Original Scientific Paper
DOI: 10.7251/AGRENG1601190F
UDC 582.583:631.86(669)

INFLUENCE OF PROPAGULE SIZE AND ORGANIC MANURE ON THE GROWTH AND YIELD OF GINGER (*Zingiber officinalis*).

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ABSTRACT

Ginger is grown majorly in the derived savannah of Nigeria for its potential health benefits, this health related usefulness of ginger have also stimulated farmers concern for the growing of the plant having realized its efficacy in life changing ailments as a result of this the availability of the propagule for planting became so scarce and not within the reach of farmers. Its cultivation has recently been introduced to the South western Nigeria. A field trial was carried out at the National Horticultural Research Institute, Ibadan (Nigeria) to study the influence of propagule size and organic manure on the vegetative growth and rhizome yield of ginger in the rainy season of 2008. Propagule size had significant effect on plant height and number of tillers. 10g propagule size of 28.2 was highest while the organic manure control was the least for all the vegetative parameters considered. As the rate of organic manure increases, there was an increase in all the vegetative parameters reaching its peak at 15t/ha and decreased again at 20t/ha. The interaction between the propagule size and organic manure was significant for the number of rhizomes, number of tillers and the yield. 10g propagule size and 15t/ha organic manure produced optimum growth and yield of ginger.

Keywords: *planting material, size, propagation, organic manure.*

INTRODUCTION

Ginger is the rhizome of *Zingiber officinale* Rosc. a herbaceous perennial belonging to the family Zingiberaceae. India is the largest producer and exporter of dry ginger in the world, contributing about 30 per cent of the world's production.
Although the country of origin is not known with certainty, it is presumed to be either India or China. The other ginger producing countries are Jamaica, Sierra Leone, Nigeria, Southern China, Japan, Taiwan and Australia. It is grown in many countries of the tropics and subtropics and is used widely in food, beverages, confectionery and medicines (Egbuchua*et al.* 2013).

The mature roots of ginger are fibrous and the juice from old ginger roots is extremely potent and often used as spices and a quintessential ingredient of Chinese, Korea, Japanese and many South Asian cuisines for flavouring dishes (Jakes, 2007). It is also used largely as recipes such as ginger bread, cookies, crackers, cakes, ginger-ale and ginger beer (Asumugha *et al*., 2006; Jakes, 2007). The medicinal values of these great ancient spices are widely recognized across the continents to contain a number of unique organic phytochemical ingredients that can take care of some human ailments. Recent studies on health related effects of ginger which have also stimulated farmers concern on the growth of the plant have shown the efficacy of the plant in some life changing ailments such as entero toxin induced diarrhea, diabetic nephropathy, nausea, plasma antioxidant, vomiting, high cholesterol, high blood pressure and inflammation (Egbuchua*et al.*, 2013).

The availability of raw material especially during planting time makes determination of the optimum propagule size important to avoid wastage. Like any other plant, ginger requires the right kind of nutrients to sustain its growth and maximum yield especially in the humid environment where rainfall is high and nutrient reserves are low due to leaching, and erosion effects. Plant nutrients usually supplied by the soil in most Sub-Saharan environment are often inadequate and sometimes in plant unavailable form hence, they need to be augmented with other sources that are cheap and environmentally friendly. The use of organic manures is one technology that has been exploited overtime and across ages because of its ability to restore soil fertility, supply major plant nutrients, such as N. P. K., Ca, Mg and also stabilizer soil pH (Sanchez and Miller, 1986). Increase in soil chemical properties which are quite essential in crop growth and yield have also been associated with organic manures (Adetunji, 1990). Organic manures however are without their limitations. These include inadequate availability, transportation and handling problems, slow nutrient release, high C: N ratio and sometimes heavy metal pollution (Ayeni*et al*., 2010). Now that emphasizes are gradually shifting to organic agriculture to maintain soil productivity and limit the use of synthetic fertilizers some of which have contributed to the changing climate, the objective of this study therefore was to evaluate the influence of different propagule size and poultry manure on the growth and yield of ginger.

MATERIALS AND METHODS

The experiment was carried out between May and December 2008 at the National Horticultural Research Institute, Ibadan, Nigeria (07^0 24'N, 03^0 35'E, and 213m above sea level).Ibadan lies in the rainforest agro-ecological zone of South Western Nigeria. The trial was laid out in a split plot design replicated three times. The main plot was the propagule size (5gm and 10gm) while the poultry manure rates (0, 5, 10, 15,20t/ha) were in the sub-plot. The plot was manually cleared, ploughed and made into 10 beds of 2 × 3 m dimensions. From each bed, composite soil samples were collected for pre-planting soil analysis. The poultry manure was applied two weeks before planting using incorporation method. Seed pieces of ginger rhizomes were cut to contain at least two buds and weighing about 5g and10

g respectively. Each was planted on the beds at a spacing of 30 × 20 cm at a depth of 5 cm. Data on morphological characters which includes plant height, number of leaves, number of tillers and number of rhizomes were taken fortnightly while the yield components was recorded at harvesting.

RESULTS AND DISCUSSION

The chemical composition of the poultry manure used is presented in Table 1 while the soil physico-chemical properties before the experiment are presented in Table 2. The latter showed that the fertility status is average especially for the major elements.

