Journal of Agriculture and Food Science
Volume 3, Number 2, Oct. 2005 pp.93-100

ISSN 1597 - 1074

INFLUENCE OF DIFFERENT TYPES OF ORGANIC MANURE ON YIELD AND NUTRIENT CONTENT OF FLUTED PUMKIN (*TELFAIRIA OCCIDENTALIS HOOK F)*

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ABSTRACT

A study on the influence of different types of organic manure on yield and mineral composition of Telfairia occidentalis was carried out at the teaching and research farm of Imo State University, Owerri using each of 21.25 ton/ha of pigs slurry, cow dung and poultry manure. The experiment was laid out in completely randomised block design and treatments were replicated four times. The yield parameters used were number of leaves per plant, fresh weight of the leaves per plant, fruit yield and mineral content of the leaves. The control experiment had no organic manure treatment. Result shows that application of poultry manure increased fruit yield, the leaf yield and nitrogen content of the leaves significantly (p=0.05). Poultry manure gave the best result followed by pig slurry while plants without any treatment gave the least yield and mineral composition.

INTRODUCTION

Fluted pumpkin (*Telfairia occidentalis)* is a leafy vegetable crop, which belongs to the *cucurbitaceae* family and is a native of West Africa (Esiaba, 1982). The fluted pumpkin is no longer known in the world, but most likely originated in West Africa's high rainfall forest belt (Schippers, 2000). The largest diversity in plant population can currently be found in Imo State and surrounding areas in South-eastern Nigeria (Schippers, 2000). The crop is found throughout the western forest areas from Sierra Leone to Angola and up to Uganda in the east (Schippers, 2000). For the Igbos, it is the most popular leafy vegetable by far (Schippers, 2000). Outside Nigeria, where it is frequently eaten by up to 35million people and apart from West Cameroon. It is far less well known mainly for it's immature edible seeds rather than for its shoots and leaves (Schippers, 2000). It is one of the leafy vegetables that contains large quantity of essential food nutrients such as protein, minerals and vitamins especially when cultivated in a good fertile soil rich in nitrogen, potassium and phosphorous.

In Nigeria, arable soils get degraded easily in chemical, physical and biological qualities due to continuous cropping which leads to reduction in crop yield. Continuous cropping with constant use of inorganic fertilizer increases soil acidity and physical degradation, which is not applicable with organic manure. Organic manure is a substance used in soil amendment. This include animal and plant remains at various stages of decay. In forests, it comes from fallen leaves, dead tree trunks and dead forest animals (Mulongoy and Merckx, 1993). The most common domestic animals, which are sources of organic manure, are horses, cattle, goats, sheep, pigs, rabbits and birds. Organic manure consists of complex carbon containing compounds. Of the many carbon-containing compounds, the most important are

carbohydrates, lignins and soil microflora, which rapidly break them down to carbon dioxide and water (Plaster, 1992). Plaster (1992) further observed that lignins, which make up 10% - 30% of the plant tissue accounted for much of the soil humus. In many parts of the tropics, most annual crops respond well to application of organic manure. This is because adequate dressing of organic manure can sustain crop yield under continuous cultivation on most soils, unlike equivalent amounts of NPK fertilizer (Maynard, 1991). Maynard (1991) further stated that the yields of vine crops (except lettuce) fertilized with 50,000 kg/ha or 50t/ha poultry manure were equal to or greater than those obtained with equivalent inorganic fertilizers. Poultry manure at 25t/ha improved the yield of egg plants, pepper and tomatoes (Maynard, 1991). The superiority of poultry manure over other manures has been confirmed in many experiments (Cooke, 1982). Hussein (1997) also reported that organic manure ensures early maturity, uniformity in fruit ripening, increased fruit size and increased yield in tomatoes. Smith *et al.* (2001) stated that 4t/ha organic manure gave the best growth with respect to vine diameter and auxiliary shoot production in seedlings of Indian spinach and that with particular respect to leaves/plant and marketable leaf yield were obtained at 6t/ha of organic manure. Organic manure does not only enhance crop yield, it also has helped in checking soil erosion by improving the soil structure (Bonchee and Anecksamphant, 1993). Obi and Ebo (1995) stated that 10kg/ha of poultry droppings used in the amendment at a highly degraded utisols gave a maize yield of 2.82t/ha compared to 0.62t/ha in the unamended plot Ojeniyi *et al*, (2001) reported that wood ash treatment increased fresh leaf yield, seed weight, root length and root weight of Amaranthus. Bimala *et al.* (2000), evaluated the effect of different organic fertilizer on the lettuce growth and he found out that poultry manure out yielded the other organic fertilizers. He also stated that dry chicken manure is presently recommended as the most suitable organic nutrient source for organic food crop cultivation in Malaysia. Dennison (1961) observed that farmyard manure gave higher yields than equivalent amounts of N.P.K fertilizer in Long term continuous cropping. Thus, manure application in all cases increased soil organic carbon, organic nitrogen and exchangeable calcium thereby resulting in a significant pH increase (Djokoto and Stephen, 1961).

