had 75% seedling emergence percentage. However, these differences in seedling percentage were not significant.

Treatment	No of Leaves at 2WAP	No of Leaves at 4WAP	No of Leaves at 6WAP
Pig Manure	9.75	71.2	206.7
Poultry Droppings	10.75	114.7	135.9
Control	3.25	105.3	183.5
Cow Manure	11.93	104.1	262.9
NPK 15:15:15	8	84.3	143.5
LSD(0.05)	2.776	NS	60.23

Table 2: Effect of Organic Manure and Inorganic Fertilizer on the Number of Leaves of Fluted Pumpkin
LSD: Least Significant Difference, N.S: Not Significant, WAP: Weeks after Planting

Table 2 above revealed the effect of soil amendments on the number of leaves of fluted pumpkin. At 2WAP the following recordings were made: 9.75, 10.75, 3.25, 11.93, and 8 for 10t/ha pig manure, 10t/ha poultry droppings, control, 10t/ha cow manure, 12kg/ha NPK: 15:15:15. At 5% probability level, the treatments were significantly different.

At 4WAP of data collection, 10t/ha poultry droppings recorded the highest value 114.7 while pig manure gave the lowest value 71.2, while 105.3, 104.1, and 84.3 were obtained from control, 10t/ha Cow manure and 12kg/ha NPK 15:15:15 Fertilizer respectively.

At 6WAP cow manure was recorded the highest 262.9 while poultry droppings recorded the lowest at 135.9. While 206.7, 183.5 and 143.5 for 10t/ha pig manure, control and 12kg/ha NPK 15:15:15 fertilizer respectively.

Treatment	NOB 2WAP	NOB 4WAP	NOB 6WAP
Pig Manure	2.42	10.9	23.4
Poultry Droppings	1.43	11.07	21.73
Control	1.23	9.15	21.15
Cow Manure	2.17	12.97	22.15
NPK 15:15:15	1.18	12.55	19.2
LSD(0.05)	0.749	NS	NS

Table 3: Effect of Organic and Inorganic Fertilizer on the Number of Branches of Fluted Pumpkin at 2, 4 and 6 Weeks after Planting
LSD: Least Significant Difference, N.S: Not Significant, NOB: Number of Branches, WAP: Weeks after Planting

Table 3 showed the effect of soil amendments on the number of branches of fluted pumpkin. At 2WAP the following recordings were collected: 2.42, 1.43, 1.23, 2.17, and 1.18 for 10t/ha pig manure, 10t/ha poultry droppings, control, 10t/ha cow manure and 12kg/ha NPK 15:15:15 respectively.

Pig manure had the highest mean number of branches, cow manure, poultry droppings followed respectively, 12kg/ha NPK 15:15:15 had the lowest number of branches.

At 4WAP, cow manure had the highest mean number of branches at mean 12.97, this is followed by 12kg/ha NPK 15:15:15, Poultry Droppings, and Pig manure had mean number of branch 12.55, 11.07, and 10.9, respectively. Then control had the lowest mean number of branches at mean 9.15. At 5% probability level the treatments were not Significant.

At 6WAP Pig manure had the highest mean number of branches at mean 23.4 this is followed by poultry droppings, Control, Cow Manure at mean 21.73 21.5, 21.5 then NPK had the lowest mean number of branches at mean 19.2. At 5% the probability level of the treatments was non-Significant.

Treatment	VL 2WAP	VL 4WAP	VL 6WAP
Pig Manure	36.25	138	188.7
Poultry Droppings	29	108.9	197.8
Control	33.82	111.3	187.8
Cow Manure	30.82	104.3	166.3
NPK 15:15:15	28.92	103.9	107.8
LSD(0.05)	NS	NS	56.27

Table 4: Effect of Organic Manure and Inorganic Fertilizer on the Vine Length of Fluted Pumpkin at 2, 4 and 6 after Planting
LSD: Least Significant Difference, N.S: Not Significant. VL: Vine Length, WAP: Weeks After Planting

The effect of soil amendments on the vine length of fluted pumpkin is represented in Table 4. At 2WAP the following recordings were collected for vine length at mean value of 36.25, 29, 33.82, 30.82, 28.92, the result revealed that pig manure had the highest mean for vine length, followed by control, cow manure, poultry droppings, while NPK fertilizer had the lowest mean for vine length. At 5% probability level the treatments were not significant.

At 4WAP pig manure also performed the highest at mean 138 for vine length, 12kg/ha NPK 15:15:15 fertilizer also had the lowest mean for vine length at mean 103.9. While Poultry Droppings, Control, and Cow Manure had: 108.9,111.3 and 104.3 mean respectively. At 5% probability level the treatments were Non-Significant.

At 6WAP Poultry manure had the highest mean for vine length at mean 197.8, while NPK just like in 2WAP and 4WAP had the lowest mean value for vine length at mean 107.8, then pig manure, control and cow manure had mean value of 188.7, 187.8 and 166.3 respectively.

