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COMPARATIVE EFFECT OF COW DUNG AND POULTRY MANURE ON THE GROWTH OF *Khaya senegalensis (Desr.)* SEEDLINGS.

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ABSTRACT

The study investigated the comparative effect organic fertilizers on the growth of *Khaya senegalensis* (Desr). Four treatments were used for this research: T1 20g of poultry manure, T2 (20g of cow dung), T3 (10g of poultry Manure + 10g of cow dung), T4 (Control experiment). 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 Test. on the height parameter assessed on *Khaya Senegalensis,* the highest plant height mean of 8.40cm was recorded in treatment 1(20g of poultry Manure) while the lowest mean plant height 7.19cm was recorded in treatment 4 (Control experiment). Also, the highest mean stem diameter was recorded in Treatment 1 with a value of 0.309mm from while the least was recorded in Treatment 4 with mean value of 2.1175mm. However, highest mean number of leaves was recorded treatment 1 (20g of poultry manure) while the least was observed in T3 (10g of poultry Manure + 10g of cow dung). The results showed that organic manure has considerable effect on the growth of Khaya senegalensis seedlings and it use should be encouraged. T3 (10g of poultry Manure + 10g of cow dung) is hereby recommended to be the best of all in the growth of *Khaya senegalensis.*

Keywords: growth and yield; *Khaya senegalensis;* organic fertilizers; seedlings

INTRODUCTION

Tropical forest is blessed with diverse of important and highly valued plant species. Forestry has the main goal of creating and implementing systems that allow forest to contribute sustainable livelihood of man and provide essential goods and services. Presently, the role of forest to create

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ecosystems and provide goods and services are becoming difficult due to over exploitation, deforestation and slow growth rate of many tropical forest species.

Khaya senegalensis is one of the many indigenous forest tree species that is most valuable and appreciable in timber world due to its importance. Its common name includes Dry zones mahogany, African mahogany and also *Khaya* wood (Orwa *et al.,* 2009). It naturally occurs in some African countries like Senegal and Nigeria and some part of the world originating from tropical area. It occurs in various habitat such as riparian forest, river bank and scattered within higher rainfall savannah woodland, in moist region it is found on higher ground (Cab, 2000). It has a very good medicinal and mechanical property. It is very hard and by far provides the best surface finishing in all Mahoganies. It provides edible and cosmetics oil and also good for furniture work. It has wide, interment and natural distribution in African countries but has only relatively minor occurrence in Sudan, Sierra lone and Nigeria. *Khaya senegalensis* contribute reasonable proportions to Nigeria economy both in timber and domestic use.

Organic fertilizers are fertilizers gotten from human excreta, vegetable matter or animal matter. The majorities of fertilizers are extracted from minerals or produce industrially. On the other hand, Organic fertilizers are usually derived from the remains of living organism either plant or animal used for improving the nutrient level of the soils (Oso, 1995). The use of organic fertilizers has been recommended by several researchers due to its ability to protect the environment, reduce cost of production, and decrease the high usage of inorganic fertilizers as well as improving the soil fertility. (Nikles, 2004) reported that, organic fertilizers are very essential for good establishment and expected growth. Organic fertilizers are becoming widely acceptable in agriculture and forestry due to its significant impact on the enhancement of C, CEC and microbial activity i.e., it plays a crucial role in soil health and fertility improvements and promoting the sustainability of agroforestry (Garcia et al. It has been found out that organic materials are major source of Nitrogen (N), phosphorous (P), Sulphur (S) (Donkor, 1997).

