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EFFECT OF SEED SOURCE ON SEEDLING GROWTH OF *Dialium guineensis* (Wild)

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ABSTRACT

The study investigated the effect of different seed source on seedling growth of Dialium guineensis with a view to providing the best provenances and growth medium at the Department of Forestry and Wildlife Management, University of Port Harcourt, Nigeria. The fruits used for the study were collected from three (3) mother trees consisting in Abeokuta (Ogun State), Aba (Abia State) and Choba (Rivers State). The collected fruits were extracted and subjected to germination using three growth medium namely Sharp River sand, Sawdust and Topsoil involving three replicates in A Randomized Complete Block Design (RCBD). The highest mean height was recorded from Abeokuta with seed sown in topsoil which had (5.34±0.12) this was followed by Choba with seed sown in topsoil which had (5.10±0.12) and the least was recorded in Aba with seed sown in sharp sand having mean value of (3.92±0.12). The highest collar diameter was recorded from Choba with seed sown in sharp sand which had (1.84±0.56) the was followed by Aba with seed sown in sharp sand which had (1.80±0.56) the least was recorded Abeokuta with seed sown in topsoil (0.63±0.56). The highest leave number was observed from Abeokuta with seed sown in sharp sand which had (4.94±0.17) this was followed by Abeokuta with seed sown in sawdust which had (4.69±0.17), the least was recorded in Choba with seed sown in topsoil which had (4.41±0.17). the results reveals that seeds from different source demonstrated different growth performance as it was recorded that the seeds from Abeokuta performed better and sharp sand as best growth media. As a result recommendation for mass production of D. guineense within the south western zone of Nigeria.

Keywords: Seed source. Growth media, seedling growth, polythene bags, *Dialium guineensis*

INTRODUCTION

Dialium guineensis commonly known as Black Velvet or Velvet Tamarind is a small size tree of rainforest that produces seeds, which have edible and nutritious outer-coat fruits; the tree belongs to the family Caesalpinaceae (Keay, 1989). The Seeds popularly called Vitamin C are available in the dry season and widely sold in most Nigeria markets (Olajide, *et al.*, 2014). Attempts made to conserve these tree species is difficult to achieve because of paucity of information on the ecology and silvicultural requirements of the species. Growing seedling and natural seed dispersal in the forest is the main way of raising planting stocks in the tropics for plantation establishment. Therefore, obtaining adequate amounts and the right kind of seeds is an important part of any plantation programme (Evans, 1986).

A seed source refers to the supply of seed for planting and replications of forest plants and genetic materials that are of aught most important. Seed sources should represent the best available genetic material for planting as exhibited by the plus trees or parental material (Mbora *et al*., 2009). Seed source testing of native species is necessary to screen the available variation for higher productivity and future breeding work. However, the rapidity of erosion of genetic resources occasioned by seemingly unmitigated deforestation is alarming. Seed source studies are desirable to screen the naturally available genetic variation to utilize the best material for maximum productivity and for further breeding programme and select suitable genotypes for productions of best planting materials for future breeding programmes (Shiv

Kumar and Banerjee, 1986; Mamo *et al*., 2006). Tropical forest provides an array of products and services of great importance to man's survival and its developmental balanced and have long been recognized for its constant supply. The array of these forest stocks ranges from abundant edible, highly nutritious and medicinal fruits, seeds, leaves, twigs nuts and bark which are of socio-economic importance and values are harvested from a source. Natural forests, particularly in the tropical regions are complex; they have great diversity of tree species with different uses. One of the fundamental and indispensable needs of man provided by forests is food. These have been ignored in the past and are currently being eroded as forests in many parts of the world are cleared and used for agricultural purposes and the remaining forest trees on farmlands come under increasing pressure of household usages. Therefore, obtaining adequate amounts of the right kind of seed from the right source is an important part of any plantation programme. This research therefore investigates the effects of seed sources and seedlings growth of *D. guineensis* in response to different seed source.

MATERIALS AND METHODS

Experiment Site

This study was carried out at the Forest nursery of the Department of Forestry and Wildlife Management, University of Port Harcourt, choba campus. Geographically the site is located at latitude 4^{o}53' 14"N through 4^{o}54' 42"N and longitude 6º 54' 00"E through 6º 55' 50"E (Chima *et al.,* 2015)

Collection of seeds

The fruits of *Dialium guineensis* were collected from different agro ecological locations of Choba (Rivers State), Aba (Abia State), and Abeokuta Matured *D. guineensis* fruits were collected from healthy plus trees in each location, which were randomly selected from traditional agroforestry farms. The fruits from each source were bulked together, all collected fruits were depulped and the seed lots were separated into three.

Experimental Design and Procedure

Seed Germination

One hundred (100) seeds were selected per location and used for germination experiment. Two months after seeds were sown; twenty (20) seedlings at uniform height from each location were selected and transplanted into polythene bags size of (25 x 15 x10cm) filled with the different growth medium. The seeds were sown into three growth medium of well decomposed sawdust, topsoil and sharp river sand which were replicated three times before laying the experiment in a Randomized Complete Block Design (RCBD). A total of one hundred and eighty (180) seedlings of *D. guineensis* was used for the experiment, three sowing media was use for the

Seedling Growth

The initial height of the seedlings in the polythene bags was recorded to determine subsequent height and girth increment. In addition, leaf production of the species was recorded. The seedlings were transplanted into polythene bags of size 0.20 litres filled with growth medium, the polythene bags were arranged under shade to reduce the scorching effect of direct sunlight on the young seedlings; the transplanted seedlings were watered daily and assessed for eight weeks (8wks). The variables evaluated include growth parameters: Seedlings height were measured using a meter rule (cm), Collar diameter increment were measured using electronic venier calliper and Leave production were determined by directly counting the number of leaves.

