

Original Research Article

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COMPARATIVE EFFECTS OF COW DUNG AND POULTRY MANURE ON THE GERMINATION AND GROWTH OF *Zingiber officinale* (GINGER) William Roscoe

ABSTRACT

The study is based on determining the effects of organic manure (cow dung and poultry manure) on the growth & germination of *Zingiber officinale* using topsoil in the research as the medium of growth. The seeds were subjected to 7 treatments which include cow dung and poultry manures and topsoil only as control treatment. The seeds were sown directly into the polythene pots thoroughly mixed with the organic manures at different levels of application which includes 2.5g, 5.0g and 10.0g with 3 replicates making a total of 21 poly pots. The germination was thoroughly observed for 3 weeks after planting. The experiment was laid in a completely Randomized design with 3 replicates.

The parameters assessed were the plant height, the number of leaves and stem girth. The data collected were subjected to ANOVA.

The Results of the study showed that treatment T1 with cow dung at 2.5g had the highest plant height Of (49.65cm), stem diameter of (0.458m) and Number of leaves (12.27) followed by T5 (5.0g of poultry Manure) with plant height of (45.40cm) stem diameter (0.435cm) and number of leaves (12.73). Treatment 7 which is the control treatment had the Least Leaf Number of (24), height of (28.97) and stem diameter of (0.257).

Therefore from all the treatments used, cow dung at 2.5g and poultry manure at 5.0g are advisable for Raising *Zingiber officinale*.

Keywords: Comparative, Effect, Cow dung, Manure, Growth, Ginger

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28 INTRODUCTION

29 Spices constitute an important group of agricultural commodities which have been used for
30 adding flavour to food. Ginger consists of fresh or dry root of *Zingiber officinale*. The English
31 Botanist William Roscoe (1753-1831) gave the plant the name of *Zingiber officinale* in an 1807
32 publication. The ginger family is a tropical group especially abundant in Indo-Malaysia,
33 consisting of more than 1,200 plant species in 53 genera. The genus *Zingiber* includes about 85
34 species of aromatic herbs from East Asia and tropical Australia.

35 The name of the genus *Zingiber* is derived from a Sanskrit word denoting "horn-shaped" in
36 reference to the protrusions of the rhizome. Some species are also used in pharmaceutical,
37 perfumery, cosmetics and other related industries. Indian is one of the most leading spice
38 producing and exporting countries in the world. In addition, large quantities of spice are
39 consumed within the country for seasoning food and for several purposes. Spices are often the
40 currency of the developing countries such as Asia, India, the improvement in agro-technique and
41 the release of many intensive researches [1].

42 The primary producers of spices are India (by far the largest producer and exporter), Egypt and
43 Brazil. Since spices are always in demand in the industrial world, export of these basic
44 agricultural commodities by developing countries can be relied upon to earn valuable foreign
45 exchange. The major importers are United States of America, East-Asia, Japan, Europe and
46 Middle Eastern countries. The current estimate of world import is 52,500 tons valued at US \$
47 1,500 million with an annual growth of 4%. This is against world production of 8.5 tons valued
48 at US \$25 billion [2].

49 Ginger plant is of two types which includes the fresh ginger and the dry ginger. Fresh ginger and
50 dry ginger are considered two different commodities; in fact, one author of an early [3] (Chinese

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51 herbal) felt that, they were so different that they must come from two different plants. The dry
52 root is used to dispel pathogens via its ability to induce sweetening. It also expels cold, relieves
53 nausea and clear away toxic matters [4] The dry root treats depleted yang, removes cold, useful
54 for "cold" pain of the stomach and abdomen, it is also useful for diarrhoea due to cold deficiency,
55 cough, rheumatism and so on. Experimental data developed by a Chinese scientist verifies in the
56 ability of the dried root to strengthen the stomach while acting as mild stomach and intestinal
57 stimulant, it has been shown to inhibit vomiting. Studies with fresh root showed that for the first
58 few hours, ginger tea reduce gastric secretions followed by a longer period of stimulation.

