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The Comparative Effects Of Organic Manure On The Vegetative Growth Of Fluted Pumpkin (Telfairia Occidentalis): Implication For School Farm Management

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Abstract
The study was to investigate the comparative effects of organic manure on the vegetative growth of Fluted Pumpkin (Telfairia occidentalis) and it's implication for School Farm Management. The treatments used for the study were 70 kg of poultry droppings, cow dung, goat dropping, pig dung respectively and zero application manure (control). The experimental design was a Randomized Complete Block Design replicated three times. The parameters measured were plant height, number of leaves, numbers of vines, stem girth, and leaf area. Mean (x) scores were used to analyse research questions. ANOVA was used to test the hypotheses formulated for the study. Fisher's least significant difference (F-LSD) test was used to compare the means (`X) at 0.05 level of significance. Application of poultry droppings (PD) had the highest significant ($P < 0.05$) effects of plant height on fluted pumpkin when compared with other treatments of Cattle dung, Goat droppings and Pig dung from 4 – 12 WAP. Application of poultry droppings and cattle dung significantly ($P < 0.05$) produced highest number of vines in most stages of the experiment (4 – 12 WAP) when compared to other treatments such as pig dung and zero application. Significantly ($P < 0.05$), application PD produced higher number of leaves when compared to other organic manure treatments at 4 and 5 WAP. However, PD and CD (cattle dung) significantly ($P < 0.05$) had the same effect on number of leaves of fluted pumpkin but significantly higher when compared with other organic treatments at 11 and 12 WAP. Application of PD and CD consistently produced significant ($P > 0.05$) higher stem girth on fluted pumpkin when compared with other organic treatments used for the study especially from 6 – 12 WAP. Poultry manure produced highest leaf area in all the stages of vegetative growth (4 – 12 WAP). However, application of PD, CD and GD at 12 WAP produced significantly ($P > 0.05$) the same leaf area but significantly higher than the production of pig manure and zero application of manure. The study recommended that Poultry and cow manure should be used for Telfairia occidentalis production in the tropical rainforest especially in growth and herbage improvements. The use of poultry or cow manure as source of nutrients to the soil will ensure quick returns when used to cultivate fluted pumpkin in school farms.

Keywords: *Comparative analysis, Telfairia occidentalis, types of Organic manure*

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I. Introduction

Fluted Pumpkin (Telfairia occidentalis), also commonly known as fluted guard, Pumpkin or Ugu is a popular West African delicacy (Awodun, 2007). The crop is probably originated in South East Nigeria and distributed by Igbos who has been cultivating it (Olaniyi & Oyerele, 2012). The tender vine and foliage are consumed as herbs while the seeds are consumed as nut. The leaves are used for the treatment of anemia and diabetes (Eseyin, Sattar & Rathore, 2014). It is propagated using the seeds; it is a creeping plant and grows well

if staked with bamboo sticks. The fruit of fluted Pumpkins have about ten deep ridges extending along their length. Accordingly, the plant is a drought tolerant dioeciously perennial that is usually grown trellised. Chido (2007) maintained that Fluted Pumpkin is a climbing plant; therefore, staking has to be done if high returns are to be achieved. Staking enables the crop to produce fruits that will not rot due to their contact with the soil. The young shoots and branches are harvested by cutting them with sharp knife throughout the year. Matured fruits are also cut off with a knife.

The young shoots and leaves of the plant are the main ingredients of a Nigerian soup "edikang - ikong", "ofe egwusi" (Chido, 2007).The leaves are rich source of protein, carbohydrate, vitamin A, potassium etc., which can also be used fresh as vegetables. The large (up to 5cm) dark red seed is rich in fat and protein and can be eaten whole, ground into powder for other kinds of soup, or made into a fermented porridge. Storage is temporarily done by keeping in the fridge. The fruits are boiled and the cotyledons eaten. Oil may be extracted from the cotyledon, when dried. Dried seeds may be kept for future use. Its seed is housed in another greater covering or hard shell which protects it from harm.

