

Full Length Research Paper

Harvesting and marketing of *Gnetum* species (Engl) in Cameroon and Nigeria

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The harvesting and marketing of *Gnetum africanum* and *Gnetum bucholzianum* (Engl), a major Non-Timber Forest Product (NTFP) in West and Central Africa, was carried out between 2002 - 2008, with the objective of examining the production and marketing of *Gnetum* species and their economic contributions to the economies of Cameroon and Nigeria and that of West and Central Africa at large. Besides timber, the forest contains many useful goods and services of subsistence and commercial value called NTFPs that sustain rural people and rural economies. Falconer (1990, 1992) defines NTFPs as all forest goods and services, excluding commercial timber. In this context, *Gnetum* as an NTFP consists of the leaves of an ever green vine from the family *Gnetaceae* that are harvested from the forest ecosystem, processed, and marketed, as well as eaten as a vegetable in Central and West Africa, Europe and the U.S.A. as a traditional African dish. The line transects questionnaires and a selection of some participatory rural appraisal (PRA) tools were used to source information from harvesters and traders on the occurrence, marketing and market channels for *Gnetum* species in the study area. Two species of *Gnetum* (*G. africanum*, *G. buchholzianum*) were identified to be sourced and processed for the market. Harvesting and processing techniques for the identified species were characterized by the use of crude tools associated with resource degradation. Market prices were found to be determined by a few buyers who acted as cartel. Analysis of variance (ANOVA) and t- test analysis showed significant differences in product quantities within and between zones as well as the dry and wet seasons at $p < 0.05$ level. Annual quantities of *Gnetum* were observed to be on the decrease from 2002 – 2008. A total of 607862.5 metric tons of *Gnetum* was produced and traded between 2002 and 2008, valued at about 631,167,345 F (CFA) equivalent to \$1, 262, 334.69 USD internally generated revenue (IGR) to the economies of Cameroon and Nigeria.

Key words: Harvesting, marketing, *Gnetum*, NTFPs, cartel, production.

INTRODUCTION

Besides timber the forest contains many useful goods and services of subsistence and commercial value called Non-timber forest products (NTFPs), which sustain rural people and rural economies. Adeyoju (1975), Ndouye et al. (1998), Omoluabi (1994a, 1994b) and Nkwatoh (2000)

studied the marketing of NTFPs in Cameroon and Nigeria) and Falconer (1990, 1992) consider NTFPs to include all forest goods and services, excluding commercial timber. In this context, NTFPs include animal parts, leaves, local building materials, edible fungi, medicinal plants, forest foods, sponges, chewing sticks, fibres, gums and rattan canes, among others. *Gnetum* as an NTFP consists of the leaves of an evergreen vine from the family *Gnetaceae* that are sourced from the forest

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ecosystem, processed and eaten as a vegetable in Central and West Africa, Europe and the USA as a traditional African dish. These NTFPs constitute rural industrial raw materials for cottage industries, cultural symbols, ritual artefacts and traditional medicine (Duncan et al., 1989; FAO, 1998; Nkwatoh, 2000). Despite their huge contribution to national and international economies, the sector has been subjected to misuse and taken for granted for a long time. Padoch and de Jong (1995) and Ndouye et al. (1997) maintained that, this neglect has been due to lack of appropriate information on the occurrences, prevalence, socio-economic and cultural potentials of these products in the developing and the developed economies of the world.

In the Humid Lowlands of Central and West Africa (HULCWA), there are many of these products in use and their occurrence and prevalence vary among component ecological sub-zones and habitat types. In the past three decades, these NTFPs have attracted greater attention of scientist in the sub-region. Prominent scientists have carried out research on the prevalence, phenology, socio-economics, genetics and domestication of many of these species. Among these are studies by Okafor (1981, 1986) who focused mainly on the edible indigenous fruit plants and their importance in the rural economy of Nigeria. Egunjobi and Lawal (1973) studied the un-exploited plant resources of Nigeria. Agbor (1986) and Ladipo (1995) worked on the collection and conservation of the genetic resources of *Irvingia gabonensis* in West and Central Africa. Doncan and Mbenkum (1987), Nkwatoh, (2000), Shiemo and Newton (1994), looked at the ethno botany of Korup National Park and its adjoining Forest Reserves, while Popoola and Oluwalana (1998), Ndonye et al. (1998), Omoluabi (1994), and Nkwatoh (2000) studied the marketing of NTFPs in Cameroon and Nigeria. Despite all these research efforts, one of the major problems facing the NTFPs sector today in Cameroon and Nigeria, the Central and West Africa at large, is the lack of any correlated research that matches biological data with socio-economic activities (Ndouye, 1995; Nkwatoh, 1995, 2000; Nkwatoh and Yinda, 2007). As part of the national and international drive to source adequate information, on what constitutes the National and international Stock of NTFPs and their socio-economic situation in Cameroon and Nigeria, the Central and West Africa, this study assessed the harvesting and marketing of *Gnetum* species in the Ejagham Forest Reserve in Cameroon and its adjoining cross -border forest in the Cross River State of Nigeria, as a contri-bution to this national and international drive. To achieve this, the study examined the following general and specific objectives: The general objective of the study was to assess the harvesting and marketing of *Gnetum* in the Ejagham Forest Reserve and its adjoining cross-border forest in the Cross River State of Nigeria, its (subsistence value) support to rural livelihoods as well as the National

