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Effect of direct planting and transplanting and use of organic manures on growth and yield fluted pumpkin leaves (*telfairiaOccidentalis*) grown in Makurdi, Benue state. Nigeria

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Abstract

The experiment was carried out at the Teaching and Research farm of Joseph Sarwuan Tarka University Makurdi, Makurdi (6° 11' - 7° 41' N Latitude and 7° 21' - 8° 37' E Longitude). The experiment aimed to investigate the effect of direct planting and transplanting and use of organic manures on growth and yield fluted pumpkin leaves (*Telfairia occidentalis*) grown in Makurdi, Benue state Nigeria. The experiment is laid in a complete randomized design with three replications. The treatments used are organic nutrient source and planting methods), the experiment was conducted during the 2024 rainy season. A 4m² plot was laid out with 1m between plots and 0.5m between blocks. Two factors were considered thus 3x2x3; there were 6 plots each within a block which gave the total number of 18 plots for the study. During the research, growth characters such as vine length, number of leaves, number of branches and leaf area were measured. Significant difference ($P \leq 0.05$) was recorded. The use of poultry manure was also observed to produce significantly ($P \leq 0.05$) produced taller plant (162.31), higher number of leaves (23.61), higher number of branches (10.31 and higher leaf area (109.23) and the use of transplanting methods had taller plant (146.12), lower number of leaves (21.31), higher number of branches (10.47) and higher leaf area (107.41). Based on the result obtained from this research, farmers are therefore advice to transplant their pumpkin and use poultry manure as source of nutrients for optimal growth in the study area.

Keywords: Direct planting, Transplanting, Poultry manure, Cow dung, Fluted pumpkin.

Introduction

Telfairia Occidentalis (Fluted pumpkin) is a species of Cucurbitaceae family in the tropics largely consumed in Nigeria, Ghana, and Sierra Leone. It is however now cultivated in almost all parts of the country (Igbozulike, 2015). The common names for fluted pumpkin include Ubong in Ibibio and Ugu in Igbo. It is a creeping vegetable that spreads low across the ground with lobed leaves and long twisting tendrils. It is a warm weather crop that grows well in low lands and tolerates elevation of some few meters above the ground. It thrives best in soils rich in organic matter (Uboh *et al.*, 2011). Fluted pumpkin plays important role in human and livestock nutrition. It is a source of protein, oil, minerals, and vitamins. The leaves are low in crude fiber but a rich source of folic acid, calcium, zinc, potassium, cobalt, copper, iron, and vitamins A, C, and K. It also has medicinal values as fluted pumpkin leaves and seeds could be used to increase hematological indices, improve sperm quality, and reduce blood glucose. It is rich in antioxidants, thiamin, riboflavin, and ascorbic acid. It thrives better in the early part of the rainy season, planted between August and October, and can be grown in a garden. It can survive 3-4 years if there is moisture in the soil (Idodo-Umeh and Ogbeibu, 2010). Environmental pollution has become an extensive and dangerous problem as a consequence of industrial and human activities. Widespread low to high pollution of large areas of agricultural land is a particular problem from indiscriminate sludge discharge from industries, crude oil pollution, and wastes (Ogbole, 2012). Human activities have dramatically changed the balance of biochemical and geological cycles of many heavy metals. An assessment of environmental risk caused by soil contamination is especially important for agricultural as well as non-cultivated areas due to the fact that metals potentially harmful to human health persist in soils for a relatively long time and may transfer into the food chain in considerable amounts (Radmila *et al.*, 2013).

