Global Journal of Agricultural Research
Vol.10, No.4, pp.16-22, 2022
Print ISSN: 2053-5805(Print),
Online ISSN: 2053-5813(Online)

The Effect of Palm Bunch Ash and Wood Ash on the Growth and Yield of Fluted Pumpkin (*Telfaria Occidentalis*)

Abana P.C.
Department of Agricultural Technology, Federal Polytechnic Nekede Owerri, Nigeria

Citation: Abana P.C. (2022) The Effect of Palm Bunch Ash and Wood Ash on the Growth and Yield of Fluted Pumpkin (*Telfaria Occidentalis*), *Global Journal of Agricultural Research*, Vol.10, No.4, pp.16-22

ABSTRACT: *This study was designed to investigate the effect of Palm Bunch and wood ash on the growth and yield performance of fluted pumpkin (Telfairia occidentalis). The Study was carried out at Federal Polytechnic Nekede, Student Research Farm. The Nekede soil is sandy loam textured, with pH value as low as 4.8 and very deficient in OM and N. Amelioration treatments were carried out by adding organic supplements (palm bunch ash and wood ash) to the soil. The study used a randomized complete block design with 10 t/ha palm bunch ash (PBA), 10 t/ha wood shave ash (WA), 5 t/ha PBA + 5 t/ha WA and a control (no additives added), making a total of four treatments. The treatments were replicated three times. The experimental works were undertaken in field plots. The growth parameters examined were: Plant height, leaf number and vine length and shoot/root ratio, fresh weight. Data collected were subjected to statistical analysis using least significant difference (LSD). Results of the studies showed that sole application of 10 t/ha PBA and 10 t/ha WA and halved their rates in combination, increased soil pH, N, OC, P, K, Ca and Mg in relation to the control treatment. Combination of palm bunch ash (PBA) and wood ash (WA) significantly enhanced yield in fluted pumpkin (Telfairia occidentalis). The study reveals that soil acidity could be neutralized; soil fertility improved and crop yield enhanced with a combination of organic amendments on the ultisols of south-eastern Nigeria.*

KEYWORDS: Palm Bunch Ash, wood shave ash, *Telfairia occidentalis*, nutrient use efficiency.

INTRODUCTION

Fluted pumpkin (*Telfaria occidentalis)* is a tropical vine grown in West Africa as a leafy vegetable and for its edible seeds. It belongs to the family *cucurbitacea.* Common names for the plant include fluted pumpkin, Ugu (in Igbo language and ikong-ubong in Efik and Ibibo language). (*Telfaria occidentalis)* is a member of the *cucurbitaceae* family and is indigenous to southern Nigeria (Akaroda, 1990). Telfaria is grown in many nations of West Africa, but is mainly cultivated in Igbo and Calabar land and it is used primarily in soups and herbal medicines (Aiyelaagbe *et al*

2002). Although the fruit is inedible (Akoroda 1990), the seeds produced by the Pumpkin are high in protein and fat and can therefore contribute to a well-balanced diet. The plant is a drought - tolerant, *dioecious perennial* that is usually grown all round. *(Telfaria* occidentalis) is traditionally used by an estimated 30-35 million indigenous people in Nigeria, including the Efik, Ibibio and Urhobo, (Nwufo, 1994). However, it is predominately used by the Igbo ethnic group, who continue to cultivate the Pumpkin for food source and traditional medicines. Wood ash is an excellent source of lime and potassium for vegetables that provides many of the trace elements that plants need to thrive (Adediran, 2003). The ashes of untreated hard and soft woods can be used as mulch or compost components. It has an alkalizing effect on overly acidic soils which is of great benefit to many ornamental and vegetable plants (Omoti *et al,* 1999). Oil palm (Elaeis guineensis), a dominant and important food and cash crop of south- east Nigeria generates a huge waste in form of palm bunch refuse during oil processing. Palm bunch refuse is the solid waste generated during the processing of oil palm fruits. Palm bunch refuse ash is obtained by burning the solid waste (palm bunch refuse (Awodun *et al,* 2007). Palm bunch refuse ash is an effective fertilizer and liming material for increasing soil fertility, pH and nutrient uptake because of its rich content in nitrogen, phosphorus, potassium, calcium and magnesium (Nwufo, 1994). According to Awodun *et al,* 2007, the effect of palm bunch ash on crops is due to the fact that it constitutes some vital mineral elements needed by plants for growth and development. The needs to use renewable forms of energy to reduce cost of fertilizing crops and the need to reduce high soil acidity have revived the use of organic fertilizer worldwide. The quantity of soil organic matters in the soil has been found to depend on the quantity of organic materials which can be introduced into the soil either by artificial application in the form of organic fertilizer. The benefit derivable from the use of organic materials have however not been fully utilized in humid tropics partly due to the huge quantities required in order to satisfy the nutritional needs of crops. This has encouraged scientists towards making use of organic materials (both organic manure as well as organic waste) for improving the physical properties of the soil that allows profitability of crop production. The main objectives of this study is to determine the effect of palm bunch ash and wood ash on the growth and yield of fluted pumpkin *(Telfaria occidentalis*) and to determine the effect of combination of palm bunch ash and wood ash on the growth and yield of fluted pumpkin (*Telfaria Occidentalis).*

MATERIALS AND METHODS

The experiment was carried out at the student research farm site of Federal Polytechnic Nekede with binominal rainfall pattern which is evenly distributed throughout the year. Initial soil samples were collected from site with auger drilled to 0.20cm depth and taken to the laboratory for physiochemical analysis prior to the land clearing.

