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COMPARATIVE EFFECT OF DIFFERENT POTTING MEDIA ON THE EARLY GROWTH OF ENTANDOPHRAGMA ANGOLENSE (WELW.)

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Abstract
The study investigated the effects of different potting media on the early growth of *Entandophragma angolense* with the view to producing viable and vigorous planting stock of the species for plantation establishment. The layout comprised of nine treatments of potting media prepared from forest topsoil, river, Sand, cow-dung, and poultry manure in varying ratios. The treatment was replicated nine times in Completely Randomized Design (CRD). Height, stem diameter, leaf production was assessed fortnightly for six weeks. The results showed that there were significant differences ($p<0.05$) among the treatment in shoot height, stem diameter, leaf production, and biomass yield. Treatment 3 (T3) gave the best result in terms of shoot height, 26.89cm, stem diameter, 3.20mm, while Treatment 7 (T7) had the highest leaf production 27.52, and Treatment 6 (T6) had the highest biomass production of 5.52g. However, Treatment 8 (T8) gave the minimum results of mean height, 9.12cm, stem diameter 0.19mm, leaf production, 5.69, and biomass production of 1.01g. The study, therefore, showed that the incorporation of an optimum level of organic manure into the potting media resulted in the growth improvement of Entandophragma angolense seedlings.

Keywords: Entandophragma Angolense, Seedling Height, Collar Diameter, Number of Leaf, and Biomass Accumulation.

1. Introduction

Entandrophragma angolense (Meliaceae) common name Mahogany, is most common in moist semi-deciduous forests, particularly in regions with an annual rainfall of 1600–1800 mm. However, it can also be found in an evergreen forest. In East Africa, it occurs in lowland and mid-altitude rainforest, but sometimes also in gallery forest and thickets, up to 1800 m altitude. It strongly prefers well-drained localities with good water-holding capacity. The heartwood is pale pinkish-brown to pale reddish-brown, slightly darkening upon exposure to deep reddish-brown, and distinctly demarcated from the creamy white to pale pinkish sapwood, which is up to 10cm wide.

A potting medium is a composition of organic materials formulated to achieve desirable chemical and physical needs required by the crop to attain its potential growth and development. According to Khan *et. al* (2006) good potting media management is essential to the production of quality fruit tree seedlings, since vigorous growth is needed to face the seasonal hazards encountered on the field Nisar *et al.* (1990) reported that a growing media containing a different mixture of loam, sand and cattle manure at a ratio of 2:1:1 had a significant effect on the growth of sour orange and troyer citrange container-grown seedling. Similarly, maximum growth was observed in *Citrus limonia* Osbeck container-grown nursery plants in a mixture of Cattle manure, lignite, and two commercial products, Agrohumus 51 and 61 (Grassi *et al*, 1999). Optimum water holding, capacity, electrical conductivity, pH, better aeration, and organic matter of a medium are the dominant factors considered when choosing materials for a potting medium (Khan *et, al*, 2006).

High-quality media to false seedlings for transplanting is a key determinant factor to establish a successful tree crop production program (Bustamante *et al,* 2008). Media that provides optimal water-bolding capacity, sufficient nutrients that are pathogen-free results in better seedling quality before transplanting (Evans 1998). Several media mixtures have been evaluated to determine an optimal formula to support seedling and growth and development. Strawberry cv. Fern seedlings had the highest growth, leaf number, leaf area, fresh and dry root weight, root length, and fresh weight when grown on 4-8mm pumice grade and 45% pumice amendment with soil (Sahin *et al*, 2004).

Successful establishment of any forest nursery and plantation depends largely on the fertility of the planting medium and soils treated with organic materials (Chijioke, 2008). There is evidence that the fertility of any cultivated soil deteriorates with use. The incorporation of organic manure such as poultry manure or cow dung or horse manure improves the soil fertility and the subsequent yield of any crop planted in the soil (Kang *et al*., 2008).

To meet the demand for this forest Product, it is necessary to have a healthy and Vigorous planting stock of the species for the Plantation establishment which involves the Raising of a viable and healthy stock. Most available soil for plantation establishment is degraded and there is a need to have a way of combating such problem. This can only be achieved by determining the deficiency of the Soil and supply the necessary deficient nutrient. Thus, raising vigorous and healthy seedlings at the nursery for plantation establishment required the use of the appropriate and optimum proportion of organic manure.

Organic manure is cheap and more readily available. It can be in solid or liquid form and contains an appreciable amount of nitrogen and phosphorus. It is easy to prepare and apply and is useful in the production of crop plants (Bhatta and Doppler, 2010).

