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# Potentials and Trade of *Gnetum africanum* Species – a Non-Timber Forest Products for Economic Development

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**ABSTRACT:** *Gnetum africanum* generally called "eru", is a species of Gnetaceae whose leaves are edible as vegetables. It constitutes a very important commercial Non-Timber Forest Product NTFP in Nigeria where it is traded as green vegetables in local and regional markets, and as well exported. The resource has been seriously threatened by unsustainable harvesting and the gradual disappearance of the forests in which they occur. In order to ensure and enhance the sustainability of these species, a production to consumption system of the species has been studied and efforts of conservation through cultivation initiated. This paper examines the potentials and trade of *Gnetum africanum* species – a NTFP for economic development. Primary data were collected on the proximate composition of *Gnetum africanum* species. The result showed that all farmers (30) surveyed (100%) were aware of the existence of *Gnetum africanum* species, its usefulness and uses which they stated is used as leaves for vegetables and also have some medicinal values. The proximate analysis of *Gnetum africanum* species showed that moisture content, crude protein, ash content, crude fibre, crude lipids and carbohydrates were 10.12%, 20.18%, 6.80%, 7.15%, 2.82% and 52.42% respectively. Secondary data was used to get the annual quantities of *Gnetum africanum* produced and traded in the area from 2008 to 2016. It was observed that there is a decrease in production and trade from 2008 – 2016. A total of 607862.5 metric tons of *Gnetum africanum* was produced and traded between 2008 and 2016, valued at about 631,167,345 F (CFA) equivalent to \$1, 262, 334.69 USD (₦1,835,295,782.44) internally generated revenue (IGR) to the economies of Nigeria. The study reveals that *Gnetum africanum* is capable of contributing to economic development if properly harnessed.

**KEYWORDS:** *Gnetum africanum*, Green vegetables, NTFPs, Economic development,

## I. INTRODUCTION

The need for economic development of both the rural and urban areas in Nigeria cannot be overemphasized. The prevailing situations of food crisis, food shortage and unbalanced diet, deforestation, desertification, low and declining agricultural productivity, soil erosion, soil infertility problems, loss of biological diversity, increasing fuel wood crisis, drought, flooding, economic crisis and general poverty amongst others, no doubt should be the fulcrum of the development. The use of fruit trees in ameliorating these myriad of problems and enhancing economic well-being of the people can also not be wished away.

*Gnetum africanum* described as an economic crop may have an important role to play in the fight against rural poverty. If compared with other highly valued forest products as timber, *Gnetum* trade touches the life of many people in the rural areas. It generates income for a wide range of people in the villages who otherwise are left out from benefiting from exploitation of the forest. It provides jobs for the youths that are involved at all stages of the process - harvesting, loading, transportation, among others. Women dominate the marketing of *Gnetum* leaves in both internal and cross-border markets. Perhaps it provides opportunity her to earn money that contributes to the well-being of her household. The marketing of this product in local markets appears not to have attracted government interest so far in view of the fact that there is no evidence of its exploitation and marketing being subjected to any form of taxation. Medicinally, *Gnetum africanum* is used in the treatment of a variety of illnesses. In Nigeria the leaves are used for the treatment of enlarged spleen, for sore throat and as a cathartic (Ndam *et. al.*, 2000).

## II. METHODOLOGY

The study was carried out at Eme River Forest Reserve, Bende Local Government Area of Abia State, South-eastern region of Nigeria. It lies between latitude 5°38' and 5°37'N and Longitude 7°25' and 7°26'E; has a tropical climate. It



is characterized by high temperatures and relatively high humidity throughout the year. Random samples of the leaves of *Gnetum africanum* (Okazi) were obtained from the forest. The leaves were removed from their stalks and air dried in the laboratory for twelve days. They were subsequently pulverized by pounding to ensure homogeneity and kept in an airtight container for further analysis. Leaves for moisture content determination were collected and analyzed *in-situ*. The sample was analyzed for moisture content, Crude protein, Crude fibre and ash content. Crude protein was determined using the *kjeldahl* method. The moisture and crude fat were determined using standard methods (AOAC, 1990) and the percentage calculated on dry weight basis. Ash was determined by incineration in a muffle furnace and the weight of ash was calculated from difference with the sample taken and calculated on a dry weight basis. The carbohydrates were determined by difference of the sum of all the proximate composition from 100%.

