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# EFFECT OF POULTRY MANURE AND COW DUNG ON THE GROWTH OF *Entandrophragma angolense* (Welw) C.DC

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## *ABSTRACT*

***This study examined the effect of poultry manure and cow dung on the growth of Entandrophragma angolense. The experiment was carried out at Federal College of Forestry, Ibadan. The experiment lasted for 12 weeks. Three weeks old seedlings at two-leaf stage were transplanted into polythene pots thoroughly mixed with varying levels of poultry manure and cow dung manure with 2 kg of top soil in each pot. Plants in control experiment had no treatment of organic fertilizer. The experiment was laid out in Completely Randomized Design (CRD) with seven treatments which were replicated three times. Plant height, number of leaves, stem girth, and leaf area were assessed weekly. The result obtained from the study shows that the seedlings treated with 10 g of cow dung performed best in all the parameters assessed with 11.73 cm for stem height, 30.58 $cm^2$ for leaf area, 0.29 mm for stem girth and 6 for number of leaves produced and this is followed by seedlings treated with 10 g of poultry dropping which had 11.52 cm for stem height, 26.48 $cm^2$ for leaf area, 0.27 mm as stem girth and 5 leaves produced during the course of the study. It is thus concluded that cow dung is best used as organic manure for raising seedlings of Entandrophragma angolense during its early growth stage in the nursery.***

**Keywords:** *Entandrophragma angolense*, poultry manure, cow-dung, growth rate, mahogany

## INTRODUCTION

*Entandrophragma angolense* (Welw) C.DC, a large tropical forest tree that belongs to the family 'Meliaceae' is one of the few trees famously known as 'Mahogany trees'. *Entandrophragma* is a genus of eleven species of deciduous trees in the mahogany family (Meliaceae) which is restricted to tropical Africa (Klaus, 2010). Some of the species attain large sizes, reaching 40-50 m in height and exceptionally 60 m and 2 m in trunk.

The importance of *E. angolense* both in furniture and in traditional medicines cannot be over-emphasized as it is highly valued for furniture, cabinet work, veneer and plywood and it is also used for flooring interior trim, paneling stairs, ship building, vehicle bodies and coffins (Tchinda, 2008). According to Adegoke, *et al.* (1968), *E. angolense* is widely used in ethno-medicinal treatment of various gastro intestinal disorders including peptic ulcer in humans. Tchinda, (2008) also reported that bark decoction of *E. angolense* has been used in the treatment of fever and also in external applications as an anodyne against stomach-ache, peptic ulcer, ear ache and kidney rheumatic or arthritic pain.

However, due to the economic importance of this species, it is on the verge of being endangered and according to IUCN (2012) Redlist, it is categorized as vulnerable, this is as a result of the indiscriminate felling of this species in the forest, its commercial exploitation has resulted in the large-scale extraction of mature individuals throughout its range (Hawthorne, 1998; Hall, 2008).

Lack of adequate information on the mode of planting, nutrient and environmental requirements, nursery techniques as well as early stage growth and development behaviours have seriously undermine attempts to establish large plantation of

the species (Ladipo *et al*., 1994; Rafiqul *et* al., 2004)

The production of valuable seedlings in the nursery requires an investment in fertilizer and soil management to improve productivity as soil fertility is one of the important environmental factors affecting plant growth as low soil fertility is a major constraint in agriculture and forest productivity (Hausthone, 2005; Tanimu, *et al*., 2007). Poultry manure and cow dung are waste products of poultry birds and bovine animal (domestic cattles, yak, etc) species respectively, these among others are used as organic fertilizers to improve soil fertility.

The slow growth rates of *E. angolense* under natural conditions, the long time needed to reach maturity in terms of fruit production and poor dispersal of the seeds away from mother trees seem to be serious draw backs, therefore it is pertinent to look into studies that can improve the growth especially under nursery conditions so as to overcome challenges of the field establishment. There is the need to carryout research with various types of eco-friendly fertilizers in order to promote its regeneration and enhance its growth in order to increase its production and save the world from the danger of its extinction in the forest. The objectives of the study therefore were to investigate the effect of poultry manure and cow-dung on the growth of *E. angolense* and determine the best manure for its optimum growth at the nursery stage.

