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Article

Growth Response of *Tetrapluera tetraptera* Schum (Thonn) Seedlings to Organic Fertilizers

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Abstract: The study was carried out to investigate the growth response of *Tetrapluera tetraptera* to selected organic fertilizers. Organic fertilizers: poultry manure and cow dung of different concentration and mixture were used to raise seedlings from Germination experiment for a period of 12 weeks. Six treatments were used for this research: T1 (control experiment), T2 (10g of poultry manure), T3 (10g of cow dung), T4 (20g of poultry manure), T5 (20g of cow dung), T6 (15g of poultry manure + 15g of cow dung). Growth parameters such as diameter, plant height and number of leaves were measured weekly over a period of twelve (12) weeks. Data obtained were subjected to Anova and mean separated using Duncan multiple range tests. on the height parameter assessed on *Tetrapluera tetraptera*, the highest plant height mean of 12.20cm was recorded in treatment 6 (15g of poultry manure + 15g of cow dung) while the lowest mean plant height 7.19cm was recorded in treatment 3 (10g of cow dung) . the highest mean stem diameter was recorded in treatment 4 with a value of 0.43mm from while the least was recorded in Treatment 1 with mean value of 0.21 m. also, highest mean number of leaves was recorded treatment 4 (12.81) while the least was observed in T3 (11.01) . The results showed that organic manure has considerable effect on the growth of *Tetrapluera tetraptera* seedlings and it use should be encouraged. T3 (10g of poultry Manure + 10g of cow dung) was hereby recommended to be the best of all in the growth of *Tetrapluera tetraptera.*

Keywords: growth and yield; *Tetrapluera tetraptera;* organic fertilizers; seedlings

1. Introduction

The contribution of forest to human existences, day to day activities as well as economic development cannot be over emphasized. Forests in Nigeria are seen an integral and formidable base of economic sustenance of the country and rural livelihood (Anderson, 2006). Additionally, forest plays a great role in the sustainable provision of raw materials, employment opportunities, and medicinal purpose amongst others. Presently, most forests are becoming depleted due to ever increasing population, over exploitation, deforestation and neglect to afforestation. These have inhibited the multi-functionality role of forests and led to unavailability of many important forest resources.

Tetrapluera tetraptera which belongs to the fabaceae family is a deciduous tree species that is generally found in the low land forest of tropical Africa. It grows up to 25m in height with the diameter of 1.5-8m. It possesses a slender bole and as the trees grow older they tend to have small, sharp, low buttress in the forest. Mostly all parts of *Tetrapluera tetraptera* plant are useful for different purposes. *Tetrapluera tetraptera* is of great importance due to its high medicinal value and other purposes such as firewood. It is also used as seasoning spice in Southern and Eastern Nigeria (Okwu, 2003). The plant has been confirmed by different researchers to be potent in the treatment of different ailments. Research carried out by (Noames *et al*, .2004) shows that the extract from the plant roots is potent in the treatment of gastro intestinal related problem. The fruit is also used in the management of different ailments such as leprosy, convulsions, rheumatism and inflammation.

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Products for trees have contributed immensely to the quality and welfare of man. The tropical forests are blessed with diverse of important forest species. Presently, tropical rainforest is under severe pressure due to urbanization, deforestation and over exploitation of highly economically valuable timber and Non-timber forest products. Additionally, most rural dwellers depend solely on the usage of medicinal plants in treatment of several ailments and other purposes due to high cost of conventional drugs. *Tetrapluera tetraptera* is a good medicinal plant which is being used in the treatment of different diseases. The ecological consequences of anthropogenic activities; deforestation, over exploitation has led to the scarcity and extinction of *Tetrapluera tetraptera* in the wild. There have been calls for the plantation production of *Tetrapluera tetraptera* in order to meet its multi-functional demands and produce vigorous seedlings. Additionally, it is believed that plant grown under intensive care and supervision should perform better than those that regenerated naturally. Additionally, Silviculture techniques and management used in raising plants is a great determinant in the quality of plants produced.

Organic fertilizers have been recorded to contribute to the fertility and improvement of soil. Several researches have confirmed its effectiveness for good establishment and expected growth (Nikles, 2004). The use of organic manure has been reported to enhance the productivity, improve soil structure and enhance crop yield. However, Questions have been raised on the effectiveness of organic fertilizers as a silviculture tools in hastening the growth of forest trees species, what is function of organic fertilizers in the production quality and healthy forest plants? Of what proportion and combination is suitable in the mass production of forest tree species seedlings? Therefore, the main objective of this study is to investigate growth response of *Tetrapluera tetrapera* seedlings to selected organic fertilizers.

