



EFFECT OF COCONUT COIR AND POULTRY MANURE ON THE GROWTH AND YIELD OF *Amaranthus hybridus* L.

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ABSTRACT

This study was carried out to determine the effect of coconut coir and poultry manure on the growth and yield of amaranthus hybridus L. The parameters accessed are germination percentage, growth performance and yield of Amaranthus hybridus L. The experiment was laid out in Completely Randomized Design consisting of two (2) treatments and control, each with fifteen (15) replicates. The data collected were subjected to Analysis of Variance (ANOVA). The means were further separated using Least Significant Difference (L.S.D) where significant differences were observed. The data collection from the experiment was taken for seven (7) weeks. The results showed that coconut coir had the highest mean value of 14.71 mm, 10, 0.4290mm and 3.600mm for the plant height, for number of leaves, stem girth, and for weight of yield (harvested Amaranthus hybridus L.) respectively at seventh (7th) week. The results of analysis of variance indicated significant differences in plant height, number of leaves, and stem girth in coconut husk among treatments applied at 0.05 level of probability. The results obtained for analysis of variance for (yield) weights of harvested Amaranthus hybridus L (yield) revealed significant difference in different media with the value of (2.000g of for top soil, 3.600g for coconut coir and 2.267g for poultry manure) among treatments applied at 0.05 level of probability.

Keywords: *Amaranthus hybridus*, Coconut Coir, Growth, Yield, Treatment

INTRODUCTION

Amaranthus hybridus L. is an important vegetable in human diet as a source of nutrients such as vitamin, minerals, sugar, water, protein and fibre needed for healthy body growth and sustenance (Inyang et al., 2018). The young leaves and stems are boiled as greens. A *hybridus* is

grown as a soup vegetable or for boiled salad greens. Vegetables are those herbaceous plants whose part or parts are eaten as supporting food for main dishes and they may be aromatic, bitter or tasteless such as broccoli, cabbage, radishes, garlic and arugula (Adam and Camen, 2011).

Poultry manure has been used by ancient farmers as a source of nutrition and its benefits have been fully realized because of its cheapness. (Wehner *et al.*, 2004). Manure is a natural fertilizer that improves the quality of the soil.

Coconut coir is the fibrous material found between the hard, internal shell and the outer coat of a ripe coconut. Coconut coir has been used in many ways for over many years. It is a 100% renewable resource which is odorless, easy to handle, and uniform in composition. It promotes strong root growth and plant vigor and has an ideal pH range of 6.0-6.8 and it contains significant amounts of phosphorus and potassium. It is used as a growing medium for many crops such as fruits tree, vegetable and cut flowers. When applied to agricultural soil, coconut coir can improve moisture retention, capacity increase nutrient content, infiltration rate, total porosity and hydraulic conductivity of that soil (Coir, 2021).

Coconut coir also retains more plant nutrient; reducing leaching and show response to applied fertilizer when incorporated to soils in growing medium has many beneficial characteristics, making it a potentially productive resource for use in agriculture if used after proper composting (Thomas *et al.*, 2009).

Soil is a natural body consisting of layers, primarily composed of minerals, mixed with at least some organic matter, which differ from their parent materials, texture, structure, consistency, colour, chemical, biological characteristics. It is the covering of fine rock particles that cover

surface of the earth. Soil is the end-product of the influence of climate, relief (slope), organisms, parent materials and time (Nashali, 2006).

The use of plants and animal materials as soil amendments to provide nutrients and in place of synthetic substances would be more sustainable with minimum damage to the environment (Stanford University, 2006).

The use of plants and animal materials as soil amendments to provide nutrients and in place of synthetic substances would be more sustainable with minimum damage to the environment (Stanford University, 2006). This work aimed at raising *Amaranthus hybridus* using coconut coir and poultry manure as growing media, and comparing the performance of the vegetable with respect to the following parameters: germination, growth and plant yield.

MATERIALS AND METHODS

Procurement of seeds

The *Amaranth hybridus* seeds were obtained from Institute of Agricultural Research and Training (IAR&T).

