

## SEEDLINGS PRODUCTION IN *Gnetum africanum* AS INFLUENCED BY PROPAGATORY ORGANS

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### Abstract

This study was conducted at the experimental site of Akwa Ibom Agricultural Development Programme (AKADEP), Uyo Zone. The rate of germination of *Gnetum africanum* as influenced by different planting materials – treated seeds, root cuttings and vine cuttings was on trial. Sixty of each set of planting materials were used for the experiment. Sixty seeds were given germination pre-treatment. Each set of treatment was raised in the nursery with the polythene pots, using Randomized Complete Block Design (RCBD). Twenty *Gnetum* pre-treated seeds germinated within 75 days out of 60 seeds planted, giving a 20 emergence percentage within 115 days, root cutting had 1 emergence percentage, while the untreated seeds never germinated throughout the experimental period that lasted for 115 days. The result however showed that the treated seeds germinated earlier (75 days) and more vigorously than the untreated seeds and root cuttings. The result suggests that *Gnetum africanum* may be raised through pre-germination treatment for fast development.

### Introduction

*Gnetum africanum* (Gnetaceae), locally known as “Afang” or “Ogasi” is a tropical genus occurring in Asia, Africa and South America (Dutta, 1979). It is a tropical wild climbing plant, found also in Nigeria, Cameroon, Gabon, Congo (Eyo et al. 1983). In Nigeria, it is mainly found in Abia State, Akwa Ibom, Anambra, Cross River and Imo States. In Akwa Ibom State *Gnetum africanum* grows very well in Uyo Local Government Area. Uyo lies within latitude 5.00<sup>0</sup> North and longitude 1.05<sup>0</sup> East. Rainfall ranges from 1800-3200mm per annum. The rains begin in March and continue till October with peaks in June and September, *Gnetum africanum* are mostly climbers, or shrubs. Presently, two species of *Gnetum* are found in Akwa Ibom State. These two species are *Gnetum africanum* and *G. bucholzianum* and are good for human consumption. The morphological differences between the two species are that the leaves of *G. africanum* are shorter and narrower, ovate in shape, with an acuminate apex on an obtuse base, dull green in colour and not fresh looking with a higher percentage of chlorophyll. While *G. bucholzianum* is longer and greenish in colour and more fresh looking but has broader lanceolate shape with acuminate apex and an acute leaf base (Ekanem, 1998).

*Gnetum africanum* is predominant in the dry season and less pronounced in the rainy season. All ethnic groups that consume this plant have different names for it. Efik and Ibibio, call it “Afang”, Ikom calls it “Nkani”, while the Igbos call it “Ogazi or Ogasi” (Ekanem, 1998).

The leaves, Ogasi are eaten raw by the Igbos as vegetable salad when shredded and mixed with palm oil and salt (Eyo et al. 1983). In Akwa Ibom State and Cross River State, it is being prepared with other vegetables such as water-leaf (*Talinum triangulare*), Okro (*Abelmoschus esculentus*) or Melon (*gaemerapsis edulis*). Some people mix the leaves with that of Editan (*Lasienthera africanum*). Cooked *Gnetum* is eaten with starchy food such as garri, fufu, pounded yam, etc. It is the most popular soup in Akwa Ibom, Abia, Anambra and Cross River States. *Gnetum africanum* requires a very good quantity of sunlight for photosynthesis. That is why it sprouts in full capacity during the dry season. It is a seed bearing vegetable, although it is a climber. Its seeds are enveloped inside the fruit. Its fruits appear green when they are unripe but when fully ripped, are red. *Gnetum* seed has a very hard seed coat which makes it impervious to water, and this explains why the seeds stay for a long time for germination to occur. According to Nwoboshi (1982), pre-germination treatment is very necessary to promote early germination.

### Propagation of *Gnetum africanum*

*Gnetum africanum* can be propagated from seeds, roots and vines, but the most popular method of propagation by the local vocational farmers (information got by contact) is by, root. According to the farmers, through their experiences the root takes about six months to sprout and the germination rates are poor in vine cutting and non-treated seeds broadcasting.

### *Gnetum* seed

*Gnetum* seed is round and has a very hard seed coat. The seed germinates in the presence of water. Water enters the seed through the micropyle and cause the seed to swell. Food in the cotyledons is made soluble and transported to the plumule and radical, then it begins to grow. The latter breaks through the seed coat at the region of the micropyle and grows downwards as the primary root from which root hairs and side roots originate.

The cotyledons allow the plumule to grow above the surface of the ground. the tiny leaves enlarge and turn green to form the first foliage leaves (Remalinmgam and Pereira, 1979).

