



EFFECTS OF SEED SOURCE ON GERMINATION AND EARLY SEEDLING GROWTH OF *Dennettia tripetala* Bak.f. FWTA

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ABSTRACT

A study of the Effect of Seed Source on Germination and early seedling growth of *Dennettia tripetala* was carried out. Matured seeds of *Dennettia tripetala* were collected from Bendel LGA – Abia State, Abak LGA – Akwa Ibom State and Etung LGA – Cross River State with distinct climatic variations and within the tropical rainforest of Nigeria. The lengths and total weights of sixty seeds of each source were obtained before sowing the seeds in uniform plastic germination baskets. Each seed source was replicated 3 times, with twenty seeds in each germination baskets. The experiment was laid out in Completely Randomized Design. Germination counts were taken every 5 days up to 25 days for each seeds source. The tender seedlings were pricked out into polythene pots and left to stabilize for two weeks. Five seedlings of uniform size from each seeds source were selected and replicated three times and laid out in Completely Randomized Design. Parameters such as: seedlings heights, collar diameters, leaf areas were measured and number of leaves produced were counted fortnightly. Total dry weights were obtained after 12 weeks of planting. Result showed that, percentage germination of *Dennettia tripetala* were highly variable as expected among the three different seeds sources. *Dennettia tripetala* seeds sourced from Abak (Akwa Ibom) gave the highest germination percentage (80%), while the least (66.7%) was obtained in seeds from Bende (Abia State). Growth variables assessed were significant difference at 5% probability level, the exception was in leaf production. *Dennettia tripetala* seeds sourced from Abak (Akwa Ibom) was the best in nursery establishment especially in Umuahia, where this study was carried out.

Keywords: *Dennettia tripetala*, Germination, Seedlings growth, Dry weight.



Introduction

Dennettia tripetala belongs to the family Annonaceae. It is a tree of the rainforest, occasionally found in the savanna area and a very useful plant of West Africa (Ogbonnaya and Agwu, 2010). *Dennettia tripetala* is a medium size tree which produces edible fruit when the conventional stable foods are scarce. The fruit are slightly pepperish edible fruit and it is used among Eket people in Akwa Ibom State of Nigeria to prevent vomiting in early pregnancy among women. While men chew it with palm wine, the young leaves are chewed on account of their pungent spicy tasted and it is a good source of vitamins.

The need to produce enough forest products for the world's ever – increasing population has been a major concern to countries all over the world. Nigeria obtained most of her food and varieties of medicines and industrial inputs from both wild and domesticated components of biodiversity (Joshua and Umoren, 2010).

Nigeria forest and savanna wood lands have been witnessing enormous pressures (Igboanugo, 2008). This was mostly due to escalating population pressures in the forms of rising demands for fuelwood and timber, expansion of croplands to meet the rising need to establish developmental projects. The alarming rate of forest destruction has adversely affected the conservation status of many of our indigenous fruit trees. The conservation of ecosystems genetic resources of *Dennettia tripetala* in areas where trees are found is particularly important in the tropics where the forests are subjected to destruction or excessive exploration. Aju and Okwulehie, (2005) opined that, some plants have tremendous impact on the society but are given little or no attention in terms of domestication and full development. It is necessary to investigate an indigenous species such as *Dennettia tripetala* with requisite fruit quality and other products necessary for mankind. Ugese and Dennis (2006) also found significant variation among seed sources in all emergence and seedlings characters considered. Similarly, seed sources had significant effect on seedlings morphology (Aderounmu *et al.*, 2011). It has also been shown that seed morphological parameters have significant effects on the seedling vigour and subsequent development of plants (Oni and Bada 1996, Jimoh and Okali 1996, Oni, 2000). Boot (1996) observed that large seed size can be ecologically advantageous. Though Adio *et al.*, (2008) reported that seed sources and sizes do not affect the germination and early seedlings growth of *C. pentandra*. Hence, this paper examined the effects of seeds source on germination and early seedlings growth of *Dennettia tripetala*.

MATERIALS AND METHOD

Matured seeds of *Dennettia tripetala* were sourced from Bende LGA in Abia State, Otoro (Abak) LGA in Akwa Ibom State and Effraya (Etung) LGA in Cross River State within the tropical rainforest of Nigeria for the study. All the seeds collected for the study were subjected to viability test using floatation. This involved steeping of seeds in water in a baker; seeds that sank



to the bottom were regarded as viable while those which floated were regarded as non viable (Gill *et al*, 1992). The lengths (cm) and total weights (kg) of 60 seeds from each source were measured and weighed before sowing, according to sources of collection in uniform plastic germination baskets were filled with same sowing medium (top soil). Each seed source was replicated three times with twenty seeds in the germination basket.