and International Economies of West and Central Africa.

The specific objectives were to: (1) Identify the varieties of *Gnetum* in the study area, sourced for the market and other end uses. (2) Evaluate the harvesting and processing techniques for the identified varieties. (3) Assess the marketing and the distribution of benefits along the market channel. (4) Assess the *Gnetum* quantities involved in local and external trade and its contribution to National and International Economies of West and Central Africa.

METHODOLOGY

The study made use of Biological and socio – economic assessment techniques (random sampling, some selected Participatory Rural Appraisal (PRA), questionnaires, visual assessments, and key-informants) for the collection of data on the harvesting and marketing of *Gnetum* species in the study area.

Sampling methods

Site selection

The study area was divided into three zones A, B and C based on accessibility for data collection as follows:

ZONE A: This consisted of villages that were 100% accessible by motorable roads.

ZONE B: This consisted of villages that were 45% accessible by motorable roads.

ZONE C: This consisted of villages that were not at all accessible by motorable roads.

From each of the zones, six villages were selected randomly. A total of 18 out of 28 villages were selected for the study. In each of the 18 villages, 50 questionnaires were administered giving a total of about 300 questionnaires per zone and 900 questionnaires in all with a sampling intensity of 10.3%.

Selection of respondents: (This can not be a random household basis because the harvesting of *Gnetum* is done by every household in the study area. Secondly traders of *Gnetum* are not necessarily villagers that belong to the village household system). One set of questionnaire divided into four sections A, B, C and D was administered to Village Chiefs, Village Traditional Council members, traders in NTFPs, farmers, *Gnetum* harvesters, hunters, students, pupils, school teachers, Agricultural and Forestry extension staff and the various Forest User Groups. Beside the administration of questionnaires, semi structured interviews, focused group discussions, ranking, seasonal calendars, resource mapping and scale balances were also employed for the collection of data on the type and occurrence of species, quantities and marketing of *Gnetum* species in the study area.

Transects establishment

In order to complement the socio-economic data collected on the identified *Gnetum* species in use, the line transects technique was employed. In each of the selected villages in the three zones, 3 one km long transects perpendicular to the main access road of the area were established. Along each transect, within the range of 20 m on both sides, a 100% inventory of all the *Gnetum* species sited, were identified and enumerated.

Table 1. Main Sources of *G. africanum* and *G. buchholzianum*.

S/N	Land types	<i>Gnetum</i> species	Degree of abundances
1	Primary forest	<i>G. africanum</i>	+++
		<i>G. buchholzianum</i>	+++
2	Secondary forest	<i>G. africanum</i>	++
		<i>G. buchholzianum</i>	++
3	Fallow land	<i>G. africanum</i>	++
		<i>G. buchholzianum</i>	++
4	Farm lands	<i>G. africanum</i>	+
		<i>G. buchholzianum</i>	+

+: Rare (1 to 2 individuals per hectare), ++: Abundant (3 to 7 individuals per hectare), +++: Highly abundant (8 individuals and above per hectare).

Analytical procedure

Descriptive statistics such as frequency distribution and tabular analysis of the respondent's dispositions and attitudes were employed for analysis. Non-parametric statistics (ANOVA, T-test) from the Statistical Package for Social Sciences (SPSS) were used for the establishment of significant differences. Trade margin analysis was employed to determine the distribution of benefits along the *Gnetum* marketing chain.

RESULTS

Occurrence of *Gnetum* species in the study area

Two species of *Gnetum* occur in the study area: *G. africanum* and *G. buchholzianum* belonging to the family Gnetaceae.