The amelioration treatments were carried out by adding organic supplements at the rate of 2.0 kg/ ha. The experimental treatments used was palm bunch ash and wood ash which was as follows:
T_0 = Zero treatment (control)
T_1 = Palm bunch ash
T_2 = Wood ash
T_3 = Palm bunch ash + wood ash.

All other agronomic practices were observed accordingly during the period of experiment such as manually weeding the farm with hand and hoe and harvesting. Data was collected at two (2) weeks intervals that is 2, 4, 6 and 8 weeks after planting (WAP). On the following parameters, vine length, number of leaves, number of branches and fresh weight (kg). Data collection was taken on four randomly selected plants in each plot. The data collected was statistically analyzed using SPSS version 20 and means separated using LSD (Least Square Difference) Special package for social science.

RESULTS

Pre-planting soil samples showed that the soil pH was acidic at the experimental sites with pH of 4.24. The soil textural class was loamy sand. Total organic matter content of the soil was also low at the experimental sites and ranged from 7.56 to 10.45 g kg^{-1}. Organic carbon was 1.09 % and total nitrogen was low with recorded values as 0.086. Available Phosphorus determined with the Bray-II extract was low at the sites used for the planting (5.20 mg kg^{-1}). Since these organic fertilizer sources provide high levels of pH, K and Ca in comparison to the surrounding soil medium they therefore act as good liming agents. Awodun et al., (2007) had reported that wood ash treated soils were rich in mineral composition resulting to improved soil
fertility. Increase in soil pH and other nutrient element

Table 1: Soil properties at the study site, prior to commencement of the experiments in 2019.

SOIL PROPERTIES	VALUES
pH (H2O)	4.24
Total N (%)	0.086
P (g/kg)	5.20
OC (%)	1.09
Avail. K (Cmol/kg)	0.14
Ca (Cmol/kg)	1.22
Mg (Cmol/kg))	0.24

The effect of palm bunch ash and wood ash on vine length (cm) and number of leaves of fluted pumpkin is shown in Table 2. At 4WAP the highest length was recorded for T_3 PBA + WA, which gave (72.5 cm) followed by T_1 PBA (62.5 cm) followed by T_2 WA (60.0cm), the least result was obtained for the untreated control T_0 which produced (44.2cm). Similar result was also obtained at 8 WAP. Similar result was obtained for number of leaves of fluted pumpkin. The combination of PBA and WA produced significantly higher number of leaves at the different sampling times when compared with the control plots.

Table 2: Effect of palm bunch ash and wood ash on vine length (cm) and number of leaves of fluted pumpkin.

	Vine length		Number of leaves	
Treatments	4 WAP	8WAP	4WAP	8WAP
T_0 Control	44.2	93.0	11.42	28.0
T_1 Palm bunch	62.5	101.0	18.2	35.0
T_2 Wood Ash	60.0	98.4	17.5	32.5
PBA + WA	72.5	130.5	19.5	43.5
LSD (0.5)	1.22	8.2	3.3	11.2

The effect of palm bunch ash and wood shave ash on the fresh weight of *Telfaira occidentalis* after harvest is shown in Table 3. The result showed that at harvest, the highest fresh weight (kg) was recorded on plots that received palm bunch ash + wood ash which recorded 6.5kg, followed by the plot treated with only palm bunch ash which recorded (5.2kg), then by the plot, that received wood shave ash, T_2 which recorded 4.53kg. The least mean fresh weight (kg) was obtained from the plot that received no `treatment which recorded 2.1kg.

Table 3: Mean fresh weight (kg) of leaves of fluted pumpkin treated with palm bunch ash and wood ash after harvest.

Treatments	Fresh Weight(kg)
T_0 Control	2.1
T_1 Palm bunch	5.2
T_2 Wood Shave	4.3
T_3 Palm bunch + wood shave	6.5
LSD (0.5)	1.1

DISCUSSION

Preliminary analysis carried out before commencement of the studies showed that the study soils are highly acidic (pH 4.32), poor in nitrogen (0.086), organic carbon (1.09), potassium (0.14 Cmol/kg) and also phosphorus (5.2 g/kg). This agrees with, a report by Sobulo, (1997) which stated that most humid tropical soils of Southern east Nigeria, have phosphorus deficiency mostly due to high soil absorption capacity or fixation or both, and that when the soil level is below 20 kg P/ha, deficiency problem exists. Similarly, Sobulo and Osiname, (1981) stated that although most soils of southern Nigeria, are considered adequate in potassium level, when exchangeable K is less than 0.2 meg/100g it becomes problematic. This study reveals that the application of organic soil amendments of PBA and WA, either sole or in combination, increased soil concentration of C, N, P, K, Ca and Mg as well as increasing the soil pH. Application of the organic materials either as sole or reduced amount resulted in sustained vegetative growth of fluted pumpkin. The soil amendments were highly significant on all growth and yield parameters of *telfairia occidentalis*. This is in line with the assertion of Wormer et al., (2001) that plants differ in their response to changing soil fertility and environmental conditions. This was evident in terms of vine length, number of leaves and fresh leaves yield.

The significant increase in the growth yield attributes of *Telfairia occidentalis* in application of palm bunch ash and wood shavings ash confirmed the roles of organic manure in the promotion of vegetable growth and yield especially when applied two weeks prior to planting. The result is similar to the findings of Akanbi et al (2007), Olaniyi (2006) who reported separately an increase in performance of fruit vegetables. On their collaborated findings. Olaniyi and Ajibola (2007) reported significant increase in the yield and nutrient uptake of tomato with the application of organic manure comparable to control (no application). The application of palm bunch ash + wood shave ash had significant effect on Telfairia growth, yield and nutrient uptake possibly due to its ability to support plant growth for an extended period of time.

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