Khaya senegalensis is one of the indigenous timber species that command good market due to its high quality and references to users The rapid increase in demand indicates that these demands can only be met if there is considerable increased production. Such increment requires improvement in the productivity of existing forest sites and establishment of plantation of fast growing species (Donkor, 1997). In recent years, there has been growing interest in the

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establishment of fast growing fast growing *Khaya* species in low tropical area. The relative importance and demand of *Khaya senegalensis* has led to its high amount of exploitation, indiscriminate deforestation and illegal felling, these has led to the need to carryout research for rapid and mass production of healthy seedlings of *Khaya senegalensis* so as to meet up with its multi-functional purposes. The only way to reduce pressure on the natural forest is to improve artificial regeneration and Silviculture techniques that will enhance the growth and development of these indigenous species. The slow growth rate of many indigenous species and over exploitation in the forest has led to several calls of their plantation production. Application of organic fertilizers is gaining prominence among agriculture and forestry sector. Different organic fertilizers have been used to hasten the growth of many highly valued slow growing species. While some have shown considerable and significant effect on the growth of highly valued indigenous species others have shown little or no considerable effect little or no effect on the seedlings, these might be due to proportion and combination used on the plants. Therefore, the main objective of this research is to investigate the effect of organic fertilizers on the growth of *Khaya senegalensis* seedlings.

MATERIALS AND METHOD

The experiment was carried out in the screen house of federal College of Forestry, Ibadan situated at Jericho Hill, under the Ibadan North West Local Government are of Oyo state. The areas lie on latitude 7^{o} 23 and Longitude 3^{o} 15 E with an altitude of 150m above the sea level. The climatic condition of the area is tropically dominated by two rainfall patterns. The average annual rainfall range humidity of about 80-85% with two district season of wet (April- October) and Dry (November to March). (FRIN, 2013).

Materials used for this research include top soil, *Khaya senegalensis*, polythene pot, sieve, germination basket, venier caliper, poultry droppings, cow dung and hand trowel. The seeds of *Khaya senegalensis* were obtained from University of Ibadan botanical garden, Ibadan, Oyo state, Nigeria. The organic fertilizers (Poultry manure and Cow Dung) were procured from the farm of Federal College of Forestry, Ibadan.

Method of preparation: sterilized river sands were filled into germination baskets. seed source was sown into germination basket. Watering was carried out every morning to aid and hasten

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germination. Polythene pots were filled. The treatments (cow dung and poultry manure) were air dried and grounded into powdery form after which it was sieved. The treatments were weighed into different quantities of 10g and 20g each and they were mixed thoroughly with 2kg of top soils each. The various organic fertilizers combinations used in this study are: A=T1(20g of poultry Manure), B= T2 (20g of cow dung), C=T3 (10g of poultry Manure + 10g of cow dung), D= T4(Control experiment). Each treatment was replicated 8 times to make it a total of 32 treatments. The first emergence was noticed after 10 days. After emergence, the seedlings were prickled out from the germination basket and transplanted to the already filled polythene pots mixed with different treatments, initial readings were taken and measurement was done every two weeks for a period of twelve weeks. The plants were watered and monitored daily.

Experimental design: The experiment was arranged in a completely Randomized design (CRD) with four treatments and 8 replicates. The parameters assessed include stem height (cm): which was measured with the aid of calibrated measuring ruler, Stem diameter: measured at the base stem of the plants with the aid of vernier caliper while the number of leaves was assessed by manual counting of the leaves on each plants.

Data analysis: Analysis of variance (ANOVA) was carried out to identify significant difference between treatments for each of the growth parameters assessed.

RESULT AND DISCUSSION

It is very important to carry out the chemical analysis of the soil and other treatments used in the experiment. These will help in having in-depth information about the treatments as well nutrient composition. The laboratory analysis revealed that the total N(Ng/Kg) contents of Top soil, Poultry manure and cow dung are; 1.71, 1,43 and 1.32 respectively. The potassium content (K (C mol/kg) are 0.21,1.0 and 0.40 respectively. Phosphorous content (P (C mol/kg) are 1.24, 1.43 and 1.67 respectively. The laboratory results revealed that there is higher percentage of Nitrogen (1.71) in the top soil used when compared with other treatments while the poultry manure contains the higher percentage of phosphorous and potassium with 1.43 and 1.0 respectively. This is a good indication that top soil and treatments used were suitable enough for as they contain the necessary nutrients needed for plant growth and development.