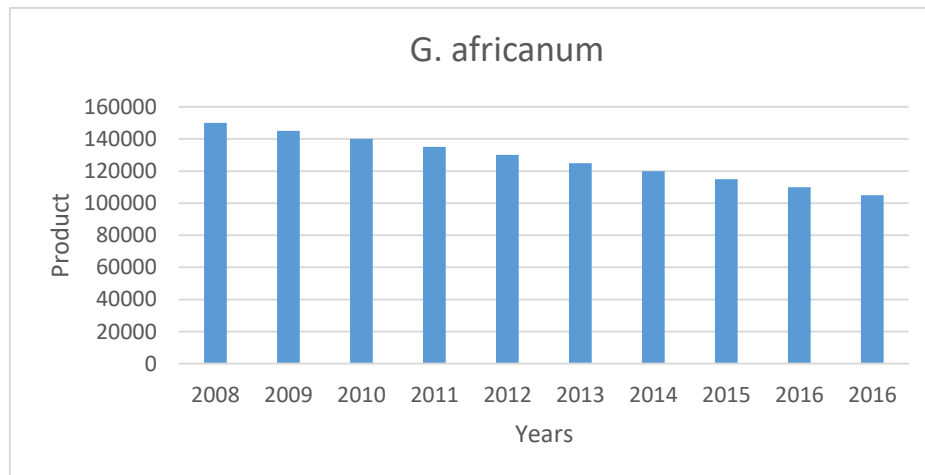
### III. RESULTS AND DISCUSSION

#### Marketing, Trade Cycle and Channels for *Gnetum africanum* in the Study Area

*Gnetum* is harvested in the study area in the primary and secondary forests by men, women and children. Harvesters move in to the forest on Mondays and establish “sleeping bush” camps where they stay and do the harvesting until Friday evening when they return to the villages. In

the village, the harvested stock is sold to *Gnetum* buyers who come in to the study area villages on Fridays and Saturdays in search of *Gnetum*. After buying, the buyers pay for the transportation of their stocks to the assembly centers or points. Here, re-bagging of the product is done. They are put in larger bags that can be transported by lorries and buses.

On Sundays, the products are transported from the assembly centers to Bende in Nigeria where they are supplied to the bulk buyers on Monday which is the Bende market day. On the other hand, bulk buyers after buying on the Bende Monday market, they transport their stock to their towns or market centres of origin (Umuahia, Ohafia, Aba, Uzuakoli, and others.) in Nigeria where they sell to retailers. After buying the retailers display the *Gnetum* plants on market benches and sell to the final consumers. The bulk buyers, after selling, return to Bende market centre on Sunday for the Monday market process and the cycle continues.



**Figure 1: Traded Quantities of *Gnetum* Species in both Seasons (dry and wet) from 2008 - 20016 in Tones**  
 Source: Field Survey, 2019

Table 1 shows the proximate analysis of *Gnetum africanum*. Various chemical composition analyses have been done on these leaves to determine their proximate, phytochemicals, anti-nutritional, mineral composition and other essential contents. Dike, (2010) carried out some analysis on the leaves of *Gnetum africanum* sourced from Umudike rainforest, Abia State while (Ekpo and Eddy, 2005) studied the chemical composition of both wild and domestic species of *Gnetum africanum* collected from Urua Akpan Ndem in Uyo Akwa Ibom State and Akwa Ibom State University Obio Akpa Campus Teaching and Research Farms respectively.