2. Materials and Methods

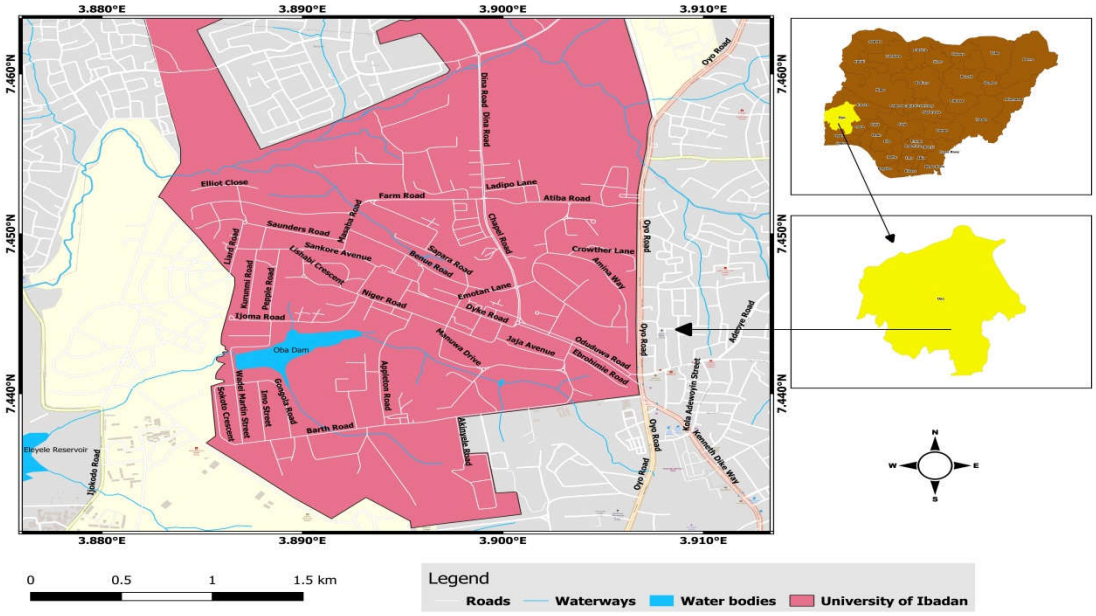

Figure 1. Map showing the study area.

Study area: the experiment was carried out in the screen house of the department of Forest production and products, University of Ibadan, Ibadan, Oyo state. University of Ibadan is located in Ibadan North Local Government are on latitude 7^0 44'N and longitude 3^0 90' E with an average annual rainfall pattern of 1300m and average humidity of 82.2%. The average temperate lies between 23^0c and 29^0c (Egbinola and Amobichukwu, 2013). The materials used are germination baskets, Vernier caliper, calibrated measuring ruler,

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field book, polythene pots, top soil (loamy), hand trowel, seed of *tetrapluera tetrepera* and river sand. The seeds were obtained from the National Horticulture Research Institute, Idi-ishin, and Ibadan. The poultry manure and cow dung were obtained from the teaching and research farm of the department of animal Science, University of Ibadan, Oyo state, Nigeria.

Method of preparation: The river sand was sterilized and sieved in order to be free from all particles that might inhibit germination. The sterilized river sand was filled into germination baskets and seeds of *tetrapluera tetrepera* were first removed from the pods and soaked into water before being sown inside the basket and watered twice daily. The poultry manure and cow dung was air dried and sieved for easy decomposition and mixing. The poultry manure and cow dung were mixed with topsoil at different levels: top soil only serve as the control experiment, 10g of poultry manure to 1kg of top soil, 10g of cow dung to 1kg of top soil, 20g of poultry manure to 1kg of top soil, 20g of cow dung to 1kg of top soil and the mixture of poultry manure and cow dung (15g each) to 1kg of top soil. The treatments were replicated 8 times to make 48 pots in total. The treatments were watered twice daily (morning and evening) for 10 weeks.

Parameters assessed: plant height, number of leaves and stem diameter were the growth parameters assessed. It was done at an interval of one week.

Plant height: measurement was carried out by measuring the height of the plant from the base of to plant to the apex with the aid of calibrated measuring ruler.

Stem diameter: this was measured by the use of venier caliper and it was measured at the base of the plant.

Leaf count: this was done by counting the number of leaves on each plant.

Experimental design: completely randomized design comprising of six treatments and each treatments was replicated 8 times. The treatments are as follows:-

T1= control experiment (Top soil only)
T2= 10g of poultry manure + 1kg of top soil
T3= 10g of cow dung + 1kg of top soil
T4= 20g of poultry manure + 1kg of top soil
T5= 20g of cow dung + 1kg of top soil
T6= (15g of poultry manure +15g of cow dung) + 1kg of top soil

3. Results

It is very important to have in-depth information on the treatments as well as growing medium used in raising of the plants. The laboratory analysis carried out(as shown in Table 1) showed that both the treatments and top soil used were suitable for the production and improving the growth of *tetrapluera tetrepera* seedlings as they possessed the necessary and essential nutrients needed for plant growth and development.

