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Effect of pig dung on the vegetative growth of *Xanthosoma sagittifolium* (Cocoyam)

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Abstract
This study was carried out at Edo State College of Agriculture, Iguoriakhi for a period of thirteen weeks. A 10m x 10m plot was cleared and made bare. The plot was divided into two equal halves of 10m x 5m plots each by bamboo pegs, the two plots were the control plot and the treatment plot. The topsoil of the treatment plot was removed to depth of 50cm. 60kg of pig dung was poured into the dug pit and covered with the sand removed and watered to quicken decomposition. After, five replicate plots of 50cm x 50cm plots were randomly located within the treated plots. In the same vein, 5 replicate plots of 50cm x 50cm were randomly located with the 5m x 10m control plot. Ten sets of cocoyam were planted, one on each of the replicate plots of control and treatment plot. Two weeks after planting, records of growth were taken. At the control plots on the 13th week, the following records were taken: 61:50 ± 24.71cm (height), 19.600 ± 4.65 leaves and 7.50 ± 2.00 branches. The treatment plots at the 13th week recorded 84.20 ± 31.96cm (height), 26.40 ± 13.43 leaves and 15.50 ± 5.10 branches. The growth rate of plants in the treatment plot with pig dung was higher than that of the control, this could have been due to the decomposition of the pig dung to form manure necessary for plant growth.

***Keywords:** Pig Dung, Vegetative Growth, Cocoyam*

Introduction

Climate and soil are the main environmental factors that determine crop yields (Udoh *et al,* 2006). Soils are very important natural resource. They are media for establishment of growth of shrubs and garden. (Esau, 2004). Soil characterization provides the information for our understanding of the physical, chemical, mineralogical and microbiological properties of soil. Each soil, based on its characteristics has a predictable response to management or any kind of manipulation (Ogunkule, 2004). A sustainable land management system is the one that does not degrade the soil or significantly contaminate the environment while providing necessary support to human life (Greenland, 2007).

Amendment of soil fertility is therefore considered an important component of interventions that has been proposed for increasing crop production. Efforts to increase crop productivity on smallholder farms must, therefore, be consistent with the reality of low use in organic fertilizers (Gachengo, 2001). The breakdown and alteration of animal remains and faecal materials by micro-organisms and the concurrent synthesis of new, more stable, organic compounds results in the formation of the dark colours colloidal organic materials called humus and this promotes the growth in the plant One of the most significant contribution of soil microbes to higher plants is that of animal residue decomposition. By this process, animal dung and even dead animals are broken down, converting

organically held nutrients into mineral forms available for renewed plant uptake and this is beneficial for plant growth and development (Griffiths, 2000).

Animals excrete large portions of the nutrient elements consumed by them in the feeds. Where animals like pig, cows, and crop production are integrated on a farm, it is not too difficult to handle manure. The use of pasture can be maximized so that animals themselves spread much of the manure while grazing (Stevenson 2002). The manure from confined animals is small enough quantities to be hauled daily to the fields or be stored under cover during the periods when soil conditions are not favourable for spreading manure.

Soil organisms also assimilate waste from animals (including human sewage, faecal materials of other mammals e.g pig, goat, cows etc.) and other organic materials added to the soils.

Cocoyam (*Xanthosoma sagittifolium*) is a root tuber crop and it plays several roles in the economy of sub-sahaan Africa. As food crop, they are a major source of carbohydrate. They provide raw materials for agro-based industries and also constitute principal sources of income for producing households. The development of animal enterprises produces a large amount of waste, which becomes potential environmental hazard. Hence, there is a renewed interest in proper and effective use of organic manure to maintain soil fertility. Aside from being source of plant nutrients organic wastes such as those of poultry (Agbede and Ojeniyi, 2009) increase the population of soil micro organics which have some influence in protecting plants against pathogens like nematodes and soil borne insects and also provides plant growth hormones like auxins

The physical properties of soil are also improved (Odiete, 2000). The application of organic manure has been found to have higher comparative economic advantage over the use of inorganic fertilizer (Ojeniyi, 2008). Research had it that in Southern Nigeria, returns per hectare were higher in organic farms though outputs were slightly less than in inorganic farm. Pig dung is available in appreciable quantity. But its use as source of crop nutrients has not received adequate research attention. Giwa and Ojeniyi, (2004) investigated effect of Pig manure and its integrated effect for application with NPK fertilizer on soil chemical properties and yield of tomato at Abeokuta, South West Nigeria. Adediran, (2003) opined the evaluation of the influence of compost, inorganic fertilizer and their combinations in Ibadan and Ilora, that application of fertilizers increased maize and cowpea grain yields and also improved nutrients element concentrations in maize leaf tissue. The aim of this project was to investigate the effect of pig dung on the vegetative growth of cocoyam (*Xanthosoma sagittifolium*).

Materials and Method

Geographical Location of Project Site

The experimental site is located at Edo State College of Agriculture, Iguoriakhi which is located at Ovia South West Area of Edo State. It is a rain forest ecosystem. Iguoriakhi is bounded to the South by Iguobazuwa and to the North by Ovia North East Local Government Area of Edo State.

Experimental Design of Project

A 10m x 10m plot was marked, cleared and made completely bare. The 10m x 10m plot was divided into two equal plots by bamboo pegs fastened to the soil. Five replicated plots of 50cm x 50cm were randomly located in the control plot I.