The seeds were considered germinating when the plumules were emerging above the surface (Olajide *et al*, 2002). Germination counts were taken every 5 days, up to 25 days. This period was adopted following similar work of Adio *et al*, (2008). DGS was calculated as cumulative percentage of total seed germination divided by number of days. Mean Daily Germination (MDG), Peak Value (PV) and Germination Value (GV) were calculated using the following formulae (Czabator, 1962).

$$\text{MDG} = \frac{\text{Cumulative percentage of full seed germination}}{\text{No of days from sowing to the end of experiment}} \dots\dots\dots (i)$$

$$\text{GV} = \text{Final (MDG X PV)} \dots\dots\dots (ii)$$

$$\text{PV} = \frac{\text{DGS}}{\text{No of days since sowing}} \dots\dots\dots (iii)$$

Where

MDG = Mean Daily Germination Percentage

PV = Peak Value

DGS = Daily Germination Speed.

After germination counts, the seedlings were pricked out into polythene pots of uniform size with same soil medium (top soil) and allowed it to stabilize for two weeks to ascertain their survival. Five seedlings of uniform size from each of the seed sources were selected, replicated three times and laid out in a Completely Randomized Design.

Growth variables such as: seedling heights, collar diameter, number of leaf and leaf area, were measured every two weeks after pricking the seedlings of *Dennettia tripetala*. The measurements of seedlings height (cm) were taken from the soil level to the tip of the apical bud with the aids of ruler. The collar diameter (mm) was measured with a venire caliper. The leaf areas (cm²) were traced on 1mm graph sheets and the area estimated by counting the number of full squares as well as those up to 75% of a square. After twelve weeks of growth measurements, five seedlings from each seed source were randomly selected. The seedlings were separated into leaf, root and stem components. Their fresh weights (kg) were determined and later oven-dried for twenty four (24) hours at temperature of 75⁰C before constant dry weights were obtained.



Data collected on seedling heights, collar diameter, leaf counts and leaf area were analyzed using analysis of variance in CRD to determine the significance difference in growth variables at 5% probability level.

RESULTS

Germination of seeds of *Dennettia tripetala* sourced from Bende LGA Abia State, Otoro (Abak) LGA, Akwa Ibom State and Effraya (Etung) LGA, Cross River State commenced in 33rd, 36th and 36th days after sowing respectively (Table 1).

Table 1: Germination (Days) After Planting the seeds of *Dennettia tripetala*

Source	Days After Planting
Bende (AbiaState)	33
Abak (AkwaIbom)	36
Effraya (Etung-C.R.S.)	36

The percentage germination of *Dennettia tripetala* collected from Abak-Akwa Ibom State had the highest (80%), while the seed collected from Bende-Abia State had the lowest (66.67%), as shown in Table 2. The Mean Daily Germination (MDG) values for *Dennettia tripetala* collected from Abak (Akwa Ibom State) was adjourned best (1.38) values, while the least (1.15) was observed in seed from Effraya (Cross River State). The Peak Value (PV) for seeds sourced from Abak (Akwa Ibom) gave the best (2.22), while Effraya (Cross River State) recorded lowest (2.00). Germination Value (GV) for *Dennettia tripetala* collected from Abak (Akwa Ibom) also had the highest (3.13) and Bende (Abia State) had the lowest (2.32).

Table 2: Percentage Germination of *Dennettia tripetala*

Source	Germination%	Means Daily Germination (MDG)	Peak Value (PV)	Germination Value (GV)
Bende (Abia)	66.67	1.15	2.02	2.32
Abak (AkwaIbom)	80.00	1.38	2.22	3.13
Effraya (C.R.S)	78.67	1.24	2.00	2.42



The effects of early seedlings growth of *Dennettia tripetala* from the three sources are shown in Table 3. The seedlings height from Abak (Akwa Ibom) had the highest mean growth of 9.11 ± 1.01 , while those seedlings from Bende (Abia State) had the least of 5.12 ± 1.11 at the end of 12th weeks of growth. The greater collar diameter of seedlings was observed in seedlings sourced from Effraya (Cross River) with value of 0.36 ± 0.01 and the least was observed from Bende (Abia State) with a value of 0.29 ± 0.01 at the end of 12th weeks of growth assessment. Also seedlings obtained from Abak (Akwa Ibom) were adjudged the best with mean leaves number of 7.60 ± 1.24 and the least seedlings from Effraya (Cross River State) with the mean value of 6.80 ± 1.2 was recorded at the end of 12th weeks of growth. The result of five randomly sampling of uniform seedlings from each of the source indicated that leaf area from Effraya (Cross River State) had the highest value of $8.30 \pm 0.89 \text{cm}^2$, while those seedlings from Bende (Abia State) had the least leaf area of $2.59 \pm 1.03 \text{cm}^2$ at the end of 12th weeks of growth assessment (Table 3). There were significant differences among various variables tested except the leaf number (Table 4).