Data Analysis

Height data were analyzed using Statistical Package for Social Sciences (SPSS) for windows (version 17.0). A two-way ANOVA test was conducted at 5% level of significance and the Duncan Multiple Range Test (DMRT) was used to separate significant means.

RESULTS

Effect of seed source and growth media on early seedling growth of *Dialium guineensis*

There were no significant differences in the effect of seed source on early seedling growths of *D. guineensis* (Table 1). The highest mean height was recorded from Abeokuta with seed sown in topsoil which had 5.34 followed by seeds collected from Choba with seed sown in topsoil (5.10±0.12) and the least was recorded for seeds collected from Aba with seed sown in sharp sand having mean value of 3.92±0.12.

Table 1: Effect of seed source and growth media on height of *Dialium guineensis*

Seed Source	Growth media			Mean
	Topsoil	Sawdust	Sharp sand	
Abeokuta	5.34±0.12	4.68±0.12	4.58±0.12	**4.87±0.07[a]**
Choba	5.10±0.12	4.67±0.12	4.01±0.12	**4.59±0.07[b]**
Aba	4.05±0.12	4.60±0.12	3.92±0.12	**4.19±0.07[c]**
Mean	**4.48±0.07[a]**	**4.65±0.07[a]**	**4.17±0.07[b]**	

Means with the same alphabet do not differ significantly from each other at $\alpha = _{0.05}$

Effect of seed source growth media on collar diameter of *Dialium guineensis*

There were no significant differences in the effect of seed source on seedling growths of *Dialium guineensis* (Table 2). The highest collar diameter was recorded from seeds collected from Choba with seed sown in sharp sand had 1.84±0.56followed by Aba (Abia state) with seed sown in sharp sand 1.80±0.56 and the least was recorded Abeokuta with seed sown in topsoil (0.63±0.56).

Effect of seed source on seedling and growth media on leave number of *Dialium guineensis*

There were significant differences in the effect of seed source on seedling growths of *Dialium guineensis* (Table 3). The highest leave number was observed from seeds collected from Abeokuta with seed sown in sharpsand and sawdust which had 4.94±0.17 and 4.69±0.17, repectively. The least was recorded in Choba with seed sown in topsoil which had (4.41±0.17).

Table 2: Effect of seed source on early seedling and growth media on collar diameter of *Dialium guineensis*

Seed Source	Growth media			Mean
	Topsoil	Sawdust	Sharp sand	
Abeokuta	0.74±0.56	0.75±0.56	0.76±0.56	**0.75±0.32[a]**
Choba	0.69±0.56	0.68±0.56	1.84±0.56	**1.07±0.32[a]**
Aba	0.71±0.56	0.63±0.56	1.80±0.56	**1.05±0.32[a]**
Mean	**0.71±0.32[a]**	**0.69±0.32[a]**	**1.47±0.32[a]**	

Means with the same alphabet do not differ significantly from each other at $\alpha = _{0.05}$

Table 3: Effect of seed source on early seedling and growth media on leave number of *Dialium guineensis*

Means with the same alphabet do not differ significantly from each other at $\alpha = _{0.05}$

Seed Source	Growth media			Mean
	Topsoil	Sawdust	Sharp sand	
Abeokuta	4.69±0.17	4.56±0.17	4.94±0.17	**4.73±0.10[a]**
Choba	4.41±0.17	4.50±0.17	4.52±0.17	**4.47±0.10[a]**
Aba	4.56±0.17	4.47±0.17	4.45±0.17	**4.50±0.10[a]**
Mean	**4.55±0.10[a]**	**4.51±0.10[a]**	**4.64±0.10[a]**	

DISCUSSION

This study shows that seeds from Abeokuta sown in topsoil had the highest mean height, and the least was on seeds from Aba sown in sharp sand. This result agrees with the work of Omokhua *et al.* (2015) whose results obtained the highest height on seedlings sown in topsoil, but disagrees with the findings of Okunomo (2010) who opined that the highest diameter height of *P. bicolor* was observed for seedlings sown in soil mixed with poultry droppings. This work also agrees with the findings of (Okunomo *et al.*, 2004; Agboola *et al.*, 2001) who reported that a higher germination percentage of *Dacryodes edulis* and *Persia americana* were obtained on seedlings sown in topsoil.

The results on collar diameter show that seeds sown in sharpsand had the highest, and the least was recorded in seeds in topsoil. This result corroborates with the findings of Omokhua *et al.* (2016) who recorded the least collar diameter on seedlings sown in sharp sand. This also agrees with the work of Dickens (2018) who recorded better performance in sharp river sand and it does disagrees with the works of Mathowa *et al.* (2014) who obtained the highest collar diameter on seedlings sown in sawdust.

Photosynthesis process in young seedling is very paramount to their survival and growth and can be hampered if the production of leaves is retarded; the study recorded the highest number of leaf production on seedlings sown in sharp sand which can be attributed to adequate light intensity. The least was observed on seedlings sown in topsoil. This result disagrees with the findings of Okunomo (2010) that obtained the highest leaf numbers in seedling sown in soil mixed with poultry droppings

CONCLUSION

The results of this experiment show that provenance or progenies from Abeokuta had the best seed source and topsoil as growth medium had significant effects on seedlings growth parameters. The significance of the growth parameters was attributed to the different provenances. Thus the finding is useful for large seedling production for afforestation and regeneration of these species and should be subjected to different growth media and locations to enhance early establishment of seedlings. This will also prevent the use of inadequately parent plant for restoration and domestication programmes.

Recommendation

Further studies on the seed source and growth medium on the growth performance of seedling in the nursery could be considered in order to increase seedlings yield and selection of quality plus trees.

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