## MATERIALS AND METHODS

### Study Area

The experiment was carried out within the forest nursery of Federal College of Forestry Jericho, Ibadan. The College is located in Ibadan North West Local Government Area, of Oyo State on Latitude $7^0$26' N and Longitude $3^0$36' E of the Greenwich Meridian. It has annual rainfall of about 1400-1500m and average relative humidity of about 80% - 85%. There are two distinct seasons that are notable in the area which are dry and wet (raining) season and the annual temperature is about $34.4^0$c.

### Experimental Procedure

The seeds of *E. angolense* were sown in a germination box filled with sterilized river sand. After germination, twenty-one uniformly growing seedlings were carefully selected from the germination box and were transplanted into the polythene pots that had been filled with 2 kg of top soil.

The treatments were:

$T_0$ -2 kg of top soil with no fertilizer (control)
$T_1$ - 5 g of ground poultry manure
$T_2$ - 10 g of ground poultry manure
$T_3$ - 15 g of ground poultry manure
$T_4$ - 5 g of ground cow dung
$T_5$ - 10 g of ground cow dung
$T_6$ - 15 g of ground cow dung

The experiment was arranged in a Completely Randomized Design (CRD) with seven treatments and a control and was replicated three times. Growth parameters were assessed for twelve weeks and they included:

i. **Stem diameter (mm):** The stem of each seedling was measured with the aid of vernier caliper
ii. **Seedling height (cm):** This was done using meter rule graduated in centimeter to measure the height from the soil level to the top of terminal bud of the seedlings.
iii. **Leaf production:** This is the total number of leaves present on each seedling and this was done by counting the leaves.
iv. **Leaf area:** This was done through the use of graphical books.

### Data Analysis

Data collected were subjected to the analysis of variance and where the means were found to be significant, DMRT was used to separate the means.

## RESULTS

### Seedling height

Table 1 revealed that plants treated with 10 g of cow dung had the best performance with mean value of 11.73 cm followed by seedlings treated with 10 g of poultry manure with mean value of 11.52 cm while 15 g of cow dung had the least performance with mean value of 7.31 cm.

### Stem diameter

Results in table 1 also revealed that 10 g of cow dung had the best performance with mean value of 0.29 mm followed by 10 g of poultry manure (0.27 mm) while seedlings treated with 15 g of poultry manure, 15 g of cow dung and seedlings with no organic manure least performed with mean value of 0.25 mm. This trend is similar to the results obtained for seedling heights.

**Leaf area**

The results for leaf area indicated that l0 g of cow dung had the highest leaf area with mean value of 30.58 $cm^2$ followed by seedlings treated with 10 g of poultry manure with mean value of 18.48 $cm^2$ while plants treated with 15 g of poultry manure had least performance with mean value of 17.02 $cm^2$.

**Number of leaves**

Results in table 1 indicated that 10 g of cow dung produced the highest number of leaves with mean value of 6 followed by 10 g of poultry manure with mean value 5. This trend is similar to results obtained for other parameters. Seedlings without application of fertilizer (control) produced the least number of leaves with mean value of 3

**Table 1: Effect of poultry manure and cow dung on height, diameter, leaf area and number of leaves produced for *E. angolense* at the nursery stage**

| Treatment | Seedling height (cm) | Stem diameter (mm) | Leaf area ($cm^2$) | Number of leave |
|---|---|---|---|---|
| | Mean | Mean | Mean | Mean |
| 5 g poultry manure | $7.31^{b}$ | $0.26^{b}$ | $17.06^{b}$ | $4^{b}$ |
| 10 g poultry manure | $11.52^{a}$ | $0.27^{ab}$ | $18.48^{ab}$ | $5^{ab}$ |
| 15 g poultry manure | $7.83^{b}$ | $0.25^{b}$ | $17.02^{b}$ | $4^{b}$ |
| 5 g cow dung | $7.91^{b}$ | $0.26^{b}$ | $15.97^{c}$ | $4^{b}$ |
| 10 g cow dung | $11.73^{a}$ | $0.29^{a}$ | $20.66^{a}$ | $6^{a}$ |
| 15 g cow dung | $7.31^{b}$ | $0.25^{b}$ | $18.10^{ab}$ | $4^{b}$ |
| **Control** | **$8.16^{b}$** | **$0.25^{b}$** | **$16.77^{bc}$** | **$3^{b}$** |

***NOTE:*** *Means with the same letter are not significantly different across the column*

The results obtained from the study showed that seedlings treated with 10 g cow dung performed best in all the parameters measured (Fig. 1). This treatment showed healthy growth in seedling height, stem diameter, leaf area, and in number of leaves produced. It was observed that moderate quantity (10 g) of cow dung was able to make *Entandrophragma angolense* grow well while the seedlings treated with higher quantity of cow dung and poultry manure did not perform as one would have expected.