59 Animal experiments have also shown analgesic and anti-inflammatory activity.

60 Ginger is known as the best spice crop, it is a perennial herb differing in shape and size in
61 different cultivate types. The herb develops several lateral shoot in clumps which begins to dry
62 when the plant matures, the leaves are narrow distinctions linear lanceolate and greenish which
63 flowers (pink in colour). Ginger is in different forms that includes raw ginger, bleached dried
64 ginger, ginger Olerosin, ginger powder, ginger oil, dried ginger and ginger flakes. It is cultivated
65 in almost every part of the world (I I S R experimental farm kerala).

66 *Zingiber officinale* thrives in any soil provided it is well drained. It is valued as the best spice
67 because it is used in cooking and baking for its flavouring nature [5]. The characteristic odour
68 and flavour of ginger is caused by a mixture of *Zingerone*, *Shogoals* and *gingerols*, volatile oil
69 that compose of one to three percent of the weight of fresh ginger. Before eating, fresh ginger
70 may be peeled and for storage, it can be substituted for ground ginger at a ratio of 6:1 although,
71 the flavour for recipes such as ginger bread, cookies crackers, cake, ginger ale and ginger beer.

72 Ginger can be placed in plastic bag and refrigerated or frozen for longer-term storage. It can be
73 used for preserving foods and it kills harmful bacteria. Indonesians frequently use spice paste
74 based on the fresh chills and ginger to rub meat before grilling or baking commences which is

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75 also applied in some of our homes whereby we use ginger for steaming our meat, fish etc, before
76 cooking to enhance the great, accurate and adequate taste of our meal.

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78 **GENERAL OBJECTIVE OF STUDY**

79 To determine the effects of organic manure on the germination and growth of *Zingiber officinale*.

80 **SCOPE OF THE STUDY**

81 This experiment is focused on the effects of poultry manure and cow dung on the growth of
82 *Zingiber officinale*.

83 **MATERIALS AND METHOD**

84 **AREA OF STUDY**

85 The experiment was carried out in Federal College of Forestry, Ibadan, Jericho, Oyo State,
86 Nigeria beside the Visual, and now, Agricultural Technology Department. The college is situated
87 at Jericho quarters under Ibadan south-West Local Government area of Oyo state. The area lies
88 between latitude 7°26 N and longitude 3°36 E. The climate of the area is tropically dominated by
89 rain fall pattern which ranges from 1,400mm - 1,500mm; the average temperature is about 31.2
90 and relative humidity about 80%. The climatic condition of the area is rainfall with two distinct
91 seasons which are dry season and rainy season.

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92 **MATERIALS**

93 The following are the materials used for the experiment. Ginger rhizomes, top soil, polythene
94 pots, cow dung, poultry manure, vernier caliper, wheel barrow, watering can, 30cm ruler,
95 exercise book and sieving basket.

96

97 **METHOD OF PREPARATION OF THE POULTRY MANURE AND COW DUNG**
98 **MIXTURE.**

99 The poultry manure was sun dried for one week; this is as a result of high nitrogen composition
100 present in the manure which may be toxic to plants when added to it. This treatment was also
101 applied to cow dung. The dried manure was later sieved and the fine dust was collected for the
102 experiment. The level of application was 2.5g, 5.0g and 10.0g.

103 The top soil was gotten from the *Gmelina* plantation in Federal College of Forestry, Ibadan and it
104 was properly sieved in order to separate all unwanted materials contained in it. Later on, the top
105 soil was measured into the polythene pots that constitute 21 pots; the weight of the soil used was
106 2.5kg per pot and the size of the pots used were 25cm by 10cm.

107 **PROCUREMENT OF RHIZOMES**

108 The rhizomes of *Zingiber officinale* were procured from National Horticultural Research
109 Institute (NIHORT). They were later bisected with a sterilized knife in order to avoid fungal
110 attack on them.