A recent study (Ano and Asumugba, 2002) has also shown a lower benefit cost ratio for chemical fertilizer compared with integrated use of chemical and organic fertilizers. Cattle, pig, rabbit and human dung provide a good deal of manure. Manure for birds is the richest of all livestock manures because of its high ancentration of nitrogen and small percentage of indigestible fibres as well as its richness in lime. Farm manure made by animals in most tropical countries are sometimes very poor because the animal diet are poor. Poor feed means poor excreta and hence poor manure (Cooke, 1982) Richness of manure depends also on the strength of the urine mixed with the litter.

Research carried out in Vom, Nigeria to compare the influence of application of 6.8ton/ha and 6.4ton/ha of cow dung and poultry manure respectively on yield of potato showed that

poultry manure is superior to cow dung as source of nutrient for potato production (Ifenkwei, 1986). Kogbe (1976) also obtained increased growth and yield in bush Okra (*Corchorus olitoris L*) treated with poultry manure. The objective of this study was to evaluate the effect of different types of animal manure on the yield and mineral composition of *Telfairia occidentalis*.

MATERIALS AND METHODS

A field experiment was carried out during the 2002 farming season at Teaching and Research Farm of Imo State University, Owerri (Latitude $5^0$27'N Longitude $7^0$02'E and 91m above see level). Land preparation consisted of clearing of existing bush and pulverizing the soil. The physico-chemical properties of the experimental site are shown in Table 1. Two beds, each measuring 1.5mx4m were made to constitute the experimental plot and the area of each plot was $12m^2$. The entire farm comprised 16 experimental plots laid out in a randomised complete block design in four replications. The total number of crops sown were 128 and 80 were used as the experimental plants, that is five plants were selected randomly from each plot and tagged. The treatment was made up of poultry manure, cow dung and pig slurry. The manure was incorporated inside the soil during the seed bed preparation at 25kg per plot (21.25ton/ha).

Table 1: Physico-chemical properties of experimental site

pH (water)	4.98
sand (%)	88.10
silt(%)	9.40
clay (%)	2.50
Na (mel/100g)	0.303
K (mel/100g)	0.118
Ca (mel/100g)	2.40
Mg (mel/100g)	2.00
ECEC (Mel/100g)	8.24
Exchangeable acidity (me/100g)	1.60
Available phosphorus (ppm)	20.20
Total Nitrogen (%)	0.07
Organic carbon (%)	1.10

ECEC – Effective Caution Exchange Capacity

The seeds of *Telfairia occidentalis* used were procured at Orji Local market of Owerri North L.G.A. Imo State. Eight seeds per plot were sown six days after manure incorporation at 1m x 1m spacing with planting depths of 8 – 12 cm at the rate of two seeds per hole. Weeding with hoe was done three times after planting with random hand pulling of weeds occasionally.

Germination percentage was determined sixteen days after planting. Determination of yield parameters started six weeks after sowing and we used five plants per plot. This was done by harvesting and weighing of the harvested leaves consistently on bi-weekly basis for three months. Also leaf samples were harvested for analysis 120 days after planting. Nitrogen was analysed using the micro kjeldahl digestion method and phosphorous was estimated using the molybdenum blue technique (Humphrey 1956). We also used Gallen kamp flame digital auto analyser to determine the quantity of potassium and magnesium. Counting and weighting the total number of fruits at maturity determined fruit yield.

