

Response of Ginger (*Zinibar officinale*) to Organic and Inorganic Fertilizer in Rain Forest Zone

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ABSTRACT

This research was carried out in school of Agriculture Teaching Farm in Delta State Polytechnic Ozoro in the year 2013. Due to the fact that gingers are not commonly cultivated in southern Nigeria, the need to evaluate the response of ginger to the application of organic and inorganic fertilizer becomes necessary. Fifty-four (54) rhizomes of ginger collected from the local market were planted in Randomized Complete Block Design replicated three times. Eighteen (18) were treated with organic fertilizer, another eighteen (18) were treated with inorganic fertilizer while the remaining eighteen served as control. Parameters measured are number of leaves, plant height and leaf area. Data collected were subjected to analysis of variance. The result shows that ginger treated with organic manure had more number of leaves of 5.8, 7.6, 14.7 and 26.1 as against 5.9, 5.4, 12.2, 21.9, 1.3, 1.5, 1.5 and 12.0 for inorganic fertilizer and control respectively. Table 3 also shows that ginger treated with organic manure had better plant height of 11.5, 16.0, 23.8 and 46.4 as against 10.5, 15.0, 21.7 and 44.8 for ginger treated with inorganic fertilizer. For the leaf area, it also followed the same trend of ginger treated with organic manure having better leaf area of 149, 167 and 172 as against 154, 182 and 195 for those ginger treated with inorganic fertilizer. However, there was significant difference between the performance of ginger treated with organic manure and those treated with inorganic manure in terms of number of leaves, plant height and leaf area at ($P>0.05$). Hence, treating ginger with organic manure is recommended for ginger farmer so as to boost yield.

Keywords: Organic, Inorganic, Fertilizer, Ginger, Plant Height, Number of Leaves.

Introduction

Ginger scientifically known as (*Zingibar officinale*) belongs to the family *Zingibraceae* and it originated from tropical jungles in Southern Asia (Tindal, 1983). The major producers of ginger today are Asia, Brazil, Jamaica and Nigeria (Philips and Hutchinson, 1983). The part of ginger we use is not the root but it is the rhizomes. Ginger is an herb but it is often classified as a spice, with

a strong distinct flavour that can increase the production of saliva. In western countries it is a popular recipe used as ginger snaps, ginger bread, ginger biscuit and ginger cakes. It is also used in many countries as a medicinal ingredient which many believe in. Some says it can help to cure diabetes, headache, cold, fatigues, nausea and flu when used in tea or food (Lumb, 1993). Ginger helps to protect and heal the gut, reduce inflammation and help destroy a host of viruses (Holtman *et al.*, 1989). Other benefits of ginger are that it promotes digestion, stimulates appetite, improves blood circulation, lower blood glucose, reduces fever and it is also used for the treatment of cancer (Grant and Lutz, 2000).

Despite the various functions, this crop performs or contributes to the well being (health) of man. Much attention has not been given by the researcher. Ginger is not commonly cultivated in this part of the country, the need to evaluate the response of ginger to organic and inorganic fertilizer (NPK) in rainforest zone.

Soil productivity maintenance is a major constraint of tropical agriculture. Tropical soils are adversely affected by suboptimal soil fertility and erosion causing deterioration of the nutrient status and changes in soil organism population (Economic Commission for Africa, 2001). Use of inorganic fertilizer can improve crop yield and soil pH, total nutrient content, nutrient availability, but its use is limited due to scarcity, high cost, nutrient imbalance and soil acidity. Use of organic manure as a means of maintaining and increasing soil fertility has been advocated. (Rodale, 1984, Alasiri and Ogunlele, 1999, Smil, 2000). Animal manure when efficiently used, ensure sustainable crop productivity by immobilizing nutrient that are susceptible to leaching. Nutrients containing manure are released more slowly and are stored for a longer time in the soil ensuring longer residual effects, improved root development and higher crop yield (Sharma and Mitta, 1991, Abou Elmagd *et al.*, 2005). Manure are applied at higher rates to give residual effects on the growth and yield of succeeding crops (Makinde and Ayoola, 2008).

Materials and Methods

This research was carried out in the school of Agricultural Teaching Farm in Delta State Polytechnic Ozoro in Isoko North Local Government Area of Delta State which is located between latitude 6⁰30N and 5⁰45E and longitude 6⁰13E.

The mean annual rainfall is between 250cm and 300mm and the mean annual temperature ranges from 28⁰C and 30⁰C with swampy/derived vegetation. The climate condition is humid (Ofunne, 1993).

A plot of land measuring 10m² was cleared and stumped. The rhizomes of ginger collected from the local market were planted into randomized complete block design at a planting depth of 5cm which was replicated three times. A total of fifty four (54) rhizomes of ginger were planted. Eighteen (18) were treated with organic fertilizer (poultry dropping), another eighteen (18) treated with inorganic fertilizer (N.P.K, 15 - 15 - 15) while the remaining eighteen served as control. The growth parameters that were measured are number of leaves, plant height, number of tuber at harvest and leaf area. Data were collected at interval of one week. Data collected were subjected to analysis of variance (ANOVA).

