Effect of increasing poultry manure rates on the yield and yield components of *Cucurbita maxima* in Owerri Ultisols, Imo State, Nigeria

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ABSTRACT: An experiment on the effect of increasing poultry manure rates on the yield and yield components of *Cucurbita maxima* in Owerri ultisols, Imo State was conducted at the teaching and research farm of the Federal University of Technology, Owerri. Results revealed that increasing rates of poultry manure increased flower and leaf production, fruit set, vine length, fruit development and yield of the pumpkin (*Cucurbita maxima*). The dry matter accumulation followed the same pattern and application of 20t ha^{-1} poultry manure performed better than all the other treatments in increasing the growth and yield of *Cucurbita maxima* indicating that vegetables require high manure content for high yield.

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KEY WORDS: Increasing poultry manure rates, *Cucurbita maxima* Owerri ultisols.

INTRODUCTION

Fruits and vegetables are very important food items in human daily nutrition for the supply of minerals and vitamins. They constitute a food class which could hardly be dispensed with, and are essential part of health foods, that forms the bulk of the dietitians' prescription (Ross, 1977). In southeastern Nigeria, the soils are mainly ultisols with low mineral reserve and hence low in fertility (Eshett, 1993).

Poultry manure is essential in crop production as exhibited by the local farmers who use it regularly on their farms. Ibeawuchi *et al.* (2006) recommended the use of poultry manure for vegetable crop production on degraded ultisols of Owerri southeastern Nigeria. Also Onweremadu *et al* (2003) recommended the use of dehydrated pig manure for the growth of maize on degraded ultisols of Owerri. All these points to the fact that the ultisols of Owerri require some forms of soil improvement for a sustained cultivation and food production especially vegetables that require large quantity and a variety of soil nutrient.

Many crop species respond well to the application of organic manure and it can sustain yield under continuous cropping on most soils unlike equivalent amount of NPK fertilizers (Maynard 1991). The potentials of organic matter and nutrient supply of the soil is particularly important in today's agriculture especially in our environment (Lal and Kang 1982). The high cost of chemical fertilizers scare farmers and these fertilizers are no longer as readily available and economically feasible.

Pumpkin (*Cucurbita maxima*) locally called "Ugboguru" is of the *Cucurbitaceae* family which is cultivated for its edible leaf, flesh and seed. The seed contains 50% oil and 30% crude protein, making it a potential source of commercial vegetable oil which may be used for cooking (Messian, 1992).

MATERIALS AND METHODS

This experiment was conducted in 2006 and repeated in 2007 cropping seasons at the teaching and research farm of the Federal University of Technology Owerri located on latitude $5^{0}28^{1}$ $46.45^{//}$ North and longitude $7^{0}02^{1}$ $38.35^{//}$, East (Hand held Global Positioning System Receiver) with an elevation of 55.3m above mean sea level. Soils of the area are ultisols, low in mineral reserve and in fertility (Eshett 1993). The soils are derived from coastal plain sands (Lekwa and Whiteside 1986) ad belong to the soil mapping unit number 431 i.e. Amakama – Orji – Oguta soil Association (FDALR, 1985).

The experiment

The site was cleared manually, and marked out using tapes, machetes, spades and pegs; and a randomized complete block design was used to lay out the experiment. Plots measured 1.2 x 5m, and in between each plot is a 1m gap, and 2m between each Block. There were 4 blocks replicated 3times. The manure rates include 0.0 t ha^{-1} (control), 5.0 t ha^{-1}, 10.0 t ha^{-1} and 20.0 t ha^{-1} respectively A single row planting was done with 2 seeds per hole at a spacing of 1.5m between each plant on the same plot and this was