Experimental Site

The experiment was carried out at Crop Production Technology Experimental site, Federal College of Forestry, Jericho, Ibadan. The area lies between latitude 7° 23' N, 7° 25' N of the equator and longitude 3° 51' E, 3° 54' E of the Greenwich meridian. The climate of the area is tropical, dominated with an annual rainfall ranging between 1300 – 1500 mm with the average temperature of 26°C and relative humidity of about 65 – 85 %. The area has two distinct seasons, which are

dry season (usually November – March) and raining season (April – October) (FRIN, 2019).

Collection of materials and preparation of Compost

This project covered the growth and yield of *Amaranth hybridus* using coconut coir and poultry manure as growing medium. Top soil was collected from Federal College of Forestry, Ibadan. It was air dried and sieved properly to produce a loose soil.

Coconut coir was collected from Ojoo Market, Ibadan. The hard cover was separated from the soft part and the soft part was air dried for five days. It was later grinded at Bode market, Ibadan to fine particles.

Poultry manure was collected from Federal College of Forestry, Jericho, Ibadan poultry farm. It was air dried for five days and sieved to produce fine particles. After the media was prepared, continuous wetting was carried out for one week to allow nutrient mineralization with the soil before planting. Readings of the rate of germination and plant height commenced two weeks after planting and the plants were watered daily to ensure proper germination. *Amaranth hybridus* seeds (10 g) were sown into polythene bags (seedling pots) containing the combination of topsoil and coconut coir. Seeds were sown into polythene bags containing the soil used as control and

also sown into polythene bags containing a combination of the topsoil and poultry manure.

Experimental Design

The experimental design was laid out in a Completely Randomized Design (CRD) with three treatments and fifteen replicates.

Data Collection and analysis

The data collected in the course of the experiment was subjected to Analysis Of Variance (ANOVA). The means were further separated using least significant difference (LSD) where significant differences were observed.

RESULTS

. The effect of coconut coir and poultry manure on plant height of *Amaranthus hybridus* are as presented in table 1. The result of analysis of variance for periodic changes in the height revealed that there was no significant difference among the treatments applied at 0.05 level of probability at first week of transplanting, but there were significant differences at weeks 2, 3, 4, 5 and 6 after transplanting. Among the treatments used, poultry manure had the highest value at first week of transplanting, followed by coconut coir and least by the control while at 2, 3, 4, 5, and 6 weeks of transplanting, coconut coir had the highest value followed by poultry manure and the least figures by the control.

Table 1: Effect of coconut coir and poultry manure on plant height of *Amaranthus Hybridus*

Treatment	Weeks after transplanting					
	1	2	3	4	5	6
2 kg of Top Soil (Control)	1.56	2.533	3.813	5.707	10.27	12.60
2 kg of Top soil + 0.1kg of Coconut coir	1.73	3.227	6.853	9.280	12.73	14.71
2 kg of Top Soil + 0.1kg of Poultry manure	1.94	2.747	4.893	7.327	11.64	13.24
LSD	0.546 ^{ns}	0.2831**	0.4222**	0.3106**	0.801**	0.961**

The effect of coconut coir and poultry manure on the number of leaves of *Amaranthus hybridus* is as presented in table 2. There was no significant difference at first week of transplanting but there was significant difference at 2, 3, 4, 5 and 6 weeks of transplanting. Among the treatments used poultry

manure had the highest value followed by coconut husk while at 2, 3, 4, 5 and 6 weeks of transplanting coconut coir had the highest value and followed by poultry manure and the least by control among the treatments applied at 0.05 level of probability.

Table 2: Effect of Coconut Husk and Poultry Manure on Number of Leaves of *Amaranthus Hybridus*

Treatment	Weeks after transplanting					
	1	2	3	4	5	6
2 kg of Top Soil (Control)	3	4	5	6	7	8
2 kg of Top soil + 0.1kg of Coconut coir	3	5	8	10	10	10
2 kg of Top Soil + 0.1kg of Poultry manure	3	4	6	7	10	10
LSD	0.522 ^{ns}	0.3474**	0.569**	0.737**	0.816**	0.838**

The effect of coconut coir and poultry manure on stem girth of *Amaranthus hybridus* are as presented in table 3 applied at 0.05 level of probability. There was no significant difference at 1, 2, 5 and 6 weeks of transplanting but there was significant difference at 3 and 4 weeks after transplanting. Among the treatments, at 1 and 2 week of

transplanting poultry manure had the highest value, followed by control and least by coconut while at 2 weeks after transplanting control had the highest, followed by poultry manure and least by coconut coir. Also, at 3, 4, 5 and 6 weeks after transplanting, coconut coir had the highest value, followed by poultry manure and the least was control.