Treatment	Fresh Weight (g) at 8WAP	Fresh Weight (g) at 11WAP
Pig Manure	137.00	171.00
Poultry Droppings	235.00	196.00
Control	134.00	185.00
Cow Manure	278.00	249.00
NPK 15:15:15	143.00	157.00
LSD(0.05)	110.50	N.S

Table 5: Effect of Organic Manure and Inorganic Fertilizer on the Fresh Weight of Fluted Pumpkin
LSD: Least Significant Difference, N.S: Not Significant. WAP: Weeks after Planting

Table 5 showed the effect of soil amendments on the fresh weight at harvest of fluted pumpkin. At 8WAP the application of 10t/ha Cow manure gave the highest mean for fresh weight of fluted pumpkin at mean 278g, followed by 10t/ha Poultry Droppings which was recorded 235g, 12kg/ha NPK 15:15:15 gave 143g,10t/ha Pig manure gave 137g, while Control gave the lowest mean for fresh weight of fluted pumpkin at harvest at mean 134g. At 5% probability level, the treatments were significantly different.

AT 11WAP the application of 12kg Cow manure gave the highest mean for fresh weight of fluted pumpkin at mean 249g then 10t/ha Poultry Droppings gave 196g, Control gave 185g, Pig Manure 171g, while 12kg/ha NPK fertilizer recorded the lowest at mean 157g. . At 5% probability level, the treatments were not significant.

4. Discussion

The seedling emergence percentage was the highest at the plot treated with, pig manure, cow manure and NPK 15:15:15 fertilizer; these plots had the highest number of emerged seedling percentage. While poultry droppings had the lowest number of seedling emergence percentage.

The leaf number increased significantly from second week after planting and was highest with 12kg cow manure application, followed by 12kg poultry droppings application.

However at 4WAP the number of leaves was at its highest with the application of poultry droppings at mean value 114.7 followed by cow manure, this indicates that poultry droppings was able to increase the vegetative growth of fluted pumpkin at 4WAP, According to Aliyu (2000), poultry droppings has profound effect on the vegetative development and growth of crops. It can therefore be said that increased in the amount of poultry manure application results in increase in vegetative growth as reported also by Dauda *et al* (2008). But the treatments at 4WAP were not significant.

At 6WAP number of leaves increased the highest significantly with the application of 12kg cow manure application at mean value 262.9. At both 2WAP and 6WAP cow manure increased the number of leaves significantly highest. Cow manure has long been recognized as perhaps the most desirable animal manures because of its high nutrient and organic matter content.

At both 2WAP and 4WAP N.P.K. Fertilizer gave the lowest mean number of leaves at mean 8 and 84.3 but later gave the second highest mean value for number of leave at 6WAP at mean 143.5.

The number of branches increased significantly with the application of pig manure at mean 2.42 at 2WAP followed by cow manure at mean 2.17 then, 12kg/ha NPK 15:15:15 plots gave the lowest number of branches with mean number 1.18.

At 4WAP, cow manure gave the highest number of branches at mean 12.97 followed by 12kg/ha NPK 15:15:15 fertilizer application at mean number 12.55, Control gave the lowest number of branches at mean number 9.15. The treatments were non-significant.

At 6WAP, there were no significant differences among the treatments at this time, the number of branches recorded the highest in the plot treated with 10t/ha Pig manure with mean value of 23.3

This shows that both pig manure and cow manure increases the number of branches when applied to fluted pumpkin.

The vine length increased the highest with the application of 10t/ha of Pig manure at 2WAP and also gave the highest mean value of vine length at 4WAP, but the treatments in both the second week and fourth week after planting were not significant.

But at the sixth week after planting the vine length increased significantly with the application of cow manure.

The fresh weight of fluted pumpkin at 8WAP recorded the highest in the plot treated with10t/ha cow manure and the treatments were increased significantly, cow manure is used as a rich fertilizer. This was followed by poultry droppings; Increase in yield was equally reported by Nweke *et al.* (2013).

At the 11WAP cow manure also recorded the highest of the fresh weight harvest and also followed by poultry droppings this indicates that both cow manure and poultry droppings both performed the highest at fresh weight of fluted pumpkin. Organic manure contains essential elements that favour high photosynthetic activities to promote prolific roots and vegetative growth. (Dauda *et al,* 2008).

5. Conclusion

The following conclusions were drawn from the results of this study:

- Organic manure serves as a good source of soil amendments, for improvement of soil properties which in turn led to the improvement of Growth and Yield of fluted pumpkin.
- Cow manure treatment was more effective than any other treatments in the term of Growth and yield of fluted pumpkin. Followed by pig manure
- This conclusion shows that the Growth and Yield of the experimental fluted pumpkin responded differently to each of the different application of organic manure.

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