In Nigeria the edible vegetable is known as 'Ugwu' in Igbo, Ubong, Nkong' in Effik Ibibio 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 *telfairia occidentalis* contain high levels of Potassium and Iron, the leaves contain a high number of antioxidants and antimicrobial properties (Nwanna 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 and Odedere, 2009). 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. Therefore, these soils must be supplemented with adequate macro materials in order 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 farmer use organic fertilizer or manure in complementing the nutrient of the soil and sometimes inorganic fertilizers such as NPK is also used. 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. The method of planting affect the production of *telfairia occidentalis*, With the increase in production of *telfairia* especially in Benue state planting material like seeds become a major problem as result of loss in viability, seed vigor, incidence of vivipary and farmers are ignorant of methods that are involve in

planting the yield of direct planting and transplanting differs. Transplanting permit maximum number of plant to be obtained from costly seeds and also depth of planting problem is easily control. As a result of ignorance, some farmers plant more than one seeds per hole to enhanced good percentage germination, unknowingly, resulting to scarcity of seeds, but to them that was to ensure total stands in their farms since direct sowing was the problem encounter as the seeds may take longer time to germinate, the result gotten from my survey from local framers. Looking forward to this problem, whether transplanting could be a way out in solving this issues encounter by farmers, the objective of the research is to: To determine the performance of transplanting *telfairia* and direct planting, To determine the effects of organic manures on growth and yield of *telfairia occidentalis* in Makurdi

Materials and Methods

The experiment was carried out at the Teaching and Research farm of Joseph Sarwuan Tarka University Makurdi, Makurdi (6° 11' - 7° 41' N Latitude and 7° 21' - 8° 37' E Longitude). The experiment aimed to investigate the effect of direct planting and transplanting and use of organic manures on growth and yield fluted pumpkin leaves (*Telfairia occidentalis*) grown in Makurdi, Benue state Nigeria. The experiment is laid in a complete randomized design with three replications. The treatments used are organic nutrient source and planting methods), the experiment was conducted during the 2024 rainy season. The organic sources of nutrients used had the following content. Cow dung (Dry matter 12%, Organic Material 11%, Total Nitrogen 14.0%, Total Phosphorus 0.3% and Total Potassium 0.6%) and Poultry dropping (100% Dry Matter, Organic Material 65%, Total Nitrogen 5.9%, Total Phosphorus 1.41% and Total Potassium 2.72%). The seeds were evaluated as follows: weight which were placed in ranges (9-14g as medium) 14-17g as large) and from 1-8g as small respectively. Which 19-14g was used, this method of ranges was determine by digital scale, the organic manure where collected from both birds and cattle that where kept under intensive management, where the organic manure where kept/stored to undergo partial decomposition for five months following the recommendation of (Bello, 2015) with 5 tones/ha before incorporation into the soil. The two planting methods used are direct planting and transplanting. The experiment that was laid in a randomized complete block design (RCBD) with three replicate, a 4m² plot was laid out with 1m between plots and 0.5m between blocks. Two factors were considered thus 3x2x3, there were 6 plots each within a block which gave the total number of 18 plots for the study, Agronomic practice such as weeding was done manually at 2 and 6 weeks after planting to ensure weed free plots, all the data were collected within the net plot of 4m² where a total of 5 plants were tagged for data collection within each net plot. The parameters recorded were vine length (taken with the aid of measuring tape from the base of the plant to the tip), number for leaves (were counted fortnightly) from 5 plants that was tagged and the average used fortnightly and number of branches were counted. Leaf area was calculated using the formulae:

$$LAI = \frac{\text{no of leaves} \times \text{area of leaf} \times \text{no of plant pr sub-plot}}{\text{Area covered (size of sub-plot)}} (1)$$

Data

Analysis All data collected were subjected to analysis of variance (ANOVA), while least significant difference (LSD) at 5% level of probability was used in separating the means.

Results and Discursion

Table 1: Effect of organic manures and planting methods on vine length of *Telfairia* grown in Makurdi,

Organic manure/planting method	2WAP	4WAP	6WAP
Poultry	32.23	92.23	162.31
Cow dung	17.23	70.23	148.12
Control	22.00	60.23	85.22
F-LSD (0.05)	3.98	9.11	20.45
Planting methods			
Direct planting	25.67	87.63	143.31
Transplanting	30.33	90.33	146.12
F-LSD (0.05)	0.08	10.11	1.05

LSD= Least Significant Differences at 5% Level of Probability.