111 **EXPERIMENTAL DESIGN**

112 The experimental design (CRD) completely randomized design comprised of seven treatments
113 with three replicates.

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122 **Table 1: EXPERIMENTAL LAYOUT**

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124	T1	T3	T2	T5	T7	T6	T4
125							
126							
127	T2	T1	T4	T3	T5	T7	T6
128							
129							
130	T4	T2	T3	T1	T6	T7	T5
131							

- 132 Ti = Cow dung 2.5g
- 133 T2 = Cow dung 5.0g
- 134 T3 = Cow dung 10.0g
- 135 T4 = Poultry manure 2.5g
- 136 T5 = Poultry manure 5.0g
- 137 T6 = Poultry manure 10.0g
- 138 T7 = Control

139 **PARAMETERS ASSESSED**

- 140 a) Plant height (cm)
- 141 b) Stem girth (mm)
- 142 c) Leaf count

143 **METHOD OF DATA COLLECTION**

144 The method of data collection adopted was done on a weekly basis. A 30cm ruler was used to

145 measure the plant height and the stem girth was measured with a vernier calliper and the leaves

146 were counted on a weekly basis.

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147 **METHOD OF ANALYSIS**

148 The experiment is subjected to mean and analysis of Variance (ANOVA).

149 **RESULTS AND DISCUSSION**

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151 **Effect of Cow dung and Poultry Manure on The Height of *Zingiber Officinale*.**

152 Table 1 show that there is a significant difference among the treatments and the period of
153 assessment (<.001) but, no significant difference in the interaction between treatments and the
154 period of assessment at 5% level of probability (1.00 Ns).

155 Table 2 shows the mean height for all treatments at 10weeks seedlings with crow dung manure
156 applied at 2.5g (T1) recorded the highest mean height of 49.65cm followed by T2 of 5.0g with
157 the mean value of 48.76cm. T7 which is the control had the least performance with mean of
158 28.97cm which is in accordance with [5] who stated that natural fertilizers (Organic manures) are
159 effective for the growth of plants and they can also be used in the place of artificial fertilizer. In
160 the result of his experiment, cow dung at 2.5g was recorded as the treatment with the highest
161 growth performance followed by 5.0g of poultry manure. However from my research findings
162 this is proven to be correct and accurate in conclusion.

163 **Table 2: Effect of organic manure on the Height of *Zingiber Officinale*.**

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TREATMENTS	Weeks after planting										Ave Mean
	1	2	3	4	5	6	7	8	9	10	
T1 (2.5g)	9.80	18.67	42.00	42.27	43.13	61.77	62.30	64.57	71.50	80.80	49.65
T2 (5.0g)	5.93	15.37	35.80	38.77	46.73	60.43	64.73	66.43	69.77	83.63	48.76
T3 (10.0g)	4.63	20.33	36.10	36.80	45.07	61.40	62.69	65.27	69.53	81.77	48.36
T4 (2.5g)	2.13	17.43	33.47	33.70	43.70	61.83	65.13	65.53	74.77	84.47	48.22
T5 (5.0g)	2.87	18.87	31.17	34.00	41.37	56.93	57.10	61.40	70.80	79.50	45.40
T6 (10.0g)	3.40	8.07	30.93	39.50	43.67	61.07	61.08	64.13	68.13	78.20	45.82
T7	0.00	2.47	11.97	20.17	26.67	38.80	38.81	41.50	48.13	61.17	28.97

174	L.S.D	6.928
175	Grand mean	45.02
176	S.E	13.573 %
177	C.V	30.1

178

179 **Effect of organic manure on the mean girth of *Zingiber officinale* Seedlings.**

180 Table 2 shows that there is no significant difference among the treatments and period of
 181 assessment but there is interactions between treatment and period of assessment at 5% level of
 182 probability (<.001).

183 Table 3 below shows the means Girth for all the treatments at 10 weeks, T1 (Cow dung 2.5g) had
 184 the highest means of 0.458 cm at 10 week after planting; followed by T5 (Poultry manure 5.0g)
 185 having the mean value of 0.435cm. T7 which is the control was recorded to have the least mean
 186 value of 0.257cm. Therefore Cow dung and poultry manure are far better than ordinary topsoil,
 187 therefore the cow dung at 2.5g is quite effective in promoting the formation of stem girth and can
 188 be useful in raising the seedling.

