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Effect Of Organic and Inorganic Fertilizer on the Growth Performance of Fluted Pumpkin (*Telfairia occidentalis*) Hook Fil

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ABSTRACT
This study was conducted to compare the effects of NPK fertilizer and chicken dropping on the growth performance of fluted pumpkin (T. occidentalis) and hence determine fertilizer preference (inorganic and organic) for this crop. Complete Randomized Design (CRD) was used with three treatments (control, chicken litter and NPK fertilizer) with 12 replications each per treatment, giving a total of 36 replicates. Two weeks after planting (WAP), fertilizer (organic and inorganic) were uniformly applied at the rate of 40kg/hectare according to the design. The result obtained shows that the soil was rich in calcium, phosphorus and organic matter but low in nitrogen and potassium which were adequately complemented for the two fertilizers. It was also observed that chicken litter fertilizer produced the tallest plant (66.52cm), largest leaf area (17.80cm), number of leaves (30.23), largest stem diameter (3.91cm), largest leaf lengths (6.85cm), lowest primary (1.8cm) and lowest secondary (1.4cm) internode lengths. The use of organic fertilizer is therefore recommended for improved seedlings of T. occidentalis.
Keywords: *Morphology, growth, NPK, poultry dropping*

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INTRODUCTION

Telfairia occidentalis 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 south east Nigeria and was distributed by the Igbo's who have cultivated this crops species since time immemorial. It is however, equally possible that fluted pumpkin was originally wild throughout its range, but that wild plant have been harvested to local extinction and now are replaced by cultivated form [1]. Though endemic to south eastern Nigeria, *T. occidentalis* is of local enthnobotanical importance in the folktale dietary and cropping systems of Igbo's and their neighbors [2]. *T. occidentalis* has long been important in the internal food intake of Igbo's like other leaf vegetables, it is of low commercial value, but can in some cases provide an appreciable cash income to small scale farmer [3]. Its leaves, succulent shoot and kennels constitute the usual ingredient that is popular and regularly consumed in Igbo's soups. Soup made of vegetable are essential for consumption of starchy pastes of yam, cassava or cocoyam [4] which are frequently consumed in the humid areas of Nigeria [1]. Many good attributes account for the increasing importance of the chief vegetable among people in Nigeria. *T. occidentalis* is used traditionally by different ethnic groups in Nigeria which comprises Igbo, Efik, Ibibio, Urhobo, Ika, Aboh, Edo and Isoho which together number 30-35 million in Nigeria [4] it has different traditional names, among the Igbo's it is known as ugu, Iroko or aporoko in Yoruba, Ukong in Efik, in Urhobo and Umeke in Edo [5]. Production of *T. occidentalis* is predominantly done by poor resource based farmers. Although integrate soil fertility management (ISFM) advocates the combine use of organic and inorganic sources of fertilizer thereby exploiting the potential of positive interaction between both input but efficient use of this fertilizer by plants are often low, accompanied by the problem of unstable producer prices which eventually limits farmers interest in fertilizer use. Hence, to ensure the proper domestication, sustainable use and management of this species, efforts must be made to ascertain fertilizer preference to this crop with

reference to its efficient use by plant, low and stable producer prices and availability of this product to poor resource base local farmers.

MATERIALS AND METHODS

Five mature fruits of *T. occidentalis* were purchase from Watt Market Calabar, Chicken litter (organic fertilizer) was obtained from University of Calabar poultry farm while NPK fertilizer was purchased from Watt Market, Calabar. The experiment was conducted behind biological science block of the University of Calabar. Five kilogram of chicken litter was properly mixed with 15kg of garden soil and filled into twelve polythene bags while the other 24 bags were filled with only 20kg of the garden soil. Mature seeds of *T. occidentalis* was sun dried for 24 hours before sowing. Planting was done by sowing two seed of *T. occidentalis* per bag; this was thin to one stand per bag at germination. Two weeks after planting, the fertilizers were uniformly applied at the rate of 40kg/hectare according to the experimental design, by using the ring method of fertilizer application to avoid the direct contact of the root of the seedlings. The other 12 bags served as the control with no chicken litter or NPK fertilizer. A completely randomized design with three treatments (the control, chicken litter and NPK fertilizer), having 12 replications each per treatment, giving a total of 36 bags was adopted for the work.