	Top Soil	Cow Dung	Poultry Manure
MC	1.84	0.08	0.24
N%	1.42	1.52	1.92
P (Cmol/kg)	1.68	1.21	1.53
K (Cmol/kg)	0.75	0.55	0.84
Mg (Cmol/kg)	1.15	0.19	0.47

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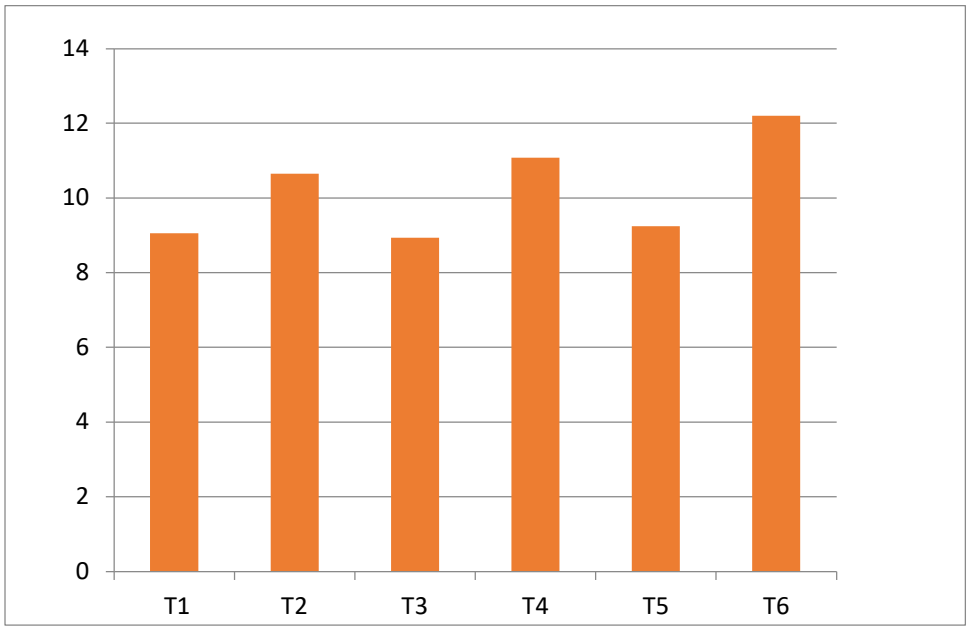
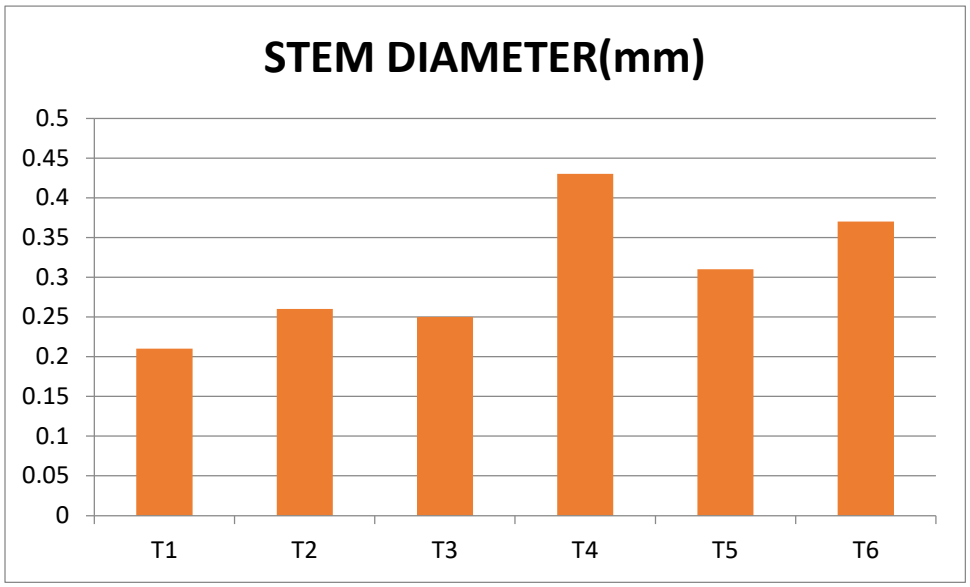
Plant Height



The results on plant height shows that T6 (15g of poultry manure + 15g of Cow dung) has the best height on plant height with the mean value of 12.20cm followed by T4 (20g of poultry manure) with mean value of 11.08cm. However, the least mean value was observed in T3 (20g of cow dung) with the mean value of 8.93cm. The low performance recorded is in tandem with the research of Adepoju (2005) that reported comparatively low performance in stem height when the seedlings of *Tetrapluera tetraptera* when heated with decomposed cassava peels and cow dung respectively. Further analysis from the result above shows that there is significant different among the treatments at 5% level of probability. This shows that organic manure had a significant effect on the height development of *Tetrapluera tetraptera* seedlings.