### **Growth rate of *Gnetum africanum***

This plant is very difficult to raise, especially in the dry season, because the root is not long enough to reach the deep rooted mineral salts that can help the plant to grow. *Gnetum africanum* survives well in a very rich soil with plant nutrients. For good result, organic or inorganic manure is recommended by Ekanem (1998) to make it grow well. This plant requires a very good quantity of sunlight for photosynthesis. This explains why it sprouts in full capacity during the dry season. Since *Gnetum africanum* is a climber, it likes to survive well in a forest ecosystem where there are trees which it can climb for support.

### **Nutritive values**

*Gnetum africanum* is an outstanding leafy vegetable and some times more expensive in the South Eastern Zone of Nigeria. It is an all season vegetable that is consumed throughout the zone. *Gnetum africanum* (Afang) has a value in the diet of many people in this zone. Nutritional value of its leaf is very high with a protein sources of 3% and 30% of amino acids (Udoh et al 1997). The spices occur in the wild but are spontaneously cultivated in the homestead farms with an effort to bring it nearer to the people. Its high demand in the Eastern part of Nigeria made it imperative for this study that investigate different methods that could shorten the duration of raising *Gnetum africanum*. The objective of this study was to evaluate three methods of raising *Gnetum africanum* from seeds, root cutting and vine cuttings.

### **Materials and Methods**

This study was conducted on the experimental site of Akwa Ibom Agricultural Development Programme (AKADEP), Uyo Zone. Sixty matured seeds of *Gnetum africanum* were treated with sulphuric acid to break the dormancy. The sixty seeds were placed in a plastic container and concentrated sulphuric acid at 98% commercial grade was poured on the seeds in a water to acid ratio of 10:1 by volume. The seeds were left to soak for 120 minutes. They were well soaked, then the seeds were rinsed in running water for two hours to wash off the acid, and were sun dried before planting.

The roots and vines were trimmed to two internodes with two nodes that polythene pots could contain. The vines were cut at the base from the root. The *Gnetum* materials ready for planting were treated seeds, non treated seeds, roots and vine cuttings.

Sand from the riverside was sieved and washed to remove fine silt particles. From the sand, soil particle sizes between 0.5-1mm, were put into a wooden germination box and the sixty treated seeds planted. Another wooden box was filled with the same soil particle sizes planted with sixty non-treated *Gnetum* seeds. Two wooden boxes filled with soil particles (sizes 0.5-1mm) were filled and planted with 60 root and 60 vine cuttings, independently. Germinated seeds with two foliage leaves and the roots and vine cuttings that sprouted were all transplanted into the polythene pots filled with forest topsoil.

Randomized Complete Block Design (RCBD) was used. The polythene bags were arranged into four blocks. Each block had 60 poly-bags with the four planting materials (treatments) planted at random. Each treatment was replicated five times. Watering was done every morning and evening except on rainy days.

### **Data Collection and Analysis**

Emergence percentage at different days was recorded. Plant height at different days after planting was noted and number of leaves on each plant was also recorded. The data collected were subjected to analysis of variance. The means of each set of data were compared using the Least Significant Difference (LSD) formula.

$$LSD = t \times \sqrt{\frac{2S^2_e}{r}}$$

where x = Significant level

$S^2_e$  = Error means square

r = Number of observations per treatment total

The LSD method used is as described by Wahua (1999).

## Results

The results of germination rate, with different *Gnetum africanum* planting materials are given in Table 1. Treatment with pre-treated seeds germinated earlier (within 75 days) than any other treatment. Non-treated seeds never germinated within the period of the experiment, which lasted for 155 days.

**Table 1: Germination rate with different *Gnetum africanum* planting materials**

<u>Emergence percentage</u>				
Treatment	Quantity	75 days	95 days	115 days
135 days	155 days			
Pre-treated seeds	60	20	26	32
38	42			
Non-treated seeds	60	0	0	0
0	0			
Root cuttings	60	0	0	1
9	15			
Vine cuttings	60	0	0	0
9	8			
LSD (0.05)		-	-	8.35
9.25	10.15			

Germination rate for root cuttings was poor and worst with vine cuttings. Table 2 shows plants height (cm) of the different *Gnetum africanum* planting materials. Seedlings from pre-treated seeds had the highest height while vine cutting had the least height.

**Table 2: Plants' height (mean) from different *Gnetum africanum* planting materials in cm**

Treatment	75 days	95 days	115 days	135 days	155 days
Pre-treated seeds	1.5	2	2.8	3.6	5.2
Non-treated seeds	0	0	0	0	0
Root cuttings	0	0	1.2	1.8	2.5
Vine cuttings	0	0	0	1.1	
1.4					
LSD (0.05)	-	-	0.05	0.62	1.35

Number of leaves per plant in each treatment is given in table 3. Within 155 days, pre-treated seeds had four leaves per plant, while root cuttings had an average of 2 leaves and vine cutting had one leaf.