Results and Discussions

Table 1 shows the physical chemical properties of the soil of the inception of the experiment. It shows that sand led 47%, SiH 14% clay 39%, texture was sandy clay soil bulk density was 1.12g/cm³. Infiltration rate was 1.9cm/sec, soil pit was S.g, organic matter - 1.96, nitrogen 6.17, exchangeable cation was mg/100g, Na 1.30, K 50, Ca - 0.65, Mg 0.55 H - 1.46 and A - 0.15.

Table 2 revealed the number of leaves of ginger at 4 - 7 week after planting. It show that ginger treated with organic manure had more leaves of S.s, 7.6, 14.7 and 26.1 as against 5.9, 5.4, 12.2, 21.9, 1.3, 1.5, 1.5 and 12.0 for inorganic fertilizer and control respectively.

Table 3 shows the plant height of ginger at 4 - 7 weeks after planting. The results shows that ginger treated with organic manure had better plant height of 11.5, 16.0, 23.8 and 46.4 as against 10.5, 15.0, 21.7, 44.8, 3.7, 7.8, 11.4 and 22.8 for both inorganic fertilizer treatment and control. Table 4 revealed the mean leaf area of ginger at 8 - 12 week after planting. It shows that ginger treated with organic fertilizer had superior leaf area of 149, 167, and 172 as against 154, 182, 193, 76, 35 and 45 for ginger treated with organic fertilizer and control respectively.

Table 1: Physical-Chemical Properties of the Soil at Inception of the Experiment

Soil Properties	Value
Sand %	47
Silt %	14
Clay %	39
Texture	Sandy clay
Soil bulk density g/cm ³	1.12
Infiltration rate cm ³ /sec	1.9
Soil pH	5.9
Organic matter %	1.96
Total nitrogen %	6.17
Available ppm	6.6
Exchangeable cation	Meg/100g soil
Na	1.30
K	0.50
Ca	0.65
Mg	0.55
H	1.46
AL	0.15

Table 2: Mean Number of Leaves of Ginger 4 - 7 Weeks After Planting

Trt	4	5	6	7
Organic	5.8	7.6	14.7	26.1
Inorganic	5.9	5.4	12.2	21.9
Control	1.3	1.5	1.5	12.0
Fcal	9.1	9.4	6.1	2.3

Table 3: Mean Plant Height of Ginger at 1 - 4 Weeks After Planting

Trt	4	5	6	7
Organic	11.5	16.0	23.8	46.4
Inorganic	10.5	15.0	21.7	44.8
Control	3.7	7.8	11.4	22.18
Fcal	12.4	36.5	7.5	74.6

Table 4: Mean Leaf Area of Ginger of 8 - 12 Weeks After Planting

Trt	8	10	12
Organic	149	167	172
Inorganic	154	182	193
Control	26	35	47
Fcal	107.7	109.2	111.1

Discussions

Table 1 revealed the amount of nutrient available in the soil before the inception of the experiment. Table 2 shows that ginger treated with organic manure had more number of leaves. This report agreed with (Rodale, 1984,

Alasiri and Ogunleye, 1999) who stated that nutrient contained in manures are more released and stored for effective root development and higher crop yield. The table 3 revealed the mean plant height of ginger and it shows that ginger treated with organic manure had better plant height. This finding agreed with (Susnauda, 2000) who stated that ginger is a heavy feeder of nutrient therefore needed proper application of organic manure to ensure proper yield. Table 4 shows the mean leaf area of ginger. It also revealed that ginger treated with organic manure had superior leaf area. This also agreed with Sharma and Mitta, 1991, Abau El magd *et al.*, (2005) who reported that animal manure when efficiently used, ensures sustainable crop productivity by immobilizing nutrient that are susceptible to leaching. Manures are released more slowly and are stored for a longer time in the soil improved root development and higher crop yield.

Summary Conclusion and Recommendation

Summary

This research was carried out in school of Agriculture Teaching Farm in Delta State Polytechnic, Ozoro in the year 2013. Forty four rhizomes of ginger collected from the local market were planted into randomized complete Block Design replicated three times. Eighteen stands were treated with organic manure, another eighteen with inorganic fertilizer (NPK 15-15-15) while the remaining eighteen served as control. Growth parameter measured were number of leaves, plant height and leaf area. Data were collected at the interval of one week and were later subjected to analysis of variance (ANOVA).

The research shows that ginger treated with organic manure performed better in terms of number of leaves, plant height and leaf area. However, there was significant difference between ginger treated with organic manure and those treated with inorganic fertilizer at ($P > 0.05$).

Conclusion

The result revealed that ginger treated with organic manure performed better than those treated with inorganic fertilizer in terms of number of leaves, plant height and leaf area.

Recommendation

Since there was significant difference between ginger treated with organic manure and inorganic fertilizer, it is therefore recommended that ginger farmers should treat ginger with organic manure so as to boost yield.

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