Table 1 showed the performance of transplanting *telfairia* to direct planting on vine length. The findings provide valuable insights into the cultivation practices for enhancing *telfairiaoccidentalis* plant growth in the specific agro-climatic conditions of Makurdi, Nigeria. Significant difference was observed with transplanting having longer vine length in all the weeks under consideration when compared with direct planting method. This could be attributed to the facts that most transplanted plants has ability to grow and establish fast after overcoming transplanting shock, these finding is a par with the work of Madina *et al.*, 2023 who reported this in work on lettuce. There was Significant differences at $P<0.05$ observed with transplant having the longest vine length with the mean value of (153.62) while direct planting had mean value of (143.31). Also, effect of organic manures on vine length of *telfairia* grown in Makurdi, Nigeria, significant difference $P<0.05$ was recorded with poultry dropping having longer vine when compared with the other source of organic manures. The results revealed that nutrient source significantly influenced vine length. *Telfairia* generally exhibited greater vine length compared to other treatment, with values ranging from (32.23) at week 2, (92.23) at week 4 and (162.31) at wee 6 at different weeks. From organic manures sources, Poultry dropping consistently promoted the highest vine length, reaching up to (162.31) at 6 WAP. On nutrient sources the use of poultry dropping had longer vines when compared with other sources of nutrient used, this could be as a result of availability of the nutrient in required quantity influencing leaves initiation for photosynthesis and utilization of assimilate, this was reported by Azam *et al.*, (2001) in his earlier work, this could also be attributed to well established climatic and soil conditions which is reported by Parthasarathy *et al.*, 2018, that vine length in crops are generally affected by climatic and soil factors, he also added that, genetic make-up of plant plays an important role in the growth and development of a crop.

Table 2: Effect of organic manures and planting methods on number of branches of *Telfairia* grown in Makurdi, Nigeria

Organic manure/planting method	2WAP	4WAP	6WAP
Poultry	1.23	6.21	10.31
Cow dung	0.02	3.63	7.13
Control	0.00	1.03	3.00
F-LSD (0.05)	0.00	1.11	1.45
Planting methods			
Direct planting	1.00	2.33	10.22
Transplanting	1.23	6.00	10.47
F-LSD (0.05)	0.00	0.11	1.45

LSD= Least Significant Differences at 5% Level of Probability.

Table 2, investigates the performance of transplanting *Telfairia* to direct planting on number of branches and impact of nutrient source on the number of branches in plants cultivated in Makurdi, Nigeria. *Telfairia occidentalis* was subjected to different organic manures sources (Poultry dropping, Cow-dungand Control) at 2, 4, and 6 weeks after planting (WAP). The results indicated significant effects of nutrient source on the number of branches. *Telfairia occidentalis* in control consistently displayed fewer branches compared to other treatments across different weeks, with values ranging from (1.23) at 2 week, (6.21) at week 4 and (10.31) at 6 weeks. From organic manuresources Poultry dropping contributed to increased branch development when compared with other sources of nutrient used, this could be as a result of nutrient availability in needed quantity leading to vegetative growth and extending the maturity days as suggested by Sing (2004) These findings provide insights into optimizing cultivation practices for *Telfairia* plants, emphasizing the importance of nutrient management for enhanced branch formation in the specific agro-climatic conditions of Makurdi, Nigeria. Effect of organic manures on number of branches of *Telfairia* grown in Makurdi, Nigeria where significant difference $P<0.05$ was recorded with poultry dropping having the highest number of branches when compared with the other source of nutrients. Agronomic practice, climatic and soil nutrient as supported by the work of Azam-Ali el at (2001)

Table 3: Effect of organic manures and planting methods on number leaves of *Telfairia* grown in Makurdi, Nigeria

Organic manure/planting method	2WAP	4WAP	6WAP
Poultry	7.23	15.11	23.61
Cow dung	6.33	12.33	22.03
Control	5.60	13.23	19.00
F-LSD (0.05)	1.00	1.02	1.45
Planting methods			
Direct planting	7.23	16.63	24.31
Transplanting	7.00	16.33	21.12
F-LSD (0.05)	0.08	0.11	1.45