Similarly, Chido, (2007) reported that pumpkin is panacea to some protracted diseases. The importance of vegetables, especially Fluted Pumpkin cannot be over emphasized. FAO (2010) recommended an average intake of 200g of vegetable per day or 73kg per year in order to ensure an adequate body nutrient supply. Also, Mcdowell (2009) averred that it is a known fact that including vegetable in your diet is a great way to improve your health and as such, they should be ideally included in basically every health-related diet. Becoming familiar with the reasons why vegetables are good for you can be a great way to motivate yourself to make them an integral part of your diet. Vegetables contain varying portions of minerals like calcium, phosphorus, zinc, magnesium iron potassium etc as well as vitamins, carbohydrates and fiber. Similarly, vegetable contains 20.5g protein, 45g fat, 23g carbohydrates, 2.2g fibre and 4.8g total ash and the seed oil could be used for the preparation of margarine and pomade as well as for use as carrier for drugs (Osadebe, Echezona & Bakare, 2015).Apart from this, an important component contained in most vegetable is phytochecmicals, which have been cited as having extreme beneficial effects on human health (McDowell, 2009).

Furthermore, Olaniyi and Oyerele (2012) averred that Telfairia occidentalis, commonly called fluted pumpkin, is an important leaf and seed vegetable indigenous to Southern Nigeria and grown in the forest Zone of West and Central Africa (Nigeria, Ghana and Sierra Leone) being the major producers.

More so, Awodum, (2007) averred that fluted Pumpkin does well when there is sufficient moisture in the soil. A deep, well fertile soil, preferably loam, is best for the cultivation. However, Awodun (2007) particularly noted that, it is preferable to sow the seeds at the end of the rainy season, or at the beginning of the dry season, to avoid damages by the larvae of the melon fly.

According to Chludil, et al (2008) soil is one of the most important environmental factors with indispensable significance in plant physiology. Thus, maintaining soil quality is of great importance for crop growth and enhancing productivity. However, one of the problems of crop production in the tropics is that tropical soils have low fertility status. The soils are highly weathered and leached, low in organic matter and available nutrients, thus leading to low productivity within few years of cultivation (Soremi, Adetunji, Azeez, Adejuyigbe & Bodunde, 2017).

Furthermore, Eteng (2017) opined that low soil fertility is identified as a major factor militating against crop production in many tropical cropping systems where fertilizer used is low and agricultural residues are not returned to the soil for its rejuvenation. Similarly, because of the pressure on land use and the outdated practice of shifting cultivation, chemical fertilizers have been used over the years to boost crop production in the face of reduced fallow periods, but over time, they become less and less effective, and eventually leave the land impoverished and unproductive with some xenobiotic chemicals, and the soil also depleted of essential mineral nutrients (Ekop & Eddy, 2007). Applying inorganic fertilizer is one of the widely accepted ways of increasing soil nutrients both in the temperate and tropical zones of the world (Yusuf, et al. 2018).There is a limit to which inorganic fertilizer can sustain the productivity of intensely cultivated soil. This is because of the problem of decrease in yield with time, enhancement of soil acidity, leaching, losses and degradation of soil physical and organic matter status (Yusuf, et al (2018).

Furthermore, Awodun (2007) noted that the excessive use of fertilizers will affect the soil pH, because, some fertilizers leave acidic residues in the soil which will eventually lead to soil acidity, nutrient in-balance condition and lead to unavailability of certain nutrient Cat- ion that causes reduction in yield later. More so, the usual unavailability and difficulty of getting chemical fertilizers, a long side it's high price and potential polluting and corrosive ability, places organic manure as a best alternative above inorganic fertilizers. Similarly, the use of chemical fertilizers as key to maintaining soil fertility and yield in conventional arable system is becoming increasingly expensive, beyond farmers' financial capacity.

The use of organic manure according to Olaniyi and Ojetayo (2012) cannot be over emphasized because of its usefulness in the improvement of physical and biological conditions of soil which in turn improves the crop growing environment and culminates in the better production of economic plants. Apart from

the role of organic manure as a store house for plant nutrients it acts as a major contributor to cat ion exchange capacity and as a buffering agent against undesirable PH fluctuations. Organic based fertilizers are less leached into ground water than chemical fertilizers. The utilization of organic waste fertilizer has found favour in enhancing crop production in Nigeria, because it is inexpensive and less possible to pollute the ground water (Sridhar & Adeoye, 2003). It developed soil fertility status along with the increment of farmers' income through increase in yield. Organic waste provide a continuous decomposition substrate and consequent gradual input of soil organic matter, thereby increasing soil nutrients and improving the soil physical properties (Sridhar & Adeoye, 2003)