Sources of *Gnetum* species in the study area and degree of abundance

In the study area, they are sourced from a variety of land forms as summarized in Table 1. *Gnetum* plants from the primary forest have dark green thick leaves with strong fiber while *Gnetum* plants from the secondary forest and other sources are light green in color and have weak fibers. There is no marked difference in taste between the two species but there exists a difference in their leaf shape that differentiates the two species but this is not a function of consumer preference. *Gnetum* dealers prefer *Gnetum* from the primary forest with its dark green thick leaves and tough fibers to that from the secondary forest and other sources with light green weak fibers. This is because the former can be stored for a longer period (5 - 10 days) than the latter which can only be stored for about 2 - 3 days.

Uses

It is primarily used as a major vegetable (food) in Cameroon and in Nigeria, secondly as a dye and purgative. Thirdly as a traditional medicine in the local treatment of sore throat and enlarged spleen in children in the Ejagham Forest Reserve of the South West Region of Cameroon (Nkwatoh, 2000, 2007).

Processing techniques for *Gnetum* species (these are primary results from our findings and had no references from secondary sources from the area)

As a vine, *Gnetum* plants climb on nearby trees. It is harvested from these trees by dragging the stems to the ground and plucking the leaves with the hands. If the tree on which it is climbing is very tall and dragging is not feasible, harvesters completely cut down the tree and the leaves are harvested. In some cases, the tree falls on the parent vine and damages the vine completely. Also in the process of cutting down the tree, the vine is also cut. The harvested leaves are tied into bundles using the rope stems of *Gnetum* previously harvested before the plucking of leaves by the harvester and marketed as such.

Storage (these are primary results from our findings and had no references from secondary sources from the area)

Traders of *Gnetum* usually store it at market places by spreading the bundles out at night. In the morning, when the sun rises, the bundles are piled up and water sprinkled on them from time to time until night falls. This process goes on until when the stock is disposed of. In situations where the stock cannot totally be disposed of