Poultry manure is very rich in calcium and has great effects on the growth of an agricultural crop. Cow dung, on the other hand, has an effective impact on the growth of forests and crops. It contains calcium and also improves soil porosity. According to Jackson, (1990) and Chijioke (2008), organic manure has been recognized as an effective silvicultural tool for raising healthy forest stock and hastens the growth of trees in the forest plantation.

The vigorous growth of seedlings is one of the factors that stimulate plantation establishments (Kang *et al,* 2008). However, *Entandophragma angolense* exhibit initial slow growth. Therefore, there is a need to identify the best potting media that could influence the fast growth of *Entandophragma angolense* seedlings.

2. Materials and Methods

Seeds of *Entandophragma angolense* were procured from Seed Store of Forestry Research Institute of Nigeria (FRIN). Before sowing the seeds, the orange covering was removed completely and seeds were soaked in water for 24hours at 25^0C to facilitate germination. Two seeds were then sown into each polythene pot of which one was thinned out after germination to make one seedling per pot. A Completely Randomized Design (CRD) was used. The potting media was prepared with forest topsoil, river sand, cow-dung, and poultry manure in varying ratios with each ratio representing different treatments. There were nine (9) treatments in all including control and replicated nine times. At both germination and seedling stages, watering was carried out twice daily.

2.1 Growth assessment

Plant height (cm): Each seedling was measured fortnightly for 16 weeks. Measurements were taken from the surface of the soil to the tip of the apical bud using the graduated ruler. The fortnight mean of the recorded readings was subjected to analysis of variance (ANOVA).

2.2 Leaf Production:

The number of leaves produced was counted fortnightly for sixteen weeks. The fortnight mean of counted leaves was subjected to analysis of variance (ANOVA).

2.3 Stem Diameter (mm):

The stem diameter of each seedling was measured at about 2cm above the root collar with the use of vernier caliper. These were done fortnightly for sixteen weeks. The data collected were subjected to analysis of variance (ANOVA).

2.4 Biomass Assessment:

Biomass assessment was carried out at the end of the sixteenth week of the Experiment. Leaves, stems, and roots of replicates of each treatment were excised with a sharp razor blade. The leaves of each treatment were separately gathered, so also the stems and roots. Their fresh weights were determined using a weighing balance and then oven-dried to constant weight for twenty-four hours at 70 C. The combined weights of the leaves, stem, and roots of each replicate accounted for the total weight. Values of the dry matter were subjected to analysis variance (ANOVA)

3. Results and Discussion

The result revealed that the best treatment for the seedling height of 26.89cm was recorded in T3 while the lowest (9.42cm) was observed in T8. The best result for the collar diameter of 3.20mm was observed in T3 while the lowest (0.19mm) collar diameter was recorded in T8. T7 produced the highest number of leaves with 27.52 while T8 produced the least number of leaves with 5.69. The biomass accumulation revealed that T6 had the best performance with 5.52g while T8 accumulated the least biomass with 1.01g. The Analysis of Variance indicated that there were significant differences in the treatments (Table 1).

Table 1: Analysis of Variance (ANOVA) for the mean seedling growth of *Entandophragma angolense*

Treatments	Height (cm)	Collar diameter (mm)	Number of Leaves	Biomass (g)
T1	21.11a	2.30a	20.22a	3.37a
T2	20.11a	2.23a	18.00a	3.26a
T3	26.89a	3.20a	19.33a	5.22b
T4	26.67a	2.57a	15.33a	4.41ab
T5	21.11a	2.12a	15.01a	3.86a
T6	20.67a	3.15a	22.56b	5.52b
T7	19.00a	3.18a	27.52b	5.41b
T8	9.42b	0.19b	5.69c	1.01c
Control	17.56a	1.96a	21.22a	3.24a

Mean±SE followed by the same superscripts in the column are not significantly different ($p>0.05$)

4. CONCLUSION

Incorporation of organic manure into the potting media resulted in growth improvement of *Entandophragma angolense* seedlings. Organic manure proved to be a better amendment for the establishment of the species as it enhanced its seedlings' morphological growth and biomass production. Organic manure showed the potential to improve the establishment of *Entandophragma angolense* at the nursery stage and it is environmentally sustainable, cheap, and easily accessible (Kang *et al.*, 2008; Bhatta and Doppler, 2010). Therefore, the utilization of poultry manure (T3) is recommended to improve seedlings production of *Entandophragma angolense* seedlings for the establishment of species plantation.

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