EFFECTS OF THE TREATMENTS ON PLANT HEIGHT

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The chart (figure 2) shows that the highest mean of plant height (8.45cm) was observed in T1 while the lowest mean was observed in the T4 (control experiment) with a mean plant height of 7.80cm. The better attributes of the treatments might be attributed to the higher proportion of poultry manure which has been reported in improving soil fertility and the water holding capacity of the soil.

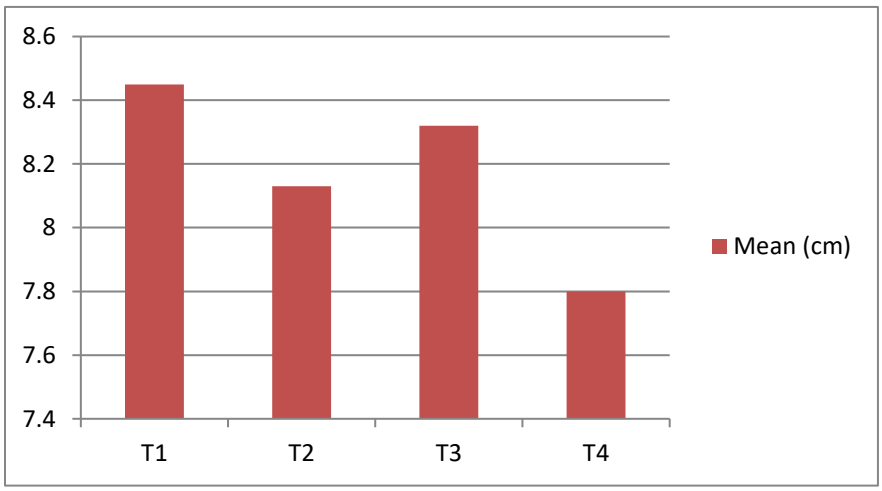

Fig 2: EFFECT OF THE TREATMENT ON THE PLANT HEIGHT

EFFECTS OF THE TREATMENTS ON STEM DIAMETER

Figure 3 showed that, the seedlings treated with T1(20g of Poultry manure) has the highest mean diameter of 0.309mm while, the lowest mean diameter in T2 with mean diameter of 0.198mm.

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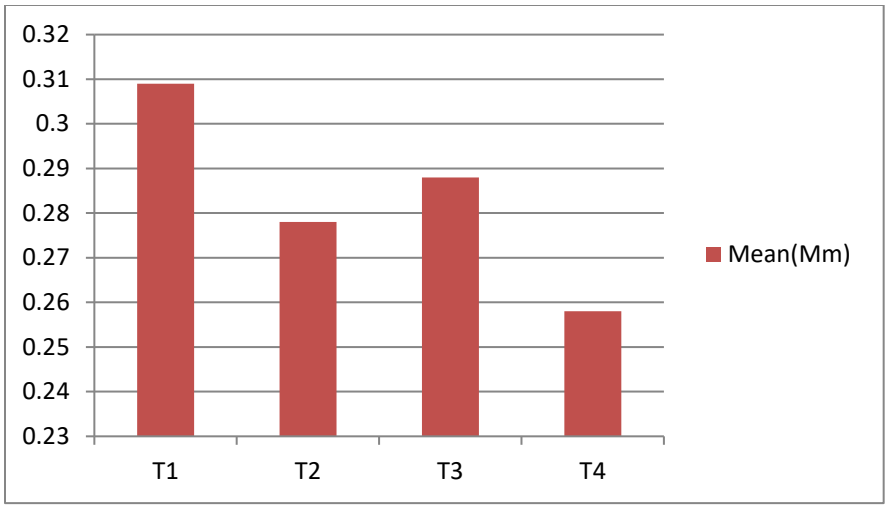

Fig 3: EFFECT OF THE TREATMENT ON THE STEM DIAMETER

EFFECTS OF THE TREATMENTS ON NUMBER OF LEAVES

Figure 4 showed that, the seedlings treated with T3 (10g of poultry Manure + 10g of cow dung) has the highest number of leaves (5) while the T2 and T4 has the lowest number of leaves.

