EFFECTS OF PRE-SOWING TREATMENTS ON GERMINATION OF *Dialium Guineense* WILD

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Abstract
The effects of pre-sowing treatments on the germination of Dialium guineense were investigated. The study was carried out at Prof. Nnabuife screen house located at Forestry and Wildlife Department, Faculty of Agriculture, Nnamdi Azikiwe University Awka. The pre-sowing treatments were soaking in cool water (T1), soaking in hot water (T2), scarification (T3), acid treatment (T4) and control (T5). The germination variables that were investigated were days to germination, germination period and germination percentage. Data collected were subjected to Analysis of Variance (ANOVA) using SAS software package version 9.0, Significant means were separated by LSD (least significant figure) test at 5% level of probability. T4 were first to germinate with the best germination percentage of 86% , followed by soaking in water (T1) with 20%, control (T5) had 18% ,T2 had 12% while T3 was the last to germinate with the poorest germination percentage of 4%.T3 had the shortest germination period of 2 days, followed by (T4) which had 4 days ,then (T1) with 20 days, (T2) had 22 days, and (T5) recorded 25 days. Therefore, to achieve uniform and maximum germination percentages of Dialium guineense within the shortest possible time, acid treatment (T4) is recommended as the best pre germination treatment followed by soaking in cool water (T1) and then soaking in hot water (T2). Mechanical scarification is not good for Dialium guineense as observed in (T3).

***Keywords**: Dialium guineense , Dormancy, Germination, Multi-purpose tree, Pre-sowing treatments.*

Introduction

Forest which is a store house of natural resources, have been known to provide wild range of benefits to mankind. Apart from timber production, forest offers varieties of other resources which includes fuelwood, food supplies, seeds, nuts, fruits, gums, latex, resins, leaves, industrial raw materials, medicine and shelter. Despite all these benefits from the forest, the rate at which the natural forest are being loss through deforestation is alarming (Oboho and Ngalum 2014).

In Nigeria, many indigenous species of ecological, sociological and economic importance have some of these problems. *Dialium guineense* is one of such species, having seed coat dormancy with slow growth rate.
Dialium guineense Wild is multipurpose tree that belongs to the family of Leguminosae, it is commonly called velvet tamarind. The fruit (Plate 1) is popularly used as food. The fruit contains very hard seed (Plate 2), the pulp has a sweet-sour astringent flavor similar to baobab, but sweeter. It can be eaten raw when dry by man and animal (Matsuda, 2006).The pulp when peeled is also eaten raw in south-east Nigeria because of its refreshing properties and pleasant scorching taste (Ubbaonu *et al.,* 2003). The thirst quenching, refreshing pulp can also be soaked in water and drunk as a beverage and also provides jam and jellies. It could also be used as flavor in snacks and non-alcoholic beverages (Efiong *et al*., 2009).
The tree is used for fuel; it is used to make firewood and charcoal. It is also used for timber.The bark is used as chewing stick (indigenous tooth brush) among Nigerian populace (Akinpelu *et al.*, 2011).

Plate 2: Fruits of *Dialium guineense*

Plate 2: Seeds of *Dialium guineense*

Dialium guineense has been discovered to have numerous medicinal values, the different morphological parts of the plants has its unique medicinal values ranging from the bark, leaves and fruits. The bark, it is chewed for oral hygiene and stomach ache among the Esan people of Edo state (Besong *et al*.,2016). It is also used as a remedy for cancer, pains, headache and infections such as diarrhea, severe cough, bronchitis, wound, malaria fever, jaundice, ulcer and hemorrhoids. The leaves are used as remedy for fever, prenatal pains, edema and infections such as diarrhea, severe cough bronchitis, wound, malaria fever, jaundice, ulcer and hemorrhoids. It is also used as vitamin supplement among some tribes in southern Nigeria, The fruits are used as remedy for diarrhea. It also is used to improve lactation and check genital infection in South East Nigeria (Besong *et al*., 2016).
Therefore, considering the uses and other sociology-economic importance of *Dialium guineense,* there is need to cultivate these specie so as to ensure the continuous derivation of its benefits, and to ensure this, there is the need to break the seed coat dormancy so as to ensure quick and uniform germination of the species, hence the purpose of this research.

Materials and Method

Experimental Site/Study Area
This study was carried out in the screen house of the Department of Forestry and Wildlife, Faculty of Agriculture, Nnamdi Azikiwe University, Awka. The university is located in the Eastern part of Nigeria and lies between the Latitude 6.24850N and Longitude 7.11540E. The climatic condition of the area is tropically by rainfall pattern ranging from 1828mm –2002mm. the average annual temperature is about 26.30^{0}C , Ezenwaji *et al*. (2013).