Determination of soil nutrient

Humus soil samples collected at different sites of the fallowed land behind biological Science block, University of Calabar, were thoroughly mixed together and dried using standard procedures. Soil pH was determined in a 2:5 (w/v) soil water suspension, organic carbon by chronic acid digestion and spectrum other analysis , total nitrogen was determined from wet acid digest [6], exchangeable cations (calcium, magnesium and potassium) were extracted using the Melich-3 procedure [7] and determine by atomic absorption spectrophotometry. Available phosphorus was extracted by the Bray-1 procedure and analyzed using the molypedaic blue procedure described by Murphy and Ridly [8].

Data collection

Data was collected fourth-nightly for a period of eight weeks on plant height, leaf area, stem diameter, leaf length, primary and secondary internodes lengths, number of branches and number of leaves per plant.

Data analysis

Data obtained were subjected to analysis of variance (ANOVA) while the significant means were separated using least significant different (LSD) test.

RESULTS

Stem diameter

The smallest stem diameter at 4, 6 and 8 weeks after planting were obtained from those without fertilizer treatment (control) which were significantly different ($P<0.05$) from all the others. The highest stem diameter were obtained from soil treated with chicken litter (organic fertilizer at 4 weeks after planting and consequently recorded the best result at 6 and 8 weeks after planting as shown in table 2, 3, and 4) stem diameter ranged from 1.66cm to 3.91cm

Number of branches per plant

At 4 weeks after planting seedlings treated with inorganic (N.P.K 15:15:15) fertilizer as well as those without fertilizer (control) had the least number of branches which differed significantly ($P<0.05$) from all others treated with chicken litter (organic). The highest number of branches was obtained from groups treated with chicken litter (organic). At 6 and 8 weeks after planting, groups with no treatment application (control) had the least number of branches while those grown in chicken litter (organic) had the highest number of branches with mean ranged from 28.13 to 38.54 (Table 2, 3 and 4).

Primary internodes length

Group which had no treatment (control) produce largest primary internodes length while groups with chicken litter had the least primary internodes length in all the stages of growth. Primary internodes length ranged from 1.8cm to 3.14cm

Secondary internodes length

The least secondary internodes length were obtained in groups treated with chicken litter at all stages of growth examined (4, 6 and 8) weeks after planting. The highest value was obtained from groups without treatments (control). Secondary internodes length ranged from 1.42cm to 2.80cm.

Plant height

The tallest plants were from group treated with chicken litter while the shortest were those from groups without treatments (control). Plant height ranged from 43.34cm to 66.52cm (Table 2, 3 and 4)

Leaf length

The longest leaves were from groups treated with chicken litter while the shortest were from groups without treatment application (control) leaf length ranged from 4.30cm to 6.85cm (Table 2, 3, & 4).

Number of leaves per plant

At 4 weeks after planting, groups with NPK 15:15:15 (inorganic) fertilizer as well as those without fertilizer treatments had the least number of leaves per plant which differed significantly ($p<0.05$) from the other treatment group. The highest number leaves were from groups given chicken litter (organic) fertilizer. At 6 to 8 weeks after planting, groups with no fertilizer application (control) had the least number of leaves while groups with chicken litter (organic) fertilizer had the highest as shown (Table 2,3 & 4). Number of leaves ranged from 20.08 to 30.23

Leaf area

The result obtained showed that leaf area was affected significantly ($p<0.05$) at all stages of growth (4, 6 & 8 weeks) after planting . The largest leaf area in all cases was that of groups treated with chicken litter (organic) fertilizer. It had mean of 16.5cm, 17.12cm and 17.80cm at 4, 6 and 8 weeks respectively after planting. The smallest leaf area in all cases was that of group with no treatment (control it had mean of 14.21cm, 15.00cm at 4,6 & 8 WAP) respectively (Table 2, 3 and 4). Leaf area ranged 14.21cm to 17.80cm.