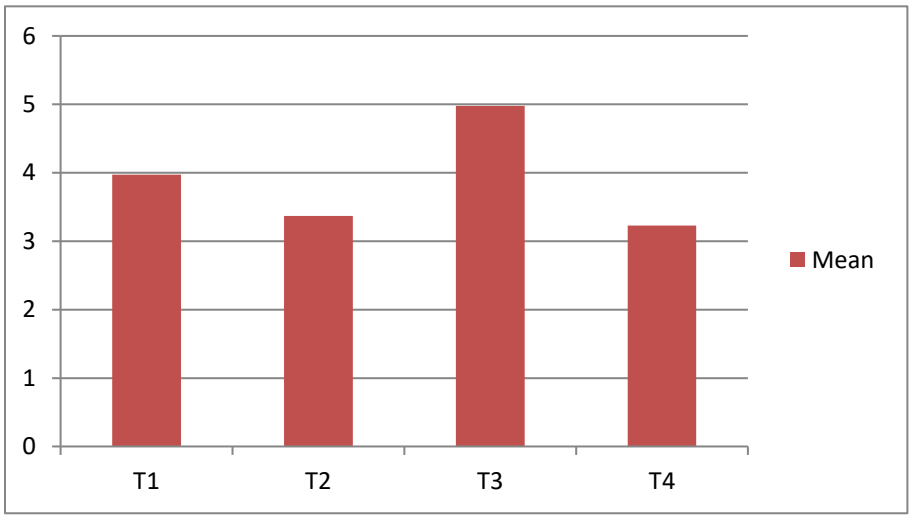

Fig 4: EFFECT OF THE TREATMENT ON THE NUMBER OF LEAVES

DISCUSSION

Organic manure is very essential in adding to soil nutrient and fertility. The results of this research also affirmed this that organic manure has considerable effect on the growth of *Khaya*

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senegalensis seedlings. Organic manure contains essential substances needed for plants growth and development. The productions of healthy and vigorous seedlings of different many tropical tree species have been traced down to the application of organic manure in the nursery stage. Apart from its role in improving soil fertility, organic manure also helps in the replacement of loss nutrient in the soil. The results of this research showed that both the treatments used are essential in the production of *Khaya senegalensis* seedlings. T1 (20g of poultry manure) have the highest impact on the stem height while treatment 3 (10g of poultry manure + 10g of cow dung) have the highest positive effects on the number of leaves and stem diameter. The results are in tandem with several researches carried out on the use of organic manure to raise different tree species. For instance, the work of Orwa *et al.*, (2009) shows that, organic manure is very important in hasten the growth of *Khaya senegalensis* seedlings. Similarly, Awotoye (2019) also confirmed that organic manure and *Gliricidia sepium* at varying levels are good for the growth and improvement of *khaya senegalensis* seedlings. Fagbenro (1995) also reported the improved performances when *Khaya ivorensis* were treated with different organic fertilizers respectively. However, it was shown that T3 had a low effect on the growth of the seedlings in all the parameters assessed and was only better than control experiment. Additionally, it also had the lowest effect on the stem diameter of *Khaya senegalensis* seedlings. This also in tandem with the research of Adepoju (2005) that reported comparatively low performance in stem diameter when the *Tetrepluera tetraptera* when heated with decomposed cassava peels and cow dung respectively.

CONCLUSION

The findings from this study shows that both sources of organic fertilizers used in the study perform excellently in the production of *Khaya senegalensis* seedlings. However, the combination of cow dung and poultry manure (10g each) is highly recommended as they perform better than all other treatments used. 20g of poultry manure can also be adopted as it also shows considerable effects on all the parameters assessed. The result when subjected to further analysis shows that there is significant difference in all treatment applied. Finally, in order to be able to raise seedlings that can be well established on the field, cow dung and poultry manure can be recommended in raising seedlings especially, seedlings of slow growing species.

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Additionally, further research should be carried out on the use of other sources of organic manure in raising different tropical tree species.

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