Plot II (treatment plot) 5m x 5m was dug up to a depth of 50cm and the earth was removed and put away. Hugh quantity of pig dung(50kg) collected from the dumpsite of the pig dung of the college was collected. The pig dung was poured and spread uniformly across the length and breadth of the entire 5m x 5m

plot. The plot was left open for one week before it was covered with earth. Five replicate plots of 50cm x 50cm were then randomly located with the 5m x 5m pig dung treated plot.

Ten sets of cocoyam were collected and one set per replicate plot of control and treatment was planted. One set of cocoyam was planted per replicate plot of control and treatment). The control replicate plots were not treated with the dung.

Parameters taken at the Replicate Plots of Control and Treatment

Two weeks after planting of cocoyam at control and treatment plots, parameters of growth was taken with respect to plant height, leaf count and branching. Readings were taken at weekly intervals for 13 weeks.

Result and Discussion

The results obtain from the experiment on the effect of pig dung on the vegetative growth of cocoyam are presented in Tables 1.

Table 1: Effect of pig dung on plant height of cocoyam (cm)

Weeks after planting	Control plot	Treatment plots
1	2.30 ± 1.27	2.20 ± 0.91
2	3. 50 ± 1.88	4.60 ± 1.22
3	6.80 ± 2.46	8.10 ± 3.15
4	10.40± 4.10	14.30 ± 3.92
5	16.20 ± 5.38	20.50 ± 4.98
6	20.50 ± 5.99	28.70 ± 7.66
7	26.90 ± 7.43	35.20± 12.17
8	32.60 ± 9.21	47.80 ± 19.18
9	40.70 ± 15.36	54.40 ± 24.38
10	47.30 ± 13.13	61.00 ± 20.81
11	53.10 ± 20.87	70.30 ± 27.92
12	61.50 ± 24.71	84.20 ± 31.96

From table 1, growth in the control plot increased steadily from 2.30 ± 1.27cm in the first week to 61.50 ± 24.71cm in the 13th week. The growth rate in the treatment plot was far higher than that of the control. At the 13th week, the cocoyam in the treatment plot recorded 84.20 ± 31.96cm. This would have been due to the decomposition of the pig dung in the soil to form manure. This observation is in agreement with (Stotzky, 2000) that the breakdown and alteration of animal remain and faecal materials by micro organisms and the concurrent synthesis of new more stable, organic compounds result in the formation of dark colours colloidal organic materials called humus, and that this promotes the growth of plant.

Table 2: Effect of pig dung on leaf count of cocoyam

Weeks after planting	Control plot	Treatment plots
1	1.00 ± 0.10	1.00 ± 0.10
2	1.00 ± 0.10	1.60 ± 0.47
3	4. 20 ± 0.94	3.50 ± 0.99
4	4. 80 ± 1.11	6.80 ± 2.27
5	6.50± 1.86	10.40 ± 4.10
6	8.10 ± 2.41	12.30 ± 4.65
7	12.80 ± 3.00	13.60± 5.11
8	12.80 ± 3.00	15.10 ± 4.97
9	12.80 ± 3.00	18.70 ± 8.83
10	15.20 ± 3.87	20.60 ± 6.26
11	17.40 ± 4.21	24.80 ± 9.72
12	19.60 ± 4.65	26.40 13.43

In table 2, the leaf count in the control plots increased from 1.00 ±0.10 leaves in the first week to 26.40 ± 13. 43 leaves in the 13th week. The shooting out of more leaflets from one set of cocoyam at the treated plots was more in the treatment plot than that of the control. The growth rate in terms of leaf count for the treatment plots was higher because of the decomposition of the pig dung to form manure needed for plant growth. This observation is in agreement with (Griffiths, 2000) that in animal residue decomposition, dung and even dead animals are broken down, converting organically held nutrients into mineral forms available for renewed plant uptake, and this is beneficial for plant growth and development.

Table 3: Effect of Pig dung in the soil on the branch number of cocoyam

Weeks after planting	Control plot	Treatment plots
1	0	0
2	0	0
3	0	0
4	0	2.30 ± 0.20
5	0	2.30 ± 0.20
6	0	4.50± 0.79
7	2.00 ± 0.15	4.50± 0.79
8	2.00 ± 0.15	7.90 ± 1.27
9	2.00 ± 0.15	10.20 ± 2.80
10	4.60 ± 0.87	13.60 ± 3.34
11	5.40 ± 1.62	15.50 ±5.10
12	7.50 ± 2.00	15.50 ±5.10

In table 3, the branch number at the 13th week for the treatment plot was higher than that of the control plot. More leaves shot-out from the cocoyam in the treatment plot than that of the control. This could also be due to the decomposition of the pig dung to form manure

necessary for plant growth. This observation is in agreement with (Odiete, 2000) that the physical properties of the soil are also improved on application of such treatment as dung.

Conclusion and Recommendations

The effect of pig dung on the vegetative growth of cocoyam for 13 weeks shown that pig dung decomposition in the soil improve the soil quality, thereby improving the fertility of the soil. Rate of growth with respect to plant height, leaf count and branch number showed that the cocoyam planted in the pig dung treated plots experienced higher growth as compared to the untreated plots.

The following recommendations are made

a. The application of animal dung as soil ameliorant is necessary for plant growth and should be encouraged by farmers particularly local farmers.
b. The use of organic manure such as pig dung is recommended to improve the productivity of the degraded soils. Farmers are at the same time encouraged to leave crop residues on their farms and incorporate same during tillage rather than burning them.
c. Programme for monitoring the fertility status of the soils at regular intervals should be entrenched into our system.

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