Table 1: Morphological parameter of *T. occidentalis* at 4WAP

Fertilizer type	Stem diameter (cm)	Number of branches	Primary internode length (cm)	Secondary internode length (cm)	Plant height (cm)	Leaf length (cm)	Number of leaves	Leaf area (cm^2)
Control	1.66±0.03	28.13±0.22	2.43±0.22	2.1±0.04	43.34±0.04	4.53±0.03	20.88±0.9	14.51±0.03
Chicken litter	2.93±0.03	31.30±0.44	1.8±0.03	1.4±0.04	51.38±0.46	5.94±0.03	25.36±0.41	16.56±0.03
NPK	1.08±0.02	29.00±0.29	2.00±0.08	1.9±0.04	48.58±0.019	4.95±0.02	22.45±0.49	15.34±0.03
LSD	1.12	1.11	1.34	1.03	1.36	1.01	1.13	1.20

Table 2: Morphological parameter of *T. occidentalis* at 6WAP

Fertilizer type	Stem diameter (cm)	Number of branches	Primary internode length (cm)	Secondary internode length (cm)	Plant height (cm)	Leaf length (cm)	Number of leaves	Leaf area (cm^2)
Control	2.12±0.02	31.12±2.02	2.92±0.03	2.5±0.02	49.34±0.37	4.91±0.02	22.66±0.26	15.00±0.02
Chicken Litter	3.56±0.02	35.44±0.44	2.0±0.02	1.4±0.02	6.38±0.19	6.34±0.04	28.92±0.87	17.12±0.04
NPK	2.68±0.02	33.00±0.35	2.34±0.02	2.2±0.02	53.40±0.09	5.30±0.03	25.30±0.49	16.34±0.03
LSD	1.13	1.15	1.41	1.06	1.43	1.10	1.23	1.30

Table 3: Morphological parameter of *T. occidentalis at* 8WAP

Fertilizer type	Stem diameter (cm)	Number of branches	Primary internode length (cm)	Secondary internode length (cm)	Plant height (cm)	Leaf length (cm)	Number of leaves	Leaf area (cm^2)
Control	2.51±0.02	34.12±0.02	3.14±0.02	2.80±0.02	53.44±0.25	5.12±0.02	25.76±0.25	15.34±0.02
Chicken litter	3.91±0.01	38.54±0.02	2.12±0.02	1.89±0.02	66.52±0.19	6.85±0.02	30.23±0.56	17.80±0.03
NPK	3.12±0.02	35.60±0.04	2.41±0.04	2.42±0.03	59.60±0.35	5.90±0.03	29.10±0.44	16.89±0.03
LSD	1.16	1.17	1.40	1.07	1.44	1.20	1.25	1.33

DISCUSSION

Fertilizer requirement of crops differ as much as such effort must be made to identify and select the appropriate fertilizer preference of any plant [4]. Result obtained in this study revealed that chicken litter (organic) fertilizer significantly ($p<0.05$) affected some important morphological traits of *T. occidentalis*. This result is in agreement with the finding of Aluko, [9], who reported that organic fertilizer (chicken litter) application increased stem diameter, leaf area, number of leaves, internode length, number of branches and leaf length of *Khaya ivrensis* seedling at nursery. The result obtained shows that groups treated with chicken litter performed better than those treated with NPK fertilizer. The study revealed that potassium and nitrogen components of the experimental soil which were low, were adequately complemented for by the two fertilizers. It is probable that this greatly enhanced the performance of these plants. This observation is in line with the finding of Hector [10] who reported that chicken litter and NPK fertilizer at 40kg/hectare enriched nitrogen, potassium, phosphorus and organic matter of the soil. the result shows that the biggest stem diameters were observed in groups treated with chicken litter. This may be due to the high mineral composition and organic matter in chicken litter fertilizer which stimulates growth, protein formation, rapid cell differentiation and division resulting to stem diameter increment [11].

The highest number of branches and leaves were observed from groups given chicken litter which comparatively performed better than group treated with NPK fertilizer. Groups with no fertilizer (control) had the least number of branches and leaves. It is probable that nitrogen and the presence of high mineral component in chicken litter (organic) fertilizer stimulate rapid leaf production and play

essential role in branching. Indeed, Hoque et al., [12] reported that the application of compost manure to seedling of *Carica papaya* significantly ($p<0.05$) increased the number of leaves and branches produced. It was also observed from the result that the least primary and secondary internodes were observed in groups treated with chicken litter fertilizer. Gbadamosi et al., [13] reported that seedling of shorea platy chados showed very low secondary and primary internode lengths when treated with chicken litter fertilizer.

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