

**EVALUATION OF *Irvingia gabonensis* TRADE IN IGUEBEN LOCAL GOVERNMENT AREA OF EDO STATE, NIGERIA*****Oladele A.T, Aiyeloja A.A, Aguma, Q. and Ehisumhen, L. O.**

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*Corresponding Author: adekunle.oladele@uniport.edu.ng (+234) 8035453341**Abstract**

This study evaluated the collection and trade of *Irvingia gabonensis* fruits in Igueben Local Government Area (LGA) of Edo State, Nigeria. Two multi-stage random sampling was employed in the data collection. The first stage was five communities which were randomly selected from the Igueben LGA namely; Ewossa, Igueben, Ebelle, Ekpon and Ebhokhinmi. The second stage was the selection of 30 marketers of *Irvingia gabonensis* which were randomly selected in each of the selected communities. A total of 150 structured questionnaires were completed for analysis. Net Profit (NP) was used to evaluate the profit level of fruit collectors and marketers of *I. gabonensis*. Return on Investment (ROI) in processing and marketing of *I. gabonensis* was calculated to determine the rate at which money invested on the enterprise could be realized. The result revealed the Profit Margin (PM) of kernels (processed seed) in Ewokhimi as (₦5,199), Ewossa (₦4,602), Ekpon (₦6,433), Ebelle (₦4,993) and Igueben (₦3,210) respectively. ROI computed was highest in Ekpon with (224.38%) and least in Igueben with (72.30%). It is concluded that *I. gabonensis* kernels trade has potentials to reduce poverty through creation of employment and generation of income for both rural and urban traders of the kernels. Incorporation of *I. gabonensis* into modern agroforestry development in farmlands is crucial for sustainable supply.

Keywords: *Irvingia gabonensis* Kernel, Trade, Profit, Enterprise, Sensitivity, Igueben**INTRODUCTION**

Irvingia gabonensis Aubry-Lecomteex O'Rorke (Irvingiaceae) is widely distributed in humid lowland forests of Central and West Africa. It produces fruits similar to *Mangifera indica* fruit and hence, it is commonly known as "Bush mango". The plant is a timber species, but the fruit is classified as a Non Timber Forest Products (NTFPs) and mostly found in the wild in the humid lowland forest areas of sub-Saharan Africa. It occupies an important position among commercial NTFPs in West and Central Africa. Fresh fruits are consumed as snacks and also traded in community markets. Ngondi *et al.* (2009) observed that *I. gabonensis* seed is nutritious and has the ability to reduce cholesterol level and weight loss in obesity.

The seeds are essential soup condiment in southern Nigeria and Cameroon (Leakey *et al.*, 2005; Tchoundjeu and Atangana, 2007) while the seed cake serves as soup thickening. The fruits contribute significantly to food security in the rural areas during raining season when most fruits are scarce. *Irvingia wombulu* seed is closely utilized except the non palatability of the flesh (bitter) when compared with *I. gabonensis*. The seed oil can be used in soap, pharmaceutical industry and margarine production (Matos *et al.*,

2009). Its' domestication and integration as agroforestry tree components have been recommended following the commercial extraction of the trunk for timber in Nigeria (Lesley and Brown, 2004). The woods of *Irvingia spp* are utilized locally as planks for building construction, ships decks and poles.

The species is highly valued locally in Nigerian market and has gained recognition in West African regional markets as an export forest produce (Omokhua *et al.*, 2012). *I. gabonensis* ranked high among prevalent NTFPs in tropical West Africa prompted by its economic potential and domestic uses (Clark *et al.*, 2004; Mateus-Reguengo, 2020). Several rural households engage in collection, processing and marketing of *I. gabonensis* fruits in the humid rain forest areas of West and Central Africa.

Usually, women and children collects the matured fruits, depulped, cracked the seed coat and cotyledons sun dried. Detailed studies on trade analysis of *I. gabonensis* seed in the rural economies of Edo people are scanty. This study evaluated the profitability and sensitivity of small scale *I. gabonensis* collection and trade in Igueben LGA, Edo State, Nigeria.

MATERIALS AND METHODS

Study Area

The research was carried out in Igueben Local Government Area (LGA) of Edo State, Nigeria. Igueben has an area of 380 km² and a population of 69,639 according to the census conducted in

2006 (FGN, 2009). It is located in the south-South Zone of Nigeria. Igueben LGA lies between Latitude 5^o 44'N and 7^o 34'N and Longitude 6^o 04'E and 6^o 43'E of the equator (Figure 1). Peasants and subsistence farmers which produce arable crops such as cassava, maize, plantain, yam and tree crops such as rubber, oil palm and citrus are predominant in the study area.