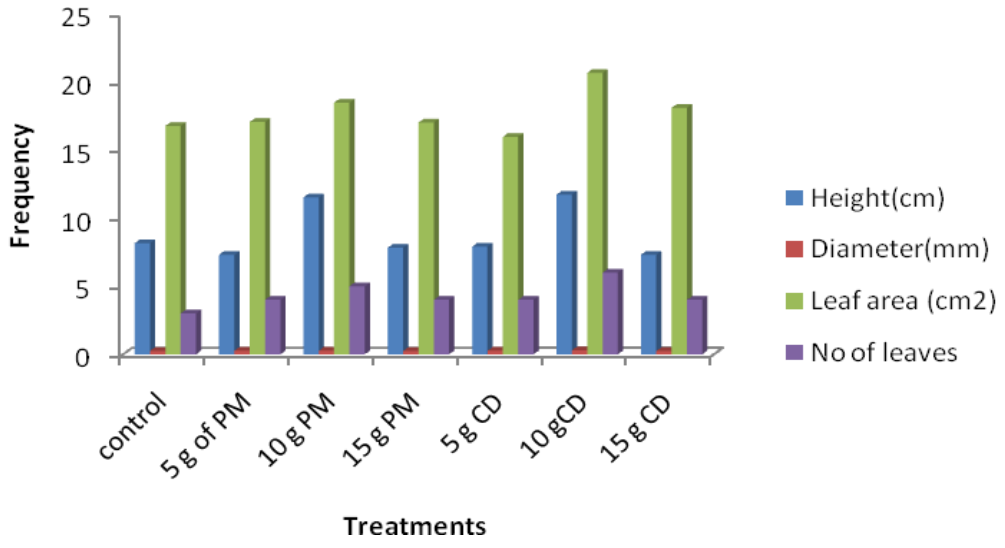


**Figure 1: Growth pattern of *E. angolense* seedlings as influenced by organic manure**

**DISCUSSION**

According to Donalue *et al.* (1990) nitrogen, phosphorus and potassium are essential for plant growth particularly at the early stage, these nutrients are available in abundance in organic manures. The highest mean value for height was recorded in seedlings treated with 10 g of cow dung and was closely followed by 10 g of poultry manure and these two fertilizer levels were significantly different from other treatments. However, results obtained from this study is slightly different from the findings of Ojo *et al*.,

(2009) who reported that poultry manure produced the highest mean height and leaf production in an experiment involving the use of both organic and inorganic fertilizers on the growth of *Adansonia digitata*, this dissimilarity could be as a result of the different species of seedlings involved in these experiments because fertilizer requirement and preference of different species vary and this current study is an effort made to identify the appropriate fertilizer preference and adequate quantity for enhanced growth in *E. angolense* seedlings.

From the results of this study, there was no significance difference in the performance of *E. angolense* seedlings treated with 10 g of cow dung and 10 g of poultry manures, this is an indication that both organic fertilizers can considerably improve the growth of the species. The implication of this is that inorganic fertilizers could be replaced by organic fertilizers in *E. angolense* seedlings nursery. This assertion is corroborated by the findings of Pondel *et al* (2001) that the use of inorganic fertilizer has negative effects on the environment causing groundwater pollution, degradation of soil structure and decreased surface water infiltration while organic fertilizers serve as soil amendments which are often essential in increasing the quality of minerals in the soil by adding organic matter, which increases water penetration and cation exchange potential, improves both the structure and texture of the soil, increases the water holding capacity of the soil and also acts as mulch, thereby minimizing the evaporation of soil moisture (Akinyele, 2007).

## CONCLUSION

The results obtained from the study showed that the seedlings that were treated with 10g of cow dung perform best. This treatment showed healthy growth in leaf production, seedling height, stem girth, and leaf area. It was observed that 10 g of cow dung was able to make *Entandrophragma angolense* grow well while the seedlings applied with high quantity of cow dung and poultry manure did not perform as expected.

### Recommendation

Based on the results obtained, it is therefore recommended that:

i. Cow dung of l0 g should be adopted for the growing of *E. angolense.*
ii. Poultry manure of 10 g should be adopted for growing *E. angolense* in the absence of cow dung manure.

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