LSD= Least Significant Differences at 5% Level of Probability

Table 3 shows the effect of planting method on number of leaves of *Telferia occidentalis* grown in Makurdi, Nigeria. Result obtained the results revealed that, the effect of planting methods on number of leaves of *Telferia occidentalis* grown in Makurdi, weeks after transplanting (WAT), shows that there was Significant differences at $P < 0.05$ level of probability was observed among the different methods of planting with direct planting having the highest number of leaves with mean value of 7.23 at week 2, 16.63 at week 4 and 24.31 at week 6. Direct planting recorded higher number of leaves at week 2, 4, and 6 with the mean value of (24.31), when compared with transplanting, this followed by transplanting with the mean value of (21.12). this work collaborate with the finding of Madina, et al., 2024, who stated that direct planting have advantage of adopting to the planting environment when compared with transplanting. While on the nutrients source, poultry droppings recorded highest number of leaves (162.31) 6WAP. Significant difference was observed with direct planting having higher number of leaves in all the weeks under consideration when compared with the other planting method. (Kumari et al. 2014), (Dauda et al., 2008). On nutrient sources the use of poultry dropping had higher number of leaves when compared with other sources of nutrient used; this is not far from the fact that poultry manure release its nutrients fast when compared with other sources of organic manure Sing et al. (2005) lend support to that.

Table 4: Effect of organic manures and planting methods on leaf area of *Telfairia* grown in Makurdi, Nigeria

Organic manure	2WAP	4WAP	6WAP
Poultry	46.57	96.34	109.23
Cow dung	45.09	95.34	104.23
Control	44.23	92.12	99.01
F-LSD (0.05)	1.95	1.32	2.21
Planting methods			
Direct planting	47.00	95.53	103.32
Transplanting	48.33	97.03	107.41
F-LSD (0.05)	0.08	0.10	1.15

LSD= Least Significant Differences at 5% Level of Probability

Result obtained from table 4 revealed that, the effect of nutrients source on leaf area of *telfairiaoccidentalis* grown in Makurdi, weeks after planting (WAP), shows that there was Significant differences at $P < 0.05$ level of probability and it was observed that among the different organic source evaluated, poultry dropping recorded the highest leaf area at week 2, 4, and 6 with the mean value of (109.23), when compared with other treatment, this followed by cow dung with the mean value of (104.23) while control had the least in terms of leaf area with the mean value of (99.01) at 6 weeks after planting. It shows that there was significant differences among the different organic source evaluated, poultry dropping recorded the highest leaf area when compared with other treatments, the use of poultry dropping produced its higher leaf area when compared with other sources of nutrient used, this is attributed to the facts that poultry manure produced its nutrients fast and aid to other microbial activities improving the soil status and making available the nutrient through-out the crop life as reported by Linnemann et al (1996). These findings offer practical guidance to farmers and agricultural

practitioners in Makurdi and similar regions, contributing to the optimization of agricultural practices and ecological sustainability (Ndor and Dauda 2013).

Week after transplanting (WAT), shows that there was Significant differences at $P < 0.05$ level of probability was observed among the planting methods with transplanting recorded the highest leaf area at week 2, 4, and 6 with the mean value of (107.41), when compared with direct planting methods with the mean value of (103.32), this is in agreement with the work of Akinyemi and Madina (2023), who stated that cultural practice and propagation method affects the vegetative and reproductive growth of plant.

Table 5: Interaction on organic manures and planting methods on some parameters of of *Telfairia* grown in Makurdi, Nigeria

Organic manure	Vine length	No. B	No. L	LA
Poultry	162.57	10.34	30.23	109.34
Cow dung	145.09	8.34	22.23	104.45
Control	104.23	5.12	17.01	99.34
F-LSD (0.05)	162.57	10.34	30.23	109.34
Planting methods				
Direct planting	115.09	9.34	18.23	100.45
Transplanting	105.23	10.12	25.01	109.34
F-LSD (0.05)	18.95	1.32	1.21	2.23

No. B= Number of branches, No. L= Number of leaves, LA= Leaf area, LSD= Least Significant Differences at 5% Level of Probability