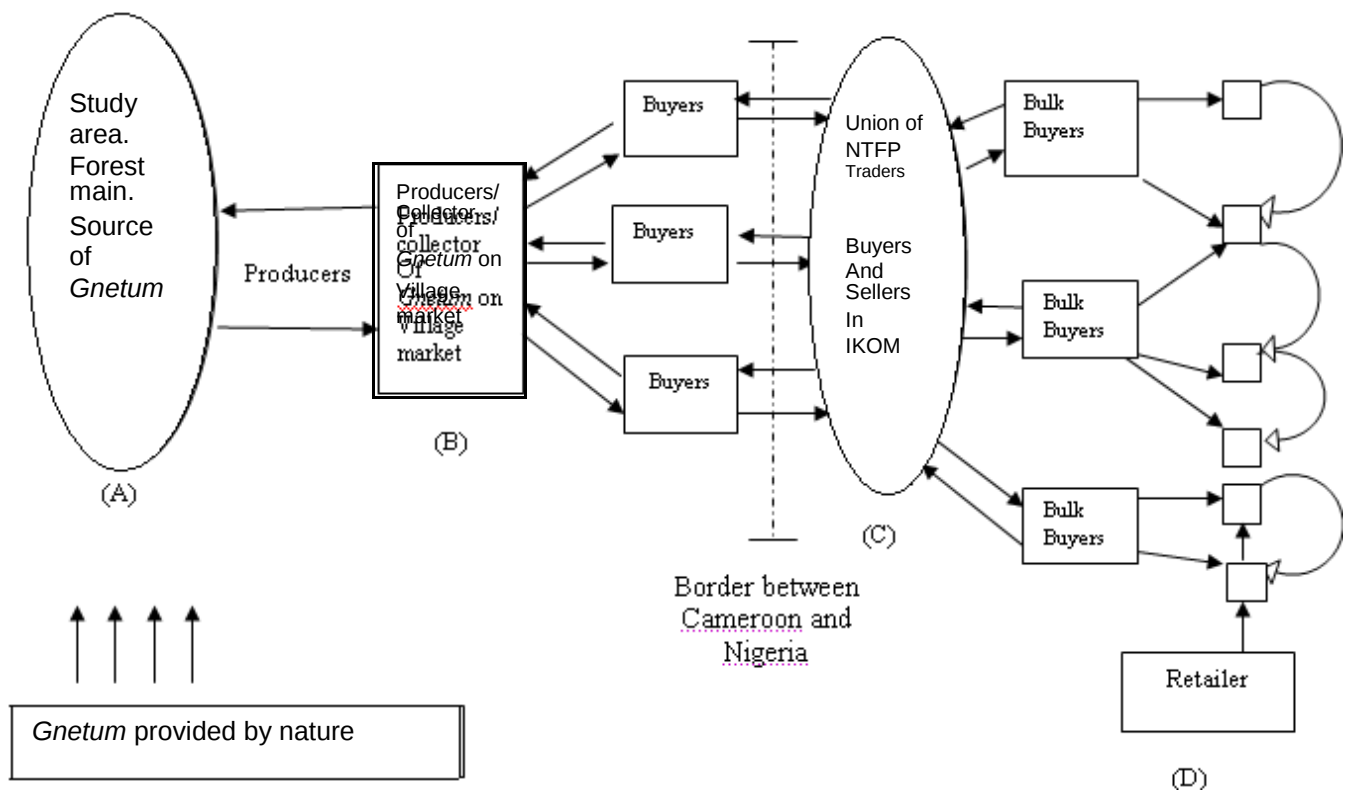


Figure 1. Schematic diagram for *Gnetum* market channel and cycle. (A) is the forest source of the natural stock of *Gnetum* in the study area. Producers are based in the villages of the study area (B). On Mondays/any day of the week, producers move to the forest (A) where they establish "sleeping bush" camps for the harvesting of *Gnetum*. After a successful harvest, they return to the village (B) on Friday in the afternoon with their harvest for sale to the buyers. Buyers from the Ikom Market Centre (C) take off in the morning on Friday and move across the border into the study Area villages (B) where they arrive in the afternoon almost at the same time with the return of the harvesters from their "sleeping bush" to buy *Gnetum* from the harvesters. When the exercise of buying which takes Friday to Sunday is completed, they transport bought stock to the Ikom market centre (C) where with the help of the NTFPs Union sell their stocks to the *Gnetum* bulk buyers who come in to the Ikom Market Centre from the major *Gnetum* consuming towns and market centres in Nigeria such as Calabar, Oyo, Aba and others (D). The bulk buyers, after buying from the buyers with the help of the NTFPs Union as a broker at the Ikom Monday market (C), transport their bought stocks to their individual towns and Market Centres of origin (D). In these towns and Market centres of origin, they supply their stocks to the *Gnetum* retailers (D) between Tuesday and Friday and return to (C) on Sunday for the repeat of the cycle. The retailers after buying retail *Gnetum* either processed or as leafy bundles to the final consumers. The arrows on the diagram show the uni-directional movement of *Gnetum* from the forest (A) to the retailers at the market centres (D). The double arrows for the retailers indicate that they can also buy *Gnetum* from their fellow retailers, if their stocks are finished in the absence of the bulk buyers/distributors. In the course of distribution bulk buyers, distribute to more than one retailer.

within this period, the bundles are sliced into tiny strands and dried.

Marketing, trade cycle and channels for *Gnetum* species

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 Ikom in Nigeria where they are supplied to the bulk buyers on Monday which is the Ikom market day. The market channel as Figure 1 shows is completed on Mondays but the buyers do not return immediately to the study area villages until Friday or Saturday, when villagers must have returned from their

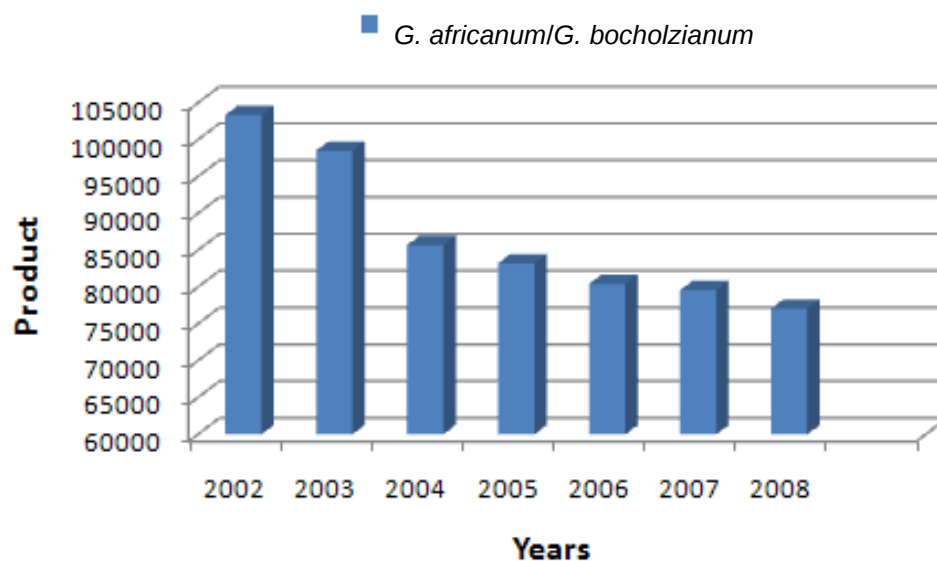


Figure 2. Traded quantities of *Gnetum* Species obtained from the study area in both seasons (dry and wet) from 2002 - 2008 in tones.

camps or “Sleeping Bush” with more stock to sell. On the other hand, bulk buyers after buying on the Ikom Monday market, they transport their stock to their towns or market centres of origin (Calabar, Abakdiike, Aba, Onisha, etc.) 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 Ikom market centre on Sunday for the Monday market process and the cycle continues.

