

Determination of Conformance of Germination in Seeds of Different Size Classes of *Nauclea diderrichii*

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Abstract

Three different size classes (Large, Medium and Small) of the seeds of *Nauclea diderrichii* were tested under humid propagator and in the open nursery bed. The seeds were weighed and the average fresh weights were 0.75kg, 0.70kg and 0.50kg for the large, medium and small seeds sizes respectively. The average lengths varied from 2.2cm and 2.9cm while the girths were from 2.0cm and 2.6cm. Results show that the medium seed size class had the highest germinative capacity of 92.5% though not significantly different from others. It is obvious the environmental conditions under which the seeds were kept contributed significantly to their germination. However, a spurious peak value observed was higher than the true peak value for all seed size classes. The small seed size class had the best germination value which is an interaction between mean daily germination and the peak value both in the open and under humid propagator.

Keywords: Humid propagator, Germinative capacity, Spurious Peak Value.

Introduction

Nauclea diderrichii also known as opebe is a dominant indigenous plantation specie in Nigeria. It is an evergreen tree that reaches a height of 30-40m and a diameter of 0.9-1.5m and belongs to the family Rubiaceae. Its natural habitat is sub-tropical or tropical moist lowland forest. The wood is dense and resistant to fungi and insects and it is used in Marine construction.

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The specie is becoming fast extinct because of overexploitation and clearance of the forest for other developmental programmes. The disastrous effect of deforestation on the environment is a major problem in the tropics. Open and closed forests in the tropics are being destroyed at the rates of 3.8 and 7.5 million hectares a year respectively (FAO, 1985). In Nigeria as in most tropical countries, shifting cultivation is one of the major causes of deforestation. Urbanization, industrialization, a rapidly expanding population and increasing demands for timber and fuel wood, are also factors which accelerate the rate of deforestation in Nigeria. Kio and Okorie (1986) noted that reserved and unreserved forests in Nigeria are being depleted of growing stock at extremely fast rates.

Forests and trees are one of the climatic buffers on which mankind depends- a buffer which uses its complex organic structures to withstand adverse environmental perturbations up to a certain threshold (FAO-UNEP, 1982). Forests and trees ameliorate the climate, protect watersheds, and prevent desertification in arid and drought stricken regions. They provide timber, food, shelter and fuel wood as well as prevent and control catastrophic environmental disaster like drought, floods and erosion. Unfortunately, illegal felling and unhealthy competition for forest lands for agriculture accelerate deforestation rates in Nigeria with disastrous consequences, one of which is constant erosion and reduction of natural gene pool of important forest tree species including *Nauclea diderrichii*.

As in other tropical countries, there has been progressive depletion of the rain forest in the country. Despite the inadequate forest resources of the country, Nigeria destroys about 300,000 hectares of her forest annually (World Resources Institute, WRI, 1987). Most of these forests belong to the rain forest ecosystem. Forest destruction estimate given by the WRI comes to about 5% of the country's closed forest whereas reforestation efforts accounted for about 26,000 hectares yearly in the 1980's. This unprecedented loss of the Nigerian forest ecosystem has serious implications not only for the in-situ preservation of genetic variability but also for the quality of the life of millions of forest dwellers.

The study therefore examined the germination tests carried out on *Nauclea diderrichii* seeds with the aim of recommending the best seed size class for plantation establishment

Materials and Methods

Seeds of the study specie were purchased from the open market and thereafter separated into different size classes; viz large, medium and small. Eighty (80) seeds from each lot were weighed and the length and breadth were measured to compare differences. Each size class was sown in 40 polythene pots containing mixtures of river sand top soil in the ratio 1:1. Forty pots per size class were arranged under humid polythene tent forming a block. This was repeated under open condition to form another block. Germination was observed and assessed both under humid and open conditions at intervals of 5 days.

The Mean Daily Germination (MDG) and Peak Value (PV) were determined to know the quality of germination i.e. the germination value (GV). The consistency in germination was related to the spurious peak value as described by Czabator (1982).

Results and Discussions

The average fresh weights of large, medium and small size were 0.75kg and 0.50kg respectively. The average lengths were 2.9cm, 2.6cm and 2.2cm respectively. The differences in average fresh weight, length and breadth for large and medium size classes were not substantial.

The germinative capacity of seeds of *Nauclea diderrichii* in the medium size class in the open was 92.5% which was the highest when compared with large and small size classes with 90% each. The germinative capacity for all size classes under humid propagator tent was lower when compared with those in the open (Table 1). This is reflected in the analysis of variance (ANOVA) (Table 2) which showed that the environment had contributed significantly to the overall total germination of the species, but the size class has not in any way affected germination. Environmental conditions had contributed significantly to the germination *Nauclea diderrichii* seeds.

The Mean Daily Germination (MDG) was approximately 3% for each of the size classes (Table 3), while the germinations after 20 days in the open were 77.5%, 72.5% and 87.5% for large, medium and small size -classes giving a True Peak Value (TPV) of 3.88, 3.63, and 4.38 respectively which is considerably lower than the Spurious Peak Value (SPV). The Spurious and True Peak Values under humid tent were obtained at different periods and they are also lower than those obtained

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under open condition. In general, the small-size class seeds of *Nauclea diderrichii* had the highest germination value both under humid tent and the open.

Conclusion

In some woody species such as *Gmelina arborea* seeds from large size-classes had been found to have better germinations than the medium and small size-classes (Ezekwesi and Oduwaye, 1987). In *Nauclea diderrichii* seeds from the small size-class had germinative capacity which compared favourably with other two size classes. But, the best germination Value was recorded in seeds from the small size-class both in the open and under the propagator. However, inconsistency in the Peak Value of germination which resulted into the spurious and true peak value occurred among all seed size classes. This phenomenon is quite different in woody species such as *Pinus caribaea* where there is consistency in seed germination.

References

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Table 1: Germination Percentage of *Nauclea diderrichii* seeds from different size classes.

	Large	Medium	Small	AV. Germination
Open	90	92.5	90	90.8
Humid Tent	85	85	80	83.3

The Average germination % in the open was higher than under humid tent.

Table 2: ANOVA (Germination of *Nauclea diderrichii* seeds)

Source	SS	df	MS	F-test	5% Level
Total	105.2028	5			
Treatment	14.5833	2	7.2916	2.33	Ns
Environmental condition	84.3750	1	84.3750	27.00	*
Error	6.25	2	3.125		

Ns = not significant

* = significant at 5% levels

Table 3: Mean Daily Germination %, Peak and Germination Values of *Nauclea diderrichii* seeds in the open and under humid tent.

Seed Size	Mean Daily Germination (MDG) %		Spurious Peak Value (SPV)		True Peak Value (TPV)		Germination Value (GV=MDGxTPV)	
	Open	Humid tent	Open	Humid tent	Open	Humid tent	Open	Humid tent
Large	3.0	2.8	6	4.5	3.88	2.4	11.64	6.72
Medium	3.08	2.8	5.2	2.5	3.63	2.63	11.18	7.36
Small	3.0	2.7	7.0	4.3	4.38	3.1	13.14	8.37

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