This study investigated the interaction of organic manure types and planting methods on selected growth parameters of *Telfairia* grown in Makurdi, Nigeria. The experiment examined the effects of poultry manure, cow dung, and a control (no manure) in combination with direct planting and transplanting methods. Results indicated significant differences ($P < 0.05$) in vine length, number of branches (No. B), number of leaves (No. L), and leaf area (LA) due to organic manure application. Poultry manure significantly enhanced vine length (162.57 cm), number of branches (10.34), number of leaves (30.23), and leaf area (109.34) compared to cow dung and the control. Planting methods also significantly influenced growth parameters, with direct planting resulting in longer vines (115.09 cm) and more branches (9.34), while transplanting led to a higher number of leaves (25.01) and larger leaf area (109.34). This is a clear indication that planting methods effects and appropriate nutrient not only improve vegetative growth but also yield in terms of increasing the vine length, number of branches, leaves and leaf area Basu et al., (2004) lend support to this finding. These findings suggest that poultry manure and appropriate planting methods can significantly improve the growth performance of *Telfairia* in Makurdi, Nigeria, furthermore, cultural practice, planting methods couple with environmental changes and having the required quantity of nutrient can lead to a positive interaction as over all yield as reported by Oyiga (2010).

CONCLUSION

There was significant different ($P < 0.05$) on the vine length with poultry dropping having the highest value. Significant difference(P

< 0.05) was also observed with transplant having higher number of branches in all the weeks under consideration when compared with direct planting methods. On the other hand direct planting had the highest number of leaves when compared with transplanting method. There was significant difference ($P < 0.05$) with transplant having higher leaf area in all the weeks under consideration when compared with direct planting method.

RECOMMENDATION

Base on the study, it can therefore be recommended that for optimal growth and yield of (*Telfairia occidentalis*), farmers should adopt the use of poultry manure and transplant method of planting or the use of poultry manure and direct planting if leaves production is the main concern.