Table 3 shows the main effect of propagule size and poultry manure on vegetative parameters, yield components and yield of ginger. Planting propagule had a significant on plant height, number of tillers and number of rhizome but on the number of leaves and the yield. Propagule size of 10 gram was better than 5gram propagule size producing significantly higher plants, number of tillers and number of rhizomes. This suggests that the amount expended on planting material of ginger can be halved with no significant different in the resultant yield. The effect of poultry on vegetative and yield parameter was significant. Plant height, number of leaves, number of tillers, number of rhizome and the yield increased with increasing poultry manure reaching its peak at 15t/ha and decline again suggesting the optimum of poultry manure application is at 15t/ha(table 3). This is in agreement with the findings of Egbuchua*et al*. (2013) that most ginger morphological characters increased with the application of treatments compared to the control with poultry manure given the best performance in terms of growth parameters and yield indices. Similar studies by Hsieh and Hsieh (1990) and Ojeniyi (2011) showed the potency of poultry manure in improving crop quality, quantity and yield when incorporated into cultivated soil. Ayeni et al. (2010) have equally reported that organic manures when properly used have proven to be very efficient in increasing soil nutrient contents, ensuring positive residual effects and enhancing soil's physico-chemical properties. Interaction was significant for number of tillers, number of rhizomes and the yield(table 3).

Table 1. Chemical composition of the Poultry manure

Element	Absolute % chemical composition
N	1.56
P	2.62
K	0.10
Ca	3.62
Mg	1.17
Na	0.65
Organic Carbon	35.6

Table 2. Soil Physico-chemical properties before the experiment

pH	6.5
Organic C (g/kg)	0.88
Total N (g/kg)	0.94
Available P (mg/kg)	5.82
Exchangable bases (Cmol/kg)	
Ca	0.39
Mg	0.15
Na	0.04
K	0.09
Micronutrients	
Mn (mg/kg)	28.58
Fe (mg/kg)	8.87
Cu (mg/kg)	0.60
Zn (mg/kg)	2.63
Particle size	
Sand	810
Silt	120
Clay	70

Table 3. Effect of propagule size and poultry manure on the vegetative parameters and yield of Ginger.

Treatment	Plant Height(cm)	Number of leaves	Number of Tillers	Number of Rhizomes	Yield (t/ha)
Propagule size					
5grams	24.6	14.4	3.2	15.2	14.9
10grams	28.2	15.6	3.7	20.4	16.6
LSD (0.05)	1.55	NS	0.32	2.20	NS
Poultry manure (t/ha)					
0	20.8	13.3	2.5	11.5	7.7
5	23.2	14.4	3.1	20.5	16.7
10	26.4	15.1	4. 0	19.3	13.5
15	31.0	16.9	4. 0	23. 0	23.9
20	30.7	15. 4	3.8	14.8	17.2
LSD(0.05)	2.51	2.45	0.51	3. 48	5. 02
P.S X P.M	NS	NS	*	*	**

*Significant at P< 0.05, **Significant at P<0. 01, NS- Not Significant, P.S-Propagule size, P.M-Poultry Manure

CONCLUSION

From the experiment, it was deduced that the use of 10 gram size of ginger propagule was better during the vegetative growth of ginger compared to 5gram size and for the different rates of poultry manure used, the least yield was obtained from the control with no poultry manure (7.7 t/ha) and the highest yield obtained from 15t/ha therefore 15t/ha rate of poultry manure will give the optimum yield of ginger.

ACKNOWLEDGEMENTS

The Executive Director of National Horticultural Research Institute, Ibadan, Nigeria is appreciated for the financial support and enabling environment for this research work. Mr P.A Kayode, MrsAkinlolu H.T., Bolodeoku P.O. and the other teams on the field for giving all the necessary technical support for the actualization of this project.

REFERENCES

Adetunji MT (1990) Soil test and fertilizer recommendations report. A comprehensive soil fertility study for a 45 ha farm at Balogun village, Abeokuta.

Asumugha GN, Ayaegbunam HN, Ezulike TO, Nwosu KL (2007). Guide to ginger production and marketing in Nigeria. National Root Crops Research Institute, Umudike Nigeria. Ext. Guide 7:1-7.

Ayeni LS, Omole T, Adeleye O, Ojeniyi SO (2010) Integrated application of poultry manure and NPK fertilizer on performance of tomato in derived savanna transition zone of South-West Nigeria. Sci. Nat. 8(2):50-54.

Egbuchua CN and Enuyeke EC (2013).Growth and yield responses of Ginger (*Zingiberofficinales*) to three sources of organic manure in a typical rainforest zone, Nigeria. Journal of Horticulture and Forestry Vol. 5(7): 109-114.

Hsieh SC, Hsieh CF (1990). The use of organic manures in crop production. FFTC Ext. Bull. 360:20.

Jakes JS (2007). Ginger as "Beverage of Champion". J. Plant Nutr. 38(6):45-56.

Ojeniyi SO (2011).Advances in integrated nutrient management for crop production in Nigeria.Proceedings of the 35th Annual Conference of the Soil Science Society of Nigeria 7th -11th March, 2011, Minna, Nigeria.

Sanchez PA, Miller RH (1986). Organic matter and soil fertility management in acid soils of the tropical soils. XVIII Congress of Int. Soil Sci. Soc. P. 10.