II. Objective(S) Of The Study

This study was carried out to investigate the comparative effects of different types of organic manure on the vegetative growth of fluted pumpkin in the school farm. The study was designed specifically to:

1) Determine the effects of different types of organic manure on the growth (height) of fluted pumpkin in cm
2) Examine the effects of the different types of organic manure on the vine number of fluted pumpkin through counting.
3) Ascertain the effects of different types of organic manure on leaf number of fluted pumpkin through counting.
4) Determine the effects of different types of organic manure on stem girth of fluted pumpkin using vanier caliper.
5) Examine the effects of different types of organic manure on leaf area of fluted pumpkin using the formula leaf area (la) = 0.9467+0.2475lw+0.9724lwn.

Research Questions

The study was guided by the following research questions:

1. What is the effect of different types of organic manure on the growth (height) of fluted pumpkin?
2. What is the effect of the different types of organic manure on the vine number of fluted pumpkin?
3. What is the effect of different types of organic manure on leaf number of fluted pumpkin?
4. What is the effect of different types of organic manure on stem girth of fluted pumpkin?
5. What is the effect of different types of organic manure on leaf area of fluted pumpkin?

Research Hypotheses

The following hypotheses was generated to guide the study and will be tested at 0.05 level of significance

HO1: There is no significant difference in the mean height of fluted pumpkin plant with respect to different types of organic manure applications.

HO2: There is no significant different in the mean vine number of fluted pumpkin plant with respect to different types of organic manure applications.

HO3: There is no significant difference in the mean leaf number of fluted pumpkin plant with respect to different types of organic manure applications.

HO4: There is no significant difference in the mean stem girth of fluted pumpkin plant with respect to different types of organic manure application.

HO5: There is no significant difference in the mean leaf areas of fluted pumpkin plant with respect to different types of organic manure application.

III. Methodology

Field preparation

An area of land measuring about 35m x 15m was mapped out using the measuring tape. The area was cleared and packed, while it was pegged out for digging. Five standard beds, replicated thrice measuring 7m x 0.8m x 0.2m was dug, using the spade. One bed was made to represent one of the treatments of cattle dung, pig dung, poultry droppings and goat droppings respectively, while the fifth bed was made to represent the control experiment (bed without treatment). Similarly, the organic manures that had been cured under shade for three weeks and thoroughly mixed was measured and applied uniformly to the plots by the use of spade and hand rake, one week before planting.

Table 1: Randomization of treatments within the blocks or replications

REP 1	REP 2	REP 3
Poultry droppings	Control	Cattle dung
Pig dung	Pig dung	Goat droppings
Control	Goat droppings	Cattle dung
Goat droppings	Cattle dung	Poultry droppings
Cattle dung	Poultry droppings	Control

Initial Soil Analysis Prior to Planting: Soil Samples was collected at a depth of 0-15cm before the start of the experiment. This was taken to Nigerian Institute for Oil Palm Research (NIFOR), Benin-City, Edo State, for analysis. The soil samples was air dried and grounded to pass through a 2mm sieve tube with another portion grounded to pass through 0.5mm sieve tube for organic matter and total nitrogen determination. The organic matter content of the soil was determined using the Walkley and black (1934) dichromate oxidation method. Total Nitrogen content was determined using micro-Kjeldahi Method. Available phosphorus was extracted using the Bray 'P' extracting solution and was determined using the Navaspec spectrophotometer. The exchangeable Cations was extracted with ammonium acetate. The exchangeable potassium was evaluated using flame photometer and calcium and magnesium EDTA titration.

Treatment/ Application: Five manure treatments were applied to pumpkin plant beds two weeks before planting. The various treatments that were used in this experiment are poultry droppings, cattle dung, goat dropping and pig dung application and zero treatment respectively. The quantity of each manure that was measure is 70kg/ bed and this was equally divided within the 7 stands per bed. The treatments that was applied to the soil are:

a. Zero Treatment
b. 70kg Pig dung
c. 70kg Cattle dung
d. 70kg Poultry dropping and
e. 70kg goat dropping

Planting date, distance and depth

The seeds of the plant that were used were obtained from National Institute for Horticultural Research (NIHORT) Ibadan. They were cured for three days to reduce moisture and prevent decay. Adopted spacing was1m x 1m distance within and between plants, on the seed beds. Seeds were sown on the 26th – 29th of September 2023. 3 seeds per hole were sown bringing the total of seeds sown to 315 for the three blocks. Depth per hole was between 3 - 5cm. The seeds were planted on beds raised to a height of 0.2m. Emergence was expected to occur after 10 days of planting. This was measured by mere observation. The percentage rate of emergence was expectedly 92%.