Stem Diameter



The results shows all treatments used had considerable effects on the stem diameter the plants. However, the best performed treatments was observed in T4 with the mean value of 0.43mm followed closely by T6 with the mean value of 0.37mm while the least performed treatment was observed in T1 with the mean value of 0.21mm. Analysis of

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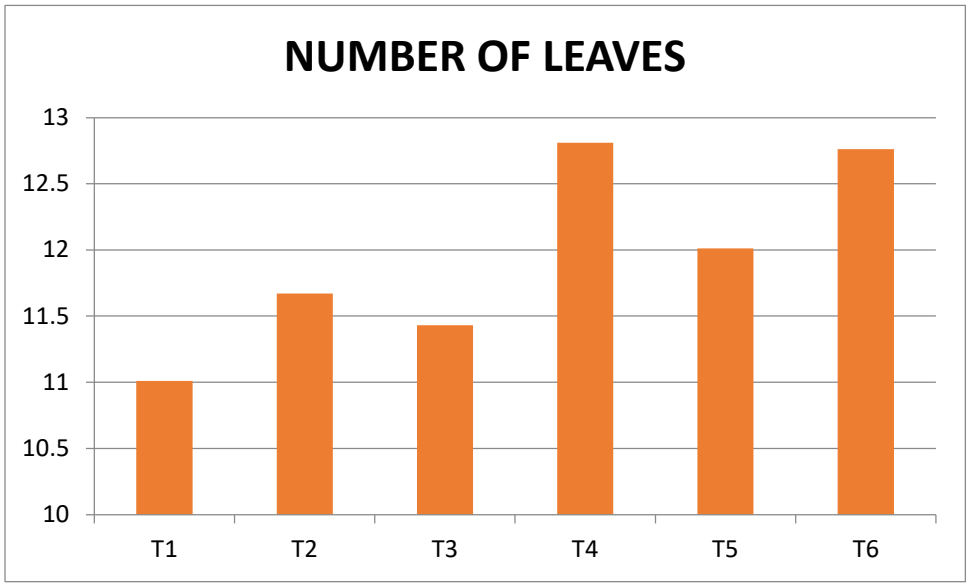
variance also shows there is significant difference among the treatments at 5% level of probability. This shows that the use of poultry manure and cow dung had a significant effect on the stem diameter of *Tetrapluera tetraptera* seedlings.

Number of Leaves



The results shows all treatments used had considerable effects on the number of leaves *Tetrapluera tetraptera* seedlings. However, the best performed treatments was observed in T4 (20g 0f Poultry manure) with the mean value of 12.81 followed closely by T6 with the mean value of 12.76 while the least performed treatment was observed in T1 (Control experiment) with the mean value of 11.01. Analysis of variance also shows there is significant difference among the treatments at 5% level of probability. This shows that the use of poultry manure and cow dung had a significant effect on the stem diameter of *Tetrapluera tetraptera* seedlings.

4. Discussion

Organic manure consists of important nutrients needed for plant growth and development. The effect of manure in improving soil nutrients and crop productivity cannot be over emphasized. Organic nutrients increase the abundance of soil organism by providing matter and micro nutrient for organisms which aids plant nutrients absorption (Mader et al., 2002). It also improves the physical condition of the soil and keeps up the level of humus in the soil and maintains the best condition for the activities of soil organism.The result of this research reflected an excellent performance on all the parameters of *Tetrapluera tetraptera* assessed. The work is also in conformity with other researches carried out on the effect of organic fertilizers on the growth of tropical tree species. (Rafiu *et al.,* 2019) confirmed the positive influence of horse dung and brewer's spent grain on the growth of *Tetrapluera tetraptera* seedlings. This research is also in tandem with the work of Awotoye (2019) which reported the positive growth response of *Khaya senegalensis* seedlings to different organic fertilizers.

5. Conclusion

The study revealed the effect of organic fertilizers (cow dung and poultry manure) at different levels and combination in enhancing and hastening the growth of *tetrapluera tetrepera* seedlings. The study also revealed that all treatments used for this study has positive effects on all the parameters assessed. However, the best results was observed in T4(20g 0f Poultry manure) as it performed best in two of the parameters assessed while T6 performed closely best and had the most positive effects in one of the parameters

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(height). Finally, in order to raise healthy and vigorous seedlings that can be well established in the field, the cow dung and poultry manure are highly recommended even recently when conventional fertilizers are expensive and scarce to come by. However, there is knowledge gap needed to be filled on the use of other sources of organic fertilizers (both animal and plant based organic fertilizers) in raising different forest tree species. In this study, the best organic material for the production of *tetrapluera tetrepera* seedlings is T4 while the use of T6 can also be recommended.

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