**Table 1: Proximate composition of *Gnetum africanum***

Parameters	Composition
Moisture content	10.12%
Crude protein	20.18%
Ash content	6.80%
Crude fibre	7.15%
Lipids	2.80%
Carbohydrate	52.42%
Vitamin A	0.129mg/g
Vitamin C	0.360mg/l

Source: Field Survey, 2019

The results in Table 1 showed a relatively low moisture content (10.12%) for *Gnetum africanum* against some values (31.6%) for *Gnetum africanum* seeds reported by (Ekpo, 2007) and some vegetables like *Piper guineense* and *Gongromea latifolium* (Mensah *et al.*, 2008), 81.36% recorded in *Bressica oleraecea* (Emedu and Anyika, 2011), 83.75% in *Pterocarpus soyaubixii* and *Gnetum africanum* (Ekumankama, 2008) but however it is within the range recorded for other vegetables like 6.82% for *Cissus petiolate* (Omoyeni and Aluko, 2010) and 7.60% - 8.55% for some vegetables from Nigeria (Iheanacho and Udebuani, 2009).

Moisture content which is an index of the water activity of many foods provides for greater activity of water soluble enzymes and coenzymes needed for the metabolic activities of these leaves. Higher moisture content indicates higher susceptibility to microbial attack during storage and shorter shelf life and also indicative of high total solids (Ogungbele, 2006), Adepoju *et al.*, (2006). The crude protein content of the leaves of *Gnetum africanum* (20.18%) was relatively high as in Table 1 and compared favourably with 17.5% recorded by (Ekpo, 2007) for the seeds of *Gnetum africanum* and 19.67% and 20.80% for the leaves of *Gnetum africanum* and *C. pepo* respectively (Iheanacho and Udebuani, 2009). It is however, lower than 32.95% recorded in undefatted leaves of *A. hybridus* (Iheanacho and Udebuani, 2009). Plant protein still remains a major source of food nutrient for the less privileged population in developing countries including Nigeria such that protein content of the leaves makes it suitable for consumption and a rich source of vegetable protein (Emedu and Anyika, 2011). The relatively high protein content suggests the high amount of essential acids which serve as an alternative source of energy when the carbohydrate metabolism is impaired via glycogenesis (Iheanacho and Udebuani, 2009). The carbohydrate content of the sample (52.42%) as presented in Table 1, could be said to be high for a vegetable material but this value was justified by the 87.62% for *Gnetum africanum* seeds (Ekpo, 2007), 52.32% reported for *Pachira glabra* and 45.92% for *A. africana* seed flowers (Ogungbele, 2006), 52.18% for *Amaranthus hybridus* (Akubugwo *et al.*, 2007). According to (Emedu and Anyika, 2011) most vegetables are generally not good sources of carbohydrates. As far as vegetables are concerned, some of them are rich sources while others contain traces of the nutrients. They provide the body with a source of fuel and energy for daily activities (Yisa *et al.*, 2010). The crude fibre content of 7.15% in the leaves of *G. africanum* in Table 1 is higher than 0.80% recorded for the seeds of *G. africanum* (Ekpo, 2007). The composition of leaves with high crude fibre may contribute to a reduction in the incidence of certain diseases like colon cancer, coronary heart disease, diabetes, high blood pressure, obesity and other digestive disorders (Ogunlade *et al.*, 2011).

From Table 1, the low fat content (2.82%) indicated that the leaves contain low quantities of lipid biomolecules (Iheanacho and Udebuani, 2009) and cannot serve as main source of these biomolecules that are important for body metabolism. Ekpo (2007) recorded a value of 3.15% for *G. africanum* seeds which is still in unison with our obtained value (2.82%). The ash content of 6.80% in the leaves was also in line with the low ash content (1.2%) obtained by (Ekpo, 2007). for the seeds of *G. africanum*, 4.34% for *R. glabra* (Ogungbele, 2006) and 4.03% for *A. africana* but lower than some vegetables such as *P. mildbraedi* (20.6%) (Akinyeye *et al.*, 2010). and *Talinum triangulare* (20.05%) Akindahusi and Salawu, (2005).