Cultural Practices

Thinning: This was carried out after two to three weeks of emergence, when the pumpkin seedlings have expectedly attained a height of 12- 14cm. It was done in the evening by carefully removing the weakest seedlings throbbing to survive from a stand to prevent overcrowding of the young seedlings and undue competition for nutrients, space, sunlight and water.

Weeding: Fluted pumpkin, like any other crops has the agronomic problem of weeds infestation. As a result, regular weeding was done on the farm so as to obtain a maximum yield. Cutlass and hoe were used on each occasion.

Routine Operations: All measurements were taken on a weekly basis. Measurement commenced after four weeks of emergence. Measurements were randomly done in all the stands.

Method of Data Collection

One group of data was collected for analysis. This includes data of stem and leaf growth analysis.

Collection of Growth Data

The parameters that were used for growth records are:

i. Plant height in CM
ii. Number of leaves through counting
iii. Number of vines through counting
iv. Stem girth, estimated by means of Vanier caliper
v. leaf area, estimated using the formula,

Leaf area (LA) = 0.9467 + 0.2475 LW + 0.9724 LWN

Where:

N= number of leaflets in a leaf
L = the length of the central leaflet
W=maximum width of the central leaflet. (Akoroda, 1993)

Method of Data Analysis

The research questions were answered using mean and standard deviation, while the hypotheses were

tested using Analysis of variance (ANOVA) at 0.05 % level of significance.

Data that were collected were analyzed using Genstat (3) Discovery edition package for statistical analysis. Separation of treatment means (`X) was carried out using Fisher's Least Significant Difference (F–LSD) procedure (Obi, 2002). Test of significance was done at 5% probability level.

IV. Results

1. Application of poultry droppings (PD) had the highest significant ($P < 0.05$) effect on plant height of fluted pumpkin when compared with other treatments from 4 – 12 weeks after planting (WAP)
2. Application of poultry droppings and cattle dungs was significantly ($P < 0.05$) produced highest number of vines of most stages of the experiment (4 – 12 WAP) when compared to treatments such as pig dung, goat dropping and zero application.
3. Significantly ($P < 0.05$), application of PD produced higher number of leaves when compared to other organic manure treatments at 4 and 5 WAP. However, PD and CD (cattle dung) finished significantly ($P < 0.05$) and had the highest and same effect on number of leaves of fluted pumpkin when compared with other organic treatments at 11 and 12 WAP.
4. Application of PD and CD consistently produced significant ($P < 0.05$) higher stem girth on fluted pumpkin when compared with other organic treatments that was used for the study especially from 6 – 12 WAP
5. Poultry manure produced highest leaf area in all the stages of vegetative growth (4 – 12 WAP). However, application of PD, CD and GD at 12 WAP produced significantly ($P > 0.05$) the same leaf area but significantly higher than the production of pig manure and zero application of manure.

V. Conclusion

Telfairia occidentalis is one of the most important leafy vegetables among Nigerian. Organic manure serves as a good source of soil amendments, for improvement of soil properties which in turn led to the improvement of growth of fluted pumpkin. It can be used for soil amendment when performing demonstration/teaching in school farms. From the findings, the study suggested that poultry manure was the best organic fertilizer for a good growth and herbage yield of fluted pumpkin as it constantly displayed dominance in improving vegetative parameters.

Therefore, it is recommended to be a good source of fertilizer for demonstrating fluted pumpkin production in school farms. Also, cow manure treatment produced close significant improvement of growth and herbage of fluted pumpkin when compared with poultry manure. Cow manure can be used as alternative source of organic fertilizer in school farms when poultry manure is not readily available.

The following recommendations are made based on the results:

Recommendations

1. Poultry manure is highly recommended for Telfairia occidentalis production in the tropical rainforest especially in growth and herbage improvements
2. The use of poultry or cow manure should discourage the use of inorganic fertilizers in school farms
3. The use of poultry or cow manure as source of organic fertilizer will ensure quick returns when used to cultivate fluted pumpkin in school farms

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