Table 3: Growth variables of *Dennettia tripetala* from 3 different sources within 12th weeks of study

Seed sources	Height (cm)	Diameter (mm)	Leaf number	Leaf area (cm ²)
Bende (Abia)	5.12 ± 1.11	0.29 ± 0.01	7.40 ± 1.64	2.59 ± 1.03
Abak (AkwaIbom)	9.11 ± 1.01	0.35 ± 0.03	7.60 ± 1.24	7.40 ± 0.92
Effraya (C.R.S)	8.23 ± 1.03	0.36 ± 0.01	6.80 ± 1.21	8.30 ± 0.89



Table 4: Analysis of variance of height, collar diameter, leaf number and leaf area of *Dennettia tripetala* from 3 different seed sources.

Variables	SV	Df	Ss	Ms	F-tab	F-cal
Height	Seed source	2	131.921	65.961	3.22	59.718*
	Error	42	46.391	1.105		
	Total	44	178.312			
Diameter	Seed source	2	0.041	0.021	3.22	69.106*
	Error	42	0.012	0.0003		
	Total	44	0.053			
Leaf number	Seed source	2	5.200	2.600	3.22	1.372 ^{ns}
	Error	42	79.600	1.895		
	Total	44	84.800			
Leaf area	Seed source	2	92.0400	47.02	3.89	18.59*
	Error	42	30.3521	2.53		
	Total	44	124.3921			

* = Significantly different at 5% level of probability, ns = Not significantly at 5% level of probability.

The mean total leaf, stem and root of *Dennettia tripetala* dry weight and percentage is presented in Table 5. The result revealed that, mean dry weight from Effraya (Cross River State) had the highest value of 0.76(g) and the least value of 0.28(g) total dry weight was recorded in seedlings from Bende (Abia State). The percentage of leaf dry weight from Abak (Akwa Ibom) was adjudged the best with a value of 56.22%, while seedlings from Cross River gave the least value of 52.88% of *Dennettia tripetala* as shown in Table 5.

Table 5: Mean Dry weights (g) of *Dennettia tripetala* produced from Abia State, Akwa Ibom and Cross River

Growth variables	Abia		Akwalbom		Cross River	
	Dry wt (g)	%	Dry wt (g)	%	Dry wt	%
Leaf	0.16	55.32	0.40	56.22	0.40	52.88
Stem	0.06	19.86	0.12	17.09	0.14	18.59
Root	0.07	24.82	0.19	26.89	0.22	28.53
Total	0.29		0.71		0.76	



DISCUSSION

Despite that the seeds of *Deenettia tripetala* from Abia State, Akwa Ibom State and Cross River State were of the same lengths and weights, germination was first observed among seed lot from Abia State in 33rd Days After Planting (DAP), while germination were first observed among the seed lots from Akwa Ibom and Cross River in 36th Days After Planting (DAP). These results disagree with the findings of Olajide *et al.*, (2002), where it was noted that germination commenced 23 DAP in *Dennettia tripetala*. The percentage germination of each seed source varied significantly. This affirmed the work of Aderounmu *et al.*, (2011) which stated that germination varied significantly with seed sources and sizes.

Mean height of *Dennettia tripetala* from three sources had significant difference ($P \leq 0.05$) from each other. This confirmed the work of many authors (Oyanma, 1994, Khasa *et al.*, 1995 and Probert, 2000) which noted variation among and between populations of different tree species in different traits studied. Variations were also observed in the collar diameter and leaf area of *Dennettia tripetala* seedling from 3 seed sources. This disagree with the work of Adio, *et al.*, (2008) who observed no significant difference ($P \geq 0.05$) for all the variables tested among various seed sources. This findings also disagree with the work of Aderounmu *et al.*, (2011) which noted that seed sources and sizes had significant effects ($P \leq 0.05$) on leaf production of the seedlings of *Vitellaria paradoxa*.

Dry matter accumulation could be an indication of variation in quantities of fibre materials among different seed sources. Also percentage of leaf, stem and root were considerable varied from source to source. Generally, variations were observed in biomass among the 3 different seedlings sources. This is in line with the study of Oni, (2000) on provenance variation in *Terminalia ivorensis*, and the work of Oni and Gbadamosi, (1998) on variations in progenies of *Dacryodes edulis*.

CONCLUSION AND RECOMMENDATION

This study revealed that *Dennettia tripetala* seeds sourced from Otoro (Abak) LGA, Akwa Ibom State could be used in raising seedlings for nursery and plantation establishment in Umuahia and its environs since it has been proved both in germination and growth morphological characters to be the best as compared to other sources. The nursery manager should be concerned with collecting healthy, viable and probably good seeds source which may be economically advantageous for plantation establishment. These findings are very necessary for effective regeneration and improvement of plants as well as discouraging importation of seeds. It also prevents the plant from extinction.



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