REFERENCES

1. Azam-Ali SN, Sesay A, Karikari SK, Massawe FJ, Anguilar-Manjarrez J, Bannayan M, Hampson KJ (2001). Assessing the potential of underutilised crop – A case study using Bambara groundnut. *Exp. Agric.*, 37: 433-472.
2. Basu, M.; Aoyama, C.; Fujiwara, K.; Watanabe, A.; Ohmori, H.; Uehara, Y.; Takano, M. (2004) Microbial mineralization of organic nitrogen into nitrate to allow the use of organic fertilizer in hydroponics. *Soil Sci. Plant Nutr.* 2004, 57, 190–203.
3. Bello, I.A. (2015). Proximate composition and functional properties of four cultivars of bambara groundnut (*Vigna subterranea*). *Plant-Foods-for-Human-Nutrition*. 53: 2, 153-
4. Dauda, S.N., Ajayi F.A. and Ndor (2008). Growth and yield of watermelon (*Citrullus lanatus*) as affected by poultry manure application. *Journal of agriculture and social sciences*, 4, 121-124
5. Idodo U. (2010). Bioaccumulation of the heavy metals in cassava tuber and plantain fruits grown in soils impacted with petroleum and non-petroleum activities. *Research journal of environmental science*. Pp 4 (1) 33-41
6. Igbozulike A.O. (2015). Mechanization of Ugu (*telfairia occidentalis*) production and postharvest operations, IOSR, *Journal of engineering*. Vol.05, pp31-35
7. Kumari A., Marya B.R and Raghwanishi R. (2014). Isolation and characterization of propagation and their effect on growth, yield and nutrient content in wheat (*Triticum aestivum* L. Biocatal. agric. Biotechnol. 3 121-128
8. Linnemann, C.M.; Khunjar, W.O.; Nguyen, V.; Tait, S.; Batstone, D.J. (1996) Technologies to recover nutrients from waste streams: A critical review. *Crit. Rev. Environ. Sci. Technol.* 1996, 45, 385–427
9. Madina, P. and Akinyemi, B. K. (2023) Effectiveness of solutions on soilless production of lettuce grown in Plateau and Makurdi, Nigeria. *Advances in Social Sciences and Management* November 2023, Vol-1, No-11, pp. 18-24
10. Madina P, Michael O. A. and Iyough, D. D (2023) Productivity of cabbage (*Brassica oleracea* L.) as affected by organic manure and varieties grown in Jos Plateau State, Nigeria. *Journal of Agricultural Science and Food Technology* Vol. 9 (1), pp. 1-5, January 2023
11. Malgorzata B. and Georgios K. (2008). Physiological response and yield of pepper plant (*capsicum annum* L.) to organic fertilizer. *Journal of central European* 9(4: 715-722.)
12. Ndor, E. and Dauda, N.S. (2013). Growth and performance fluted pumpkin (*telfairia occidentalis* hook. f) under organic and inorganic fertilizer on ultisols of north central Nigeria. *Global journal of plant ecophysiology*, 3, 7-11
13. Ndor E.D, Abimiku E.O, Azaguku, D.E. and Anazanku H. (2012). Effect of phosphorus fertilizer and spacing on growth, nodulation count and yield of cowpea. In southern guinea savannah agro ecological zone of Nigeria *Asian journal of agricultural science* 494:254-257
14. Nwanna, E.E. (2008) Anti-oxidation and hepatoprotective of (*telfairia occidentalis*) leaf fluted pumpkin. Thesis and dissertation. (Biochemical). 5(1) 440-449
15. Ogbole E.I (2012) light-absorbing product form during the aqueous phase reaction of phenolic compound in the presence of nitrate and nitrite with UV illumination *journal of air pollution* vol (1), no 2
16. Oyiga, B. C., Uguru, M. I. and Aruah, C. B. (2010). Pollen behavior and fertilization impairment in Bambara groundnut (*Vigna subterranea* (L.) Verdc.). *Journal of Agricultural Science*. 2(3):205-239.
17. Parthasarathy, Y. L., Heuvelink, J.S., Aleksandra S. and Dragana J. (2011) Challenges of using organic fertilizers in hydroponic production systems. In *Proceedings of the Symposium on Water, Eco-Efficiency and Transformation of Organic Waste in Horticultural Production*, Brisbane, Australia, 17–22 August 2014; Volume 1112, pp. 365–370
18. Qlaniyi J.O and Odedere M.P. (2009). The effect of mineral and compost fertilizers on the growth yield and nutritional values of fluted pumpkin (T^o) in south western Nigeria *journal of annual and plant science*
19. Radmila. P., Aleksandra S. and Dragana J. (2013). Assessment of soil and plant contamination by select. Heavy metals. *Polish journal of environmental studies*. Vol 22 pg 1465-1472
20. Scphipper R.R (2010). African indigenous vegetable an overview of the cultivated species. Revised edition on CORM. National resources international limit.
21. Singh, A.L., Basu, M.S., Chaudhari, V. and Patel C.B (2004). Phenological requirement of bambara groundnut (*Vigna subterranea* L. Verdc.) for its cultivation in Semi-arid region. In: *Proceeding of National Seminar on Plant Physiology* held from 27-29th Dec. at Department of Botany, University of Pune, India.
22. Singh, A.L., Basu, M.S., Chaudhari, V. and Patel C.B (2005). Fertilizer and seasonal requirement of bambara groundnut in India. In *Physiological approaches for crop stress management under different environmental conditions-issues and strategies*. *Proceeding of National Symposium* held from 5-7 March 2005 at. WTC, TNAU Coimbatore, India
23. Uboh F.E, Akpanabiat M. I, Edet E.E. and Okan I.E. (2011). Distribution of heavy metals in fluted pumpkin (*telfaria occidentalis*) leaves planted at different distances away from the traffic congested high ways. *Intentional journal of advanced biotechnology and research*. Vol 2. Pp 250-256

24. Udoh, E.J. (2005). Technical inefficiency in vegetable forms of humid region, an analysis of dry season planning by urban women in South-South zone Nigeria. *Journal of agriculture and social science* 1: 30-35