From Figure 1, the quantity of *Gnetum* harvested and sold from 2008 – 2016 is characterized by a steady decrease from year to year. This is as a result of the poor harvesting methods which are gradually degrading the resource base. The progressive conversion of primary forest areas into farm lands, encroachment into the Forest Reserve by the surrounding ever increasing population for logging, and settlement are equally presenting themselves as major challenges to the sustainability of this NTFP. The sharp drop in quantity



between 2008 and 2016+ as shown in Figure 2 was a result of the bad roads that made transportation of harvested and bought stock to the markets very difficult in that particular year. Figure 2 shows the volume (quantities) of *Gnetum* species harvested and sold in Nigeria between 2008 to 2016. There is a steady decline from 2008 to 2016. The quantity of *Gnetum* species involved in the *Gnetum* trade in the study area and across the Nigerian boarder from 2008 – 2016 was about 607862.5 tons, contributing a total of about 631,167,345FCFA (\$1262334.7 USD/ ₦1,835,295,796.98) to the economies of Nigeria.

Harvesters lack market information which is a function of market price determination. As a result of this, buyers who have this monopoly, set the prices in their favour.

Though return to investment put harvesters on a better scale than buyers, this could be misleading as harvesters have no entry capital while buyers need a minimum of an entry capital of about 137000frs CFA (\$272.00 USD/₦395,458.08) into the market with the acquisition of cross border traveling documents inclusive.

#### IV. CONCLUSION AND RECOMMENDATION

*Gnetum* species are not just climbing vines in the tropical forest of Africa - it is a source of living to thousands of people stretching from Central and West Africa to Europe and America. The pressure on the wild population of *Gnetum* species from increased demand for commercial purposes is eminent. The trade presence a huge opportunity if the threats can be managed. Cultivation provides a feasible approach to manage some of the threats. Cultivation of *Gnetum* is possible, and can be integrated into existing agroforestry farming systems to increase *Gnetum* production to meet this increased demand by the market. This will generate income for rural farmers thereby contributing to the reduction of rural poverty. However, there is still need to develop sustainable management systems for the *Gnetum* population in the wild. A more supporting and effective legislation is still required in most of the countries where *Gnetum* naturally occur. More work still needs to be done to create gene pools for the two species in other countries. The multimillion trade in *Gnetum* leaves provides employment to a wide range of people, mostly women, and has a place in the fight against malnutrition and poverty alleviation. Certainly, today *Gnetum* is a source of life to many, and with a little more effort towards its conservation, it can continue to support the thousand it already does - giving more meaning to the tropical rainforest.

From the foregoing, it could be seen that non-timber forest species if properly harnessed could enhance the economic well-being of the people. *Gnetum africanum* can indeed be used as food and also to generate income. Therefore, it is recommended that a deliberate policy should be put in place that will initiate awareness and massive development of non-timber forest species in Nigeria. Also, further studies have to be carried out to isolate, characterize and elucidate the structures of the bioactive compounds from the plant for industrial drug formulation.