**Table 3: Number of leaves (mean) from each plant from different *Genetum africanum***

Treatment	75 days	95 days	115 days	135 days	155 days
Pre-treated seeds	1	2	2	3	4
Non-treated seeds	0	0	0	0	0
Root cuttings	0	0	1	2	2
Vine cuttings	0	0	0	2	1
LSD (0.05)	-	-	0.06	0.04	0.12

## Discussion

The cause of imperfect germination in *Gnetum africanum* is the seed-coast dormancy. *Gnetum* seeds have protective coverings so impervious that either oxygen or moisture is excluded from the embryo (Etukudo, 2000). Malac (1990), Stoeckeler and Jones (1997), also reported that this kind of dormancy can be broken by soaking the seeds in concentrated sulphuric acid to soften the seed coat and promote early germination. The researchers also added that the seeds that germinated quickly produced seedlings vigorous enough to survive competition in the open.

This study is in line with Malac (1990), Stoeckeler and Jones (1997) because the pre-treated seeds of *Gnetum africanum* germinated as early as 75 days while the non treated seeds never germinated throughout the period (155 days) of this research. This research also indicated that the treated seeds germinated earlier than other *Gnetum* planting materials (Table 1).

Pre-treatment seeds enhances vigorous seedlings (Malac, 1990). The result of this study (Table 2) is consistent with that of Malac (1990) who reported that pre-treatment of seeds enhances vigorous seedlings and many leaves. This study has further revealed the significant positive contribution ( $P < 0.5$ ) of pre-treatment to fasten seed germination, better height and vigorous growth than other *Gnetum* planting materials.

Table 1, 2 and 3 indicate that there is a significant difference between the treatments. It inferred that treated seeds germinated with a shorter duration (75 days) than root and vine cutting using Least significant Difference (LSD) methods as described by Wahua (1999) at 5% significant level.

In a study of "Effect of *Leucaena leucocephala* on yield of three cassava varieties in Uyo", King and Ekpe (1998) used the LSD at 5% level to compare *Leucaena* and control plots. It was noticed that *Leucaena* plots had the higher yield. Again King, et al. (1998) reported on a preliminary study of effect of *Leucaena leucocephala*, *Gliricidia sepium* and *Acacia auriculiformis* on the yield of food crops, LSD was used and the researcher found out that there was no significant difference in yield between the treatments.

This study supports the use of LSD by King and Ekpe (1998) and King et al. (1998) because LSD has a single value for comparisons and more sensitive to small differences than most other procedures for separating or comparing means of different treatments.

### Conclusion

*Gnetum africanum* is an all season vegetable. It stands the chance of dominating, especially in the dry season when other vegetables are scarce. To meet up the demand, it is necessary to plant *Gnetum africanum* with treated seeds because harvesting period is shorter than planting with vine or root cuttings. However, it is also recommended that this study should be extended for a longer period to observe whether there would be a change in germination rate.

### References

- Dutta, A. C. (1979). Botany for Degree students, 5<sup>th</sup> Edition. Oxford University Press. Oxford. 95-103.
- Ekanem, F. A. 1998. The fertilizer treatment of forest vegetables in homestead farm. J. Hort Sci. 45:14-26.
- Eyo, E. S., Mohme, E. and Abel, J.H. (1983). Chemical Composition and amino acids content of *Gnetum africanum*, *Heinsia crinata* and *Piper guinensess*. Nigerian Journal of Nut Sci. 4(1): 57-62
- King, E. J. and Ekpe S. (1998). Effects of *Leucaena leucocephala* on the yield performance of maize (*Zea mays* D) varieties intercropped under Agroforestry system in Uyo. N. J. Crop soil and FOR. 5 (1) 55 -62.
- King, E. J.; Udo. E. S. and Ubom, R. M. (1998). A Preliminary study of Effects of *leucaena leucocephala*, *Gliricidia sepium* and *Acacia auriculiformis* on the yield of food crops under Agroforestry system in Uyo, Nig. Journ. Agric. Tech. 7. 63 – 70.
- Malac, B. F. (1990). More on Stratification of Pine Seed in Polythene Bags. USES Tree planters' Note 42:7-9
- Nwoboshi, I. C. (1982). Tropical Silviculture Principles and Techniques. University Press. Ibadan. 31-40.
- Stoeckeler, J. H. and Jones G. W. (1997). Forest Nursery Practice in the lake State, USDA Agri. Handbook. 56 - 58
- Udo, P. O., Salem, F. and Oswald, T. (1997). Chemical Analysis of *Gnetum africanum*, Plant and Soil 30:445-56.
- Wahua, T. A. T. (1999). Applied Statistics for Scientific Studies. Afrika-Link Communications Ltd. Abia State, Nigeria, 150-153.