189 **Table 3: Effect of organic manure on the Height of *Zingiber Officinale*.**

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	Weeks after planting										
TRMITS	1	2	3	4	5	6	7	8	9	10	Avg/M
T1(2.5g)	1.333	1.600	0.170	0.167	0.173	0.183	0.200	0.223	0.240	0.290	0.458
T2(5.0g)	0.933	1.467	0.170	0.163	0.170	0.183	0.190	0.210	0.237	0.290	0.401
T3(10.0g)	0.4771	1.633	0.180	0.160	0.170	0.180	0.197	0.223	0.243	0.293	0.376
T4 (2.5g)	0.900	1.500	0.167	0.157	0.167	0.183	0.203	0.223	0.240	0.290	0.403
T5(5.0g)	1.267	1.500	0.160	0.160	0.170	0.180	0.187	0.210	0.230	0.230	0.395
T7	0.00	1.033	0.157	0.147	0.160	0.173	0.190	0.210	0.227	0.277	0.257
L.S.D	01120										
Grand mean	0.389										

201 S.E 0.2194

202 % C.V 56.3

203

204 Table 3 shows that there is no significant difference among the treatments and period of
205 assessment but there is interactions between treatment and period of assessment at 5% level of
206 probability (<.001) See Appendix.

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210 **Table 4: Effect of organic manure on the mean leaf production of *Zingiber Officinale***

211 **Seedlings.**

212

TRMTS	1	2	3	4	5	6	7	8	9	10	Avg/M
214	0.33	2.33	6.33	6.33	9.00	11.33	16.00	19.33	24.00	27.67	12.27
215	0.00	1.67	5.00	6.69	10.00	11.33	14.33	18.00	22.00	26.00	11.50
216	0.33	2.67	6.33	7.67	10.00	11.67	15.67	19.33	24.00	28.00	12.57
217	0.00	3.67	6.67	6.67	9.00	11.00	16.33	20.00	24.33	28.33	12.60
218	1.00	3.67	8.33	7.00	9.33	11.00	16.00	19.67	23.67	27.67	12.73
219	0.67	2.00	6.33	6.33	8.67	10.33	14.67	18.33	22.67	26.67	11.67
220	0.00	0.00	2.00	4.00	6.33	7.67	13.33	16.33	20.33	24.33	9.43

221 L.S.D 1.244

222 Grand mean 11.82

223 S.E 2.438

224 % C.V 20.6

225 Table 4 shows the means leaf production for all the treatments. Poultry manure applied at 5.0g
226 (T₅) recorded the highest mean of 12.73 at 10 weeks after planting in the pots, followed by T₃

227 cow dung at 10.0g with the means of 12.57 or 12.6 while T₆ poultry manure applied at 10.0g and
228 T₇ the control had the lowest mean of 11.7 and 9.43 respectively after 10 weeks of planting. The
229 poultry manure was quite effective followed by cow dung equally in promoting the leaf
230 formation of the seedling and can be used for raising the seedling in line with [6].

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232 REFERENCES

- 233 1. Oladimeji, O.H and Ahmadu, A.A: Antioxidant activity of compounds isolated from
234 *Pycnanthus angolensis* (Welw.) warb and *Lam. pinnatum* (Lam.) oken. *European*
235 *Chemical Bulletin*. 2019.
- 236 2. Carey, R.O, Hochmuth, G.J, Martinez, C.J, Boyer, T.H, Nair, V.D, Dukes, M.D: A
237 review of turfgrass fertilizer management practices: Implications for urban water quality.
238 *Hort Technology*. 2012; 22 (3), 280-291.
- 239 3. Ben Cao: The original Source of Modern Research on Chinese Medicinal. Material.
240 HSOA. *Journal of Alternative, Complementary and Integrative medicine*. 2017; 23:67
- 241 4. Agbede T.M, Ojeniyi S.O and Adeyemo A, J: Effect of Poultry Manure on Soil Physical
242 and Chemical Properties, Growth and Grain Yield of Sorghum in South West Nigeria.
243 *American-Eurasian Journal of Sustainable Agriculture*. 2008; 2(1): 72-77.
- 244 5. Adeyemo M.A: Effects of fertilizer and pot sizes on early growth seedling growth in
245 *synsepalium dulcificum* (Daniel). 2004; Chapter 5, Pp 27.
- 246 6. Adeyeye, E.I, Akinyeye, .R.O, Ogunlade, I.O, Olaofe, O, Boluwade, J.O. Effect of Farm
247 and Industrial Processing on the Amino Acid Profile on Cocoa Beans. *Food Chemistry*
248 2010; 118:357 -363.

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