Seed Procurement
The seeds used in carrying out this experiment were procured from Nibo in Awka South L.G.A, Anambra State.Matured ripe fruits of *Dialium guineense* were gathered from a pheno- typically superior mother tree from Nibo. After procurement, the fruits were manually de-pulped. The total number of seed extracted were 250 seeds

The Treatments
The pre-sowing treatments used includes;
T1= Soaking of seed in cool water (72hrs)
T2 = 10 minutes soaking in hot water
T3 = Scarification (This is done using file)
T4= Treatment of seed with 80% H_2SO_4 for 5 minutes
T5 = Control (no treatment)

Data Collection and Analysis
Data was collected based on germination assessment at highlighted below;
The effects of pre-sowing treatment on seed germination was assessed by counting the numbers of seeds that germinated daily for 12 weeks. The germinated seeds were counted and recorded from the date of first emergence/germination until there will be no more germination.
The germination parameters measured includes;
(i). Days to first emergence (ii). Germination percentage (iii). Germination trend
Data collected were subjected to Analysis of variance (ANOVA) using SAS software package version 9.0 (SAS 2002). Means were separated by LSD (least significant figure) test at 5% level of probability.

Results
Dialium guineense seeds exhibit epigeal germination. T4 germinated first after 9 days of sowing followed by control (T5) which started germination on the 10th day and soaking in water (T1) germinated on the 12th day, control (T5) started germination on the 10th day, soaking in hot water (T2) started germination on the 11th day. Scarification (T3) germinated last on the 14th day. Acid treatment (T4) had the highest germination percentage of 86%, followed by soaking in water (T1) with 20% , control (T5) had 18% ,T2 had 12% while T3 had the poorest percentage of 4% (Table 1, Plate 1).

Acid treatment (T4) also had a short germination period of 4 days followed by soaking in water (T1) which gave a germination period of 20 days and (T2) soaking in hot water had 22 days ,(T5) control recorded 25 days .The table below shows the germination parameters of *Dialium guineense* seeds.

Table 1:Summary of Germination parameters of *Dialium guineense* in relation to treatments

TREATMENTS	Days to Germination	Germination Period	Germination Percentage (%)
T1	12.00^{b}	20.00^{b}	20.00^{b}
T2	11.00^{b}	22.00^{b}	12.00^{c}
T3	14.00^{a}	2.00^{c}	4.00^{d}
T4	9.00^{c}	4.00^{c}	86.00^{a}
T5	10.00^{bc}	25.00^{a}	18.00^{bc}
LSD	**10.78**	**12.97**	**27.69**
Sig	**	**	**

Means within columns with different superscript are significantly different
**= significantly different at P< 0.05.

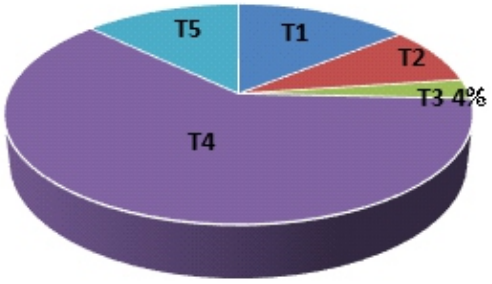

Figure1: Germination percentage of *Dialium guineense* under various treatments

Germination trend

Germination trend (Fig 2) for *Dialium guineense* seeds was irregular / intermittent irrespective of the treatment and the time of attainment of peak germination varied between treatments.