thinned down to 1 plant per hill after germination. The soil was analyzed in the laboratory before and after the experiment. Total nitrogen was obtained using micro kjeldahl (Bremner and Mulvancy 1982).The exchangeable calcium, (Ca) magnesium (Mg) and potassium (K) were extracted by ammonium acetate at pH 8.0 (Chapman and Pratt, 1965). Calcium and Magnesium were measured using atomic absorption spectro-photometry. Soil pH was estimated electronically in a soil solution ratio of 1.2.5 (Hendershot et al 1993). Bray No. 2 method was used to extract available phosphorus (Olsen and Sommers 1982). The organic carbon was determined by wet digestion (Nelson and Sommers 1982) and the percentage organic matter content was calculated by multiplying percent carbon by a factor of 1. 724.
The following parameters were measured in the course of the experiment and data collected were subsequently analysed using analysis of variance (ANOVA) (Wahua 1999).

_ Vine length (m), Total dry matter yield (g), Leaf area (cm^2), Fruits yield (t ha$^-$)
_ Leaf yield (kg), Fresh root yield (g), Number of flower/plant, Dry root yield (g)
- Number of branches/plant; Number of fruit per plant.

RESULTS AND DISCUSSION

It is common knowledge that low soil nutrient does not promote high crop yield. This is evident in this experiment as reduced crop growth and yield were recorded in all the control plots while increasing levels of poultry manure showed increases in yield resulting in high yields at the end of the experiment (Table 1). Poultry manure increased the yield of the pumpkin vegetable crop and this is in line with recommendations of Ibeawuchi *et al* (2006). Also, poultry manure supplies the essential nutrients especially nitrogen which enhances and encourages vegetative growth. This agreed with Uguru (1981) who explained that poultry manure is a good source of nitrogen, phosphorus and potassium required for good crop growth and maximum production. Results revealed that the increasing poultry manure rates increased flower, production, fruit set, fruit development resulting in high yield (Table 1). The response of fruit weight to increased poultry manure rates confirmed that the higher the amount of poultry manure applied the higher the yield obtained and the greater the dry matter content (Tables 1 and 2).

Generally, fruit yield, leaf yield and leaf expansion and other yield and yield components increased in response to increasing rate of poultry manure application. The dry matter distribution followed the same pattern (Table 2).

Table I: Effect of poultry manure on the yield components of pumpkin (Cucurbita maxima) 8WAP

Poultry manure (tha^{-1})	Vine length (m)	Dry matter accumulation (g)	Leaf Area (cm^2)	Fruit yield (tha^{-1})	Fresh leaf yield (g)	No of flower	Fresh root wt (g)	Dry root wt (g)	N0 of branch per plant	N0 of fruit per plant
0.0	1.97	57.75	177.oo	9.o8	146.02	6.99	4.51	1.70	2.56	2.35
5.0	3.14	95.89	256.41	14.10	234.11	21.08	6.83	3.02	12.88	5.33
10.0	4.03	111.39	266.33	15.70	337.31	23.34	6.91	3.21	12.39	4.89
20.0	4.83	185.34	312.37	21.76	384.43	27.58	11.42	5.62	18.33	7.67
LSD (0.05)	0.92	71.64	50.01	4.29	133.68	8.38	3.53	1.41	4.29	1.85

Table 2: Mean dry matter distribution of pumpkin at maturity as affected by poultry manure rates.

Poultry manure t ha^{-1}	**leaves/plant** (g)	**Total Vine/plant** (g)	**Root/plant** (g)	**Whole plant** (g)
0.0	3599	20.06	1.70	57.75
5.0	4229	50.57	3002	95.88
10.0	59.45	56.72	3.21	111.38
20.0	111.33	68.39	5.62	185.34
LSD (0.05)	**43.39**	**26.84**	**1.41**	**71.64**

CONCLUSION

The experiment showed that increasing application of poultry manure to the soil improved the nutrient status of the soil which in turn enhanced the growth and yield of *Cucurbita maxima.* The application of 20.0 t ha^{-1} of poultry manure gave the highest growth rate and yield of the pumpkin. This experiment is adoptable by small scale / resource poor farmers who crop small land space and can source poultry manure locally to increase yields of their vegetable farms.

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