Table 3: Effect of Coconut Husk and Poultry Manure on Stem Girth of *Amaranthus Hybridus*

Treatments	Weeks after transplanting					
	1	2	3	4	5	6
2 kg of Top Soil (Control)	0.1080	0.1193	0.1247	0.1233	0.300	0.317
2kg of Top soil + 0.1kg of Coconut coir	0.1067	0.1167	0.1513	0.1733	0.353	0.420
2kg of Top Soil + 0.1kg of Poultry manure	0.1113	0.1180	0.1333	0.1700	0.327	0.360
LSD	0.01557^{ns}	0.01972^{ns}	0.01587*	0.01891**	0.0587^{ns}	0.0753^{ns}

Table 4: Weight of *Amaranthus hybridus* after harvesting

Treatment	7th week
2kg of Top Soil (Control)	2.000
2kg of Top soil + 0.1kg of Coconut coir	3.600
2kg of Top Soil + 0.1kg of Poultry manure	2.267
LSD	0.2906**

Table 5: Analysis of Top Soil

Soil parameters	Content in soil
pH (H ₂ O)	6.2
T.O.C (g/kg)	33.62
T.N (g/kg)	2.48
Avail.P (mg/kg)	14.71
Exch Acid (H ⁺ AL)	0.4
Ca (Cmol/kg)	15.82
Mg (Cmol/kg)	4.63
K (Cmol/kg)	0.83
Na (Cmol/kg)	1.40
Mn (mg/kg)	288.00
Fe (mg/kg)	357.00
Cu (mg/kg)	1.96
Zn (mg/kg)	32.70
Pb (mg/kg)	92.75
Silt (g/kg)	56.0
Clay (g/kg)	76.0
Sand (g/kg)	868.0

Table 6: Analysis of Coconut Husk

Parameters	Content
O.C (%)	9.55
O.N (%)	33.71
T.N (%)	2.62
Avail. P (%)	0.027
Na (%)	1.68
K (%)	2.06
Ca (%)	0.17
Mg (%)	0.8
Mn (%)	0.007
Fe (%)	0.25
Cu (%)	0.002
Zn (%)	0.0048

Table 7: Analysis of Poultry Manure

Parameters	Content
Nitrogen	2.6
Ca ₊₊ (mg/100g)	543
Fe ₊₊ (mg/100g)	12.6
K ₊ (mg/100mg)	37
PO ₄ (mg/100g)	475
Zn ₊₊ (mg/100g)	0.4
Cu ₊₊ (mg/100g)	1.3
Mg ₊₊ (mg/100g)	6.4
Mn ₊₊ (mg/100g)	0.03

DISCUSSION

In this study, all treatments encourage an increase in growth of *Amaranthus hybridus*, however, control i.e. no manure application had the least increment in growth and yield of *Amaranthus hybridus*. It could be observed from the result obtain that there was an increase in plant height, stem girth, number of leaves and yield. The result showed that application of coconut coir and poultry manure significantly influenced the growth and yield of *Amaranthus*. The results is in agreement with the findings of Oviasogie *et al.*, (2013), Anbuselvi *et al.*, (2017) and Sabijon *et al.*, (2020) who also observed an increase in the growth and yield of amaranthus and sweet pepper as a result of application of organic manure. The co-composting of different organic fertilizers with coconut coir or

husk were also found to increase growth and yield of cowpea, cayenne pepper, tomatoes and *Amaranthus* significantly as reported by Thomas *et al.*, 2013, Udayana *et al.*, Truong *et al.*, 2017 and Bustami *et al.*, (2019).

CONCLUSION

Based on the research carried out, it can be concluded that the use of coconut coir as a growing media possessed a great potential as regards plant height, number of leaves, stem girth and weight of *Amaranthus hybridus* followed by poultry manure.

Recommendation

the use of Coconut husk is advisable for farmers to grow *Amaranthus hybridus* due to the presence of necessary nutrient needed for *Amaranthus hybridus*.

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