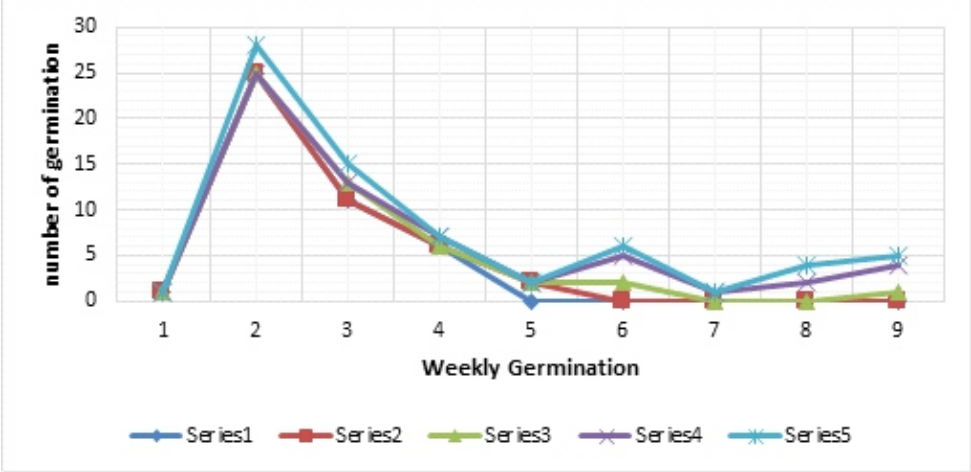

Figure 2: Graphical representation of germination trend from various treatment

Discussion

Dialium guineense seeds had epigeal germination and an intermittent/ irregular germination trend. T4 was the first to germinate with the highest germination percentage of 86%, this could be as a result of the effect of the acid on the seed coat that removes the dormancy barrier and thereby allows the imbibition of water which triggers germination. This supports the findings of Onyekwelu (1990) who obtained 100% germination of *Tetraplura tetrapletra* when treated in sulphuric acid. Somade and Obiaga (1992) also reported high germination percentage for *Terminalia superba* using Sulphuric acid treatment. This study is in line with the findings of Mensah and Ekeke, (2016), who stated that hydrogen peroxide combined with scratching seeds quickly overcome the seed coat, which help in enhancing the germination, the acids acts to oxidize, degrade and soften the coat to permit water uptake and gaseous exchange and remove the constraint imposed by the covering layers. This result is in contrary to the findings of Aghatise *et al* (1994) who recorded low germination percentage at 11% for *Dialium guineense* seeds when treated with sulphuric acid. Also, Anozie and Oboho

(2019) recorded low germination percentage in *Canarium schweinfurthii* seeds treated with sulphuric acid. Soaking of seeds in water (T1) had low germination percentage of 20%. This low germination percentage was also recorded by Rasebeka *et al,* (2014*)* who reported that seeds soaked in cold water recorded the lowest germination percentage in Acacia species. Amusa (2010) also observed that soaking of seeds in cold water reduced the germination of *Afzelia africana* seeds. However, this did not support the findings of Oboho (2014) who reported that soaking of seeds of *Adansonia digitata* in water increased germination percentage and reduced the days of germination from 43 days to 24 days. Owonubi *et al* 2005 reported that soaking of seeds of *Azadirachta indica* in cold water resulted in increased rate of seed germination. Also, Anozie and Oboho (2019) recorded increase in germination percentage in *Canarium schweinfurthii* seeds soaked in water.

The mechanical scarification treatment of *Dialium guineense* seeds using file gave the poorest germination percentage, this poor germination could be attributed to a possible detrimental effect of the removal of the seed coat that provides protection to the embryo during germination and early growth . Also the scarification may expose the embryo and this may lead to ant feeding on the cotyledons of the crop in T3 upon germination. This result supports the findings of Mustapha *et al* (2005) who recorded low germination percentage in seeds of *Cuscuta campestris* treated with mechanical scarification method. Anozie and Oboho (2019) recorded poor germination percentage using scarification (partial cracking and complete removal of seed coat) in *Canarium schweinfurthii*. Also Oboho (2015) reported that mechanical scarification and removal of seed coat affected the germination percentage of *Gambiya albida* seeds.

However, this opposes the findings of Burhan (2000) who found that physical scarification was more effective in breaking dormancy of *Rhynchosia minimali* seeds than chemical scarification with hydrochloric acid.
The control treatment (T5) had low germination percentage of 18%. This is an indication that *Dialium guineense* seeds will germinate without treatment but at a much lower rate.Hot water treatment (T2) of *Dialium guineense* had low germination percentage of 12%. This low germination could be attributed to the effect of the heat on the seed embryo. This result contradicts the findings of Aduradola and Adejumo (2005) who stated that treatment of seeds of *Erythropleum suaveolens* with hot water gives higher germination percentage. Awodola and Abdullahi (1990) reported that hot water treatment gives higher germination percentage with the seeds of *Acacia nilotica.*

Conclusion

This study investigated the effects of pre sowing treatments on the germination of *Dialium guineense* willd. The investigation revealed that pre sowing treatments have effect on the seed germination of *Dialium guineense*. The result showed that the best treatment to enhance germination of *Dialium guineense*was was Acid treatment (T4) and the germination period was achieved within 4 days which reveals that high percentage of seedling germination can be achieved within the shortest period. This investigation also revealed that manual scarification of the seed coat is detrimental to the germination of *Dialium guineense* as observed in treatment (T3).

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