#### REFERENCES

1. Adepoju, O.T., Onasanya, L.O. and Udoh, C.H. (2006) Comparative Studies of Nutrient Composition of Cocoyam (*Colocassia esculenta*) Leaf with Some Green Leafy Vegetables. *Nigerian Journal of Nutritional Sciences*, **27**, 40-43. I. O. Okerulu, C. T. Onyema 609
2. Akindahusi, A.A. and Salawu, S.O. (2005) Phytochemical Screening of Nutrients and Anti-Nutrient Composition of Selected Tropical Green Leafy Vegetables. *African Journal of Biotechnology*, **4**, 497-581.
3. Akinyeye, R.O., Oluwadunsi, A. and Omoyeni, A. (2010) Proximate, Mineral, Antinutrients, Phyto-Chemical Screening and Amino Acid Compositions of Leaves of *Pterocarpus mildbraedi* Harms. *Electronic Journal of Environmental, Agricultural and Food Chemistry*, **9**, 1322-1333.
4. Akubugwo, I.E., Obasi, N.A., Chinyere, G.C. and Ugbogu, A.E. (2007) Nutritional and Chemical Value of *Amaranthus hybridus* L. Leaves from Afikpo, Nigeria. *African Journal of Biotechnology*, **6**, 2833-2839.
5. AOAC (1990) Official Methods of Analysis. 15th Edition, Association of Official Analytical Chemists, Washington DC, 200-210.
6. Dike, M.C. (2010) Proximate and Nutrient Compositions of Some Fruits, Seeds and Leaves of Some Plant Species at Umudike, Nigeria. *ARNP-Journal of Agricultural and Biological Science*, **5**, 7-16.
7. Ekpo, A.S. (2007) Determination of Chemical Composition of *Gnetum africanum* (AFANG) Seed. *Pakistan Journal of Nutrition*, **6**, 40-43. <http://dx.doi.org/10.3923/pjn.2007.40.43>
8. Ekpo, A.S. and Eddy, N.O. (2005) Comparative Studies of the Level of Toxicants in the Seed of Indian Almond (*Terminalia catappa*) and African Walnut (*Coula edulis*). *Chem. Class J.*, **2**, 74-76.
9. Ekumankama, I.O. (2008) Nutrient Composition of Indigenous Vegetables (*Pterocarpus soyanxii*, *Pterocarpus santalicides* and *Gnetum africanum*). *Nigerian Journal of Nutritional Sciences*, **29**, 195-200.



10. Emedu, P.K. and Anyika, J.U. (2011) Proximate and Mineral Composition of Kale (*Brassica leracea*) Grown in Delta State, Nigeria. *Pakistan Journal of Nutrition*, **10**, 190-194.
11. Iheanacho, K.M.E. and Udebuani, A.C. (2009) Nutritional Composition of Some Leafy Vegetables Consumed in Imo State Nigeria. *Journal of Applied Sciences and Environmental Management*, **13**, 35-38.
12. Mensah, J.K., Okoli, R.I., Ohaju-Obodo, J.O. and Eifidiyi, K. (2008) Phytochemical, Nutritional and Medicinal Properties of Some Leafy Vegetables Consumed by Edo People of Nigeria. *African Journal of Biotechnology*, **7**, 2305-2308.
13. Ndam, N., J. P. Nkefor, and P. Blackmore, 2000. Domestication of *Gnetum africanum* and *G. buchholzianum*, an over-exploited wild forests vegetable of the Equato-Congolian Region. In press XVI<sup>th</sup> AETFAT Proceedings.
14. Ogungbele, H.N. (2006) Chemical Composition Functional Properties and Amino Acid Composition of Some Edible Oil Seeds. *Rivista Italiana delle Sostanze Grasse*, **83**, 81-86.
15. Ogunlade, I.A., Ilugbiyin, A. and Osasona, A.I. (2011) A Comparative Study of Proximate Composition, Anti-Nutrient Composition and Functional Properties of *Pachira glabra* and *Azalia Africana* Seed Flours. *African Journal of Food Science*, **5**, 32-35.
16. Omoyeni A.O. and Aluko, B.T. (2010) Qualitative Determination of Chemical and Nutritional Composition of *Cissus petiolata* Leaves. *Electronic Journal of Environmental, Agricultural and Food Chemistry*, **9**, 436-440.
17. Yisa, J., Egila, J.N. and Darlinton, A.O. (2010) Chemical Composition of *Annona senegalensis* from Nupe Land, Nigeria. *African Journal of Biotechnology*, **9**, 4106-4109.





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