The data we obtained were subjected to analysis of variance (ANOV) and the means were compared using the least significant difference (LSD) at p = 0.05.

$$\text{Germination \%} = \frac{\text{No germinated}}{\text{No planted}} \times \frac{100}{1}$$

RESULTS AND DISCUSSION

The germination percentage as affected by poultry manure, cow dung and pig slurry is shown in Table 2. The plants that were treated with poultry manure gave the best result followed by those treated with pig slurry whole the least germination percentage of 89.80% was obtained from plots without any organic manure application. We observed that the manure application did not however affect the germination percentage significantly.

Table 2: Effect of animal manure on germination percentage of *Telfairia occidentalis*

Animal manure source 21.25ton/ha	Germination percentage
Cow Dung	92.76
Poultry Manure	95.50
Pig slurry	90.00
No Treatment	89.80
LSD (0.05)	NS

The effect of application of different types of organic manure on leaf nutrients of *Telfairia occidentalis* is shown in Table 3. The nitrogen content of the leaves of plants treated with poultry manure was significantly higher than the nitrogen content from plants treated with other two organic manure at P = 0.05. Percentage nitrogen available in plants treated with crow dung was statistically equal to that produced by plants not treated with any organic manure. Also application of organic manure did not affect other nutrient contents such as phosphorus calcium and magnesium significantly.

Table 3: Effect of organic manure on leaf nutrients

Organic Manure Source 21.25ton.ha	%P	%N	%Ca	%Mg
Pig slurry	0.03	1.74	0.10	0.09
Poultry Manure	0.40	2.04	0.08	0.07
Low Dung	0.41	0.50	0.07	0.05
No Treatment	0.40	0.32	0.05	0.66
LSD	NS	0.20	NS	NS

NS = Not Significant

Data on fresh matter yield are given in Table 4. There was significant increase in number of fruits per hectare, fruits yield per hectare and fruit per plot with the application of organic manure at P=0.05. The highest pods per plant (2.3) were obtained from the plants treated with poultry manure while the least fruit per plot (1.2) was obtained from plants without any manure treatment. Also the highest number of fruits per hectare (1648) and fruit yield (14.83ton) was obtained from the poultry manure. This result agrees with the observation of Schippers (2000) that farmers are not likely to get more than 2000 – 2500 frits/ha when the crop is not grown for seed. The low fruits number per hectare in this study may be due to regular shoot harvest.

Number of leaves per plant was significantly increased by the application of organic manure (Table 4). The highest number of leaves per plant (120.3) was produced by plants with poultry manure application while the lowest number of leaves per plant was obtained from plants without any treatment. Also the leaf number obtained from poultry manure application was higher than that of cow dung application (63.6). This result agrees with Ifenkwei *et al.* (1986) that poultry manure was superior to cow dung as source of nutrient for potato production.

There was significantly a higher increase of the leaf fresh weight per plant (table 4). The highest leaf fresh weight per plant (501.6g) was obtained from plants that were treated with the poultry manure followed by those with application of pig slurry (409.04) while the plants without manure treatment gave the least result (199.5g). The result also shows that application of organic manure increased the yield of fluted pumpkin compared with the plants without organic manure treatment, with poultry manure giving better increases in yield of *Telfairia occidentalis* compared with other types of manure. Also treatment with pig slurry gave better yield than the application of cow dung. This increase in yield from plants grown in plots of land treated with pig slurry and poultry manure might be attributed to the fact that these soil amendments are rich organic manure which improve soil fertility and thus promote crop developments and yield. This superior quality may be due to the higher

nutrient content of the birds and pigs feed vis-à-vis grasses on which cow feed which have poor nutrient values.

Table 4: Effect of animal manure on leaf and fruit yield

Animal Manure source (21.25ton/ha	No. of Fruit/plot	Leaf fresh weight (g/plant)	No. of Leaves/ plant	No. of Fruit/ha	Fruit yield/ton
Cow Dung	1.5	275.2	63.6	1,401	12.60
Poultry manure	2.3	501.6	120.3	1,648	14.83
Pig slurry	1.9	409.04	95.2	1,596	14.36
No Treatment	1.2	199.5	35.04	1,287	11.60
LSD (0.05)	0.4	25.3	18.9	37	0.42

CONCLUSION

Our findings in this experiment revealed that, poultry manure is one of the most effective organic manure for *Telfairia occidentalis* production. Considering the abundance of animal droppings in our society this source of cheep organic fertilizer could be utilized for effective improvement in the production of fluted pumpkin, which is a good source of vitamins and mineral needed for a health development of the entire population.

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