***Gnetum* market margins and distribution of benefits**

The analysis centered on only two groups of people along the *Gnetum* trade channel, (harvesters and buyers). The total cost of harvesting of about 250 bundles of *Gnetum* in a week was estimated at 8000fs CFA (\$16.00 USD) in all the three zones. The selling price of harvesters was estimated at about 12500fs (\$25.00 USD) at 50fs CFA per bundle. This gave a margin of 45000fs CFA (\$ 9.00 USD) with a corresponding return to investment of 57% for the harvesters. Buyers of *Gnetum* on the other hand, had a total cost of 70000 FRS CFA (\$140.00 USD). This was the cost of buying the *Gnetum* and other expenditures (feeding, accommodation/storage, transportation, handling charges, taxes, union, council and market fees). The selling price of buyers was estimated at 82000 FRS CFA (\$164.00 USD). This gave a margin of 12000FRS CFA (\$ 24.00 USD) with a corresponding return to investment of 49%. Though the margins varied with respect to zones from A to C on the average, it was not significant.

Quantities of *Gnetum* species traded between 2002 and 2008

The quantities of *Gnetum* traded between 2002 - 2008 varied significantly from zone A to C at the $P = 0.05$ level of significance. T- test analysis which compared the means of *Gnetum* with respect to the two seasons, showed that both species of *Gnetum* showed no significant variation in quantity harvested and sold in the two seasons at the $P = 0.05$ level of significance. As Figure 2 shows, the volume (quantities) of *Gnetum* species harvested and sold in the study area showed a steady decline from 2002 to 2008. The quantity of *Gnetum* species involved in the *Gnetum* trade in the study area and across the Nigerian boarder from 2002 - 2008 was about 607862.5 tons, contributing a total of about 631,167,345FCFA (\$1262334.7 USD) to the economies of Cameroon, Nigeria, the Central and West Africa at large.

DISCUSSION

In the study area *Gnetum* species are highly abundant in the primary forest with a steady decrease from secondary forest to fallows and farm lands (in that order). This is not unconnected to the fact that both species of *Gnetum* are shade-loving plants and as the degree of shade decreases with ecotypes, abundance is affected (Shiembo, 1994) . As Nkwatoh (1995, 2000, 2007), Bessong (1997) and Adekunle (1971) show, the harvesting of *Gnetum* species in the study area was

observed to be ecosystem destructive, and unsustainable as it involved the cutting of the vine, pulling of the vine to the ground and cutting of the tree on which the vine was found to be climbing. If sustainable harvesting methods are not developed, the resource base will be degraded in the long run. Harvesters of *Gnetum* in general were observed to have a lower profit margin while buyers enjoyed a higher margin along the *Gnetum* trade chain. As Vabi (1995), Ndouye (1998), and FAO (2001) put it, this is as a result of the absence of improved processing and storage methods for *Gnetum*, making harvesters unable to add value and increasing selling prices. 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) into the market with the acquisition of cross border traveling documents inclusive.

The quantity of *Gnetum* harvested and sold from 2002 – 2008 from the study area is characterized by a steady decrease from year to year. According to harvesters 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 2003 and 2004 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.

Conclusion

There exists an important trade in *Gnetum* species between Cameroon and Nigeria perceived to be sustaining both their economies in particular and those of West and Central Africa at large. Unfortunately, the sector is characterized by the use of rudimentary tools, poor processing equipment, lack of market information and seasonal road inaccessibility.

RECOMMENDATIONS

1. Extensive research is needed in the sector of the development of appropriate technology for the processing of *Gnetum* for the eventual addition of market value.
2. Sustainable harvesting of *Gnetum* should be developed and disseminated to harvesters to improve on the current trend which is ecosystem destructive.
3. The Governments of Cameroon and Nigeria should

encourage the cultivation/domestication of *Gnetum* in order to prevent the eminent resource degradation in the long run.

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