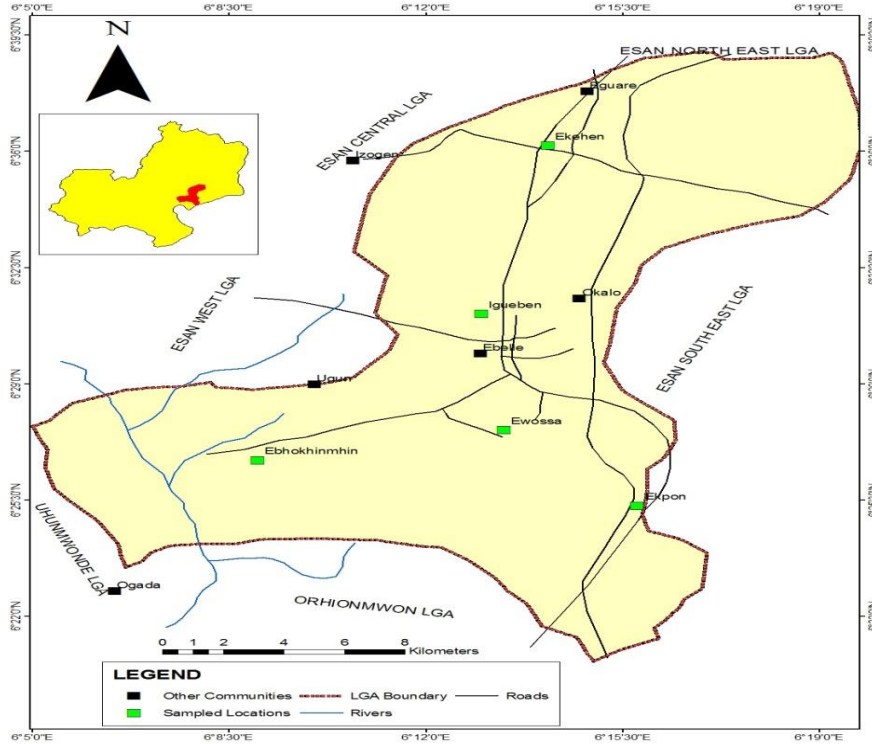


Figure 1: Map of Igueben LGA showing the study communities

Data Collection and Analysis

Two multi-stage random sampling was employed in the data collection. The first stage was five communities which were randomly selected from the Igueben Local Government Area (ILGA) of Edo State, Nigeria namely; Ewossa, Igueben, Ebelle, Ekpon and Ebhokhinmi. Thirty (30) marketers of *I. gabonensis* were randomly selected for interview in each of the selected communities in the second stage. A set of well structured questionnaire was administered in form of oral interview where questions were interpreted in local language (Esan) and responses were carefully recorded. A total of 150 structured questionnaires were completed for analysis. Questionnaires enquiries focused on uses, seasonality, cost and daily sales in each of the selected communities. Net profit (NP) was used to evaluate the profit level of fruit collectors and marketers of *I. gabonensis*.

Net profit (NP) = Total sales (TS) – Total cost (TC)

Mathematically, NP = TS – TC.....Equation 1

Returns on Investment (ROI) was calculated to determine the rate at which money invested on the enterprise could be realized. This measures the rate at which the invested capital could be recouped.

$$ROI = \frac{TR - TC}{TC} \times \frac{100}{1}$$

.....Equation 2

Where; TR = Total revenue, TC = Total cost

RESULTS AND DISCUSSION

Demographic Characteristics of Bush Mango Traders in Igueben LGA of Edo State, Nigeria

Level of education is important in marketing activities as it can influence organizational spirit of actors into marketing activities. About 70.4 % of the respondents attained primary and secondary education, while, 12 % attained tertiary education. Educational level is not a threat as both literate and illiterate can be involved in both collection

and processing of bush mango fruit. No specialized training required to process the collected fruits. The current study showed that most producers/collectors and marketers were married and hence more stable (Table 1). This high percentage of married collectors is consistent with findings on NTFPs and Bush mango collections in Cameroun (Tajoacha, 2008; Awono *et al.*, 2009). NTFPs are collected and marketed to support large and extended families which are predominant in West Africa.

Table 1: Demographic characteristics of *I. gabonensis* marketers in Igueben Local Government Area of Edo State, Nigeria

Parameters		Frequency	Percentage (%)
Sex	Male	16	10.7
	Female	134	89.3
	Total	150	100
Age	20-40	48	32.0
	41-60	74	49.3
	Above 60	28	18.7
	Total	150	100
Education Level	Non formal education	40	26.6
	Primary education	46	30.7
	Secondary education	46	30.7
	Tertiary	18	12.0
	Total	150	100
Occupation	Civil servant	28	18.7
	Farming	52	34.7
	Trading	66	44.0
	Artisan	04	2.6
	Total	150	100
Family Size	1-3	12	8.0
	4-7	80	53.3
	8-12	58	38.7
	Total	150	100
Marital Status	Married	102	68.0
	Single	10	6.6
	Separated	16	10.7
	Widowe(r)	22	14.7
	Total	150	100

Local Sources of *I. gabonensis* Fruit in Igueben Local Government Area of Edo State, Nigeria

% sourced from homestead and 35 % were sourced from natural forest alone (Figure 2).

The study revealed that 38 % of the traded and consumed fruits were sourced from farm lands, 27

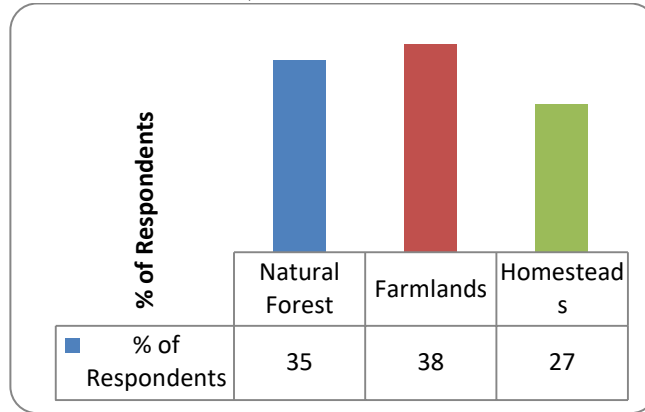


Figure 2: Local sources of Bush Mango fruits in Igueben LGA

Unregulated forest exploitation driven by demand, deforestation via urbanization and agricultural expansion is a threat to sustainable production and availability of this important non- timber forest products. *I. gabonensis* plays a key role in sustainable ecosystem management as an agroforestry species.

own the land. Wholesalers buy directly from the producers and processed it in large quantity, while others buy the processed fruits (depulp), crack, dry the kernels and sell to wholesalers who in turn transmits to city markets in bulk (Figure 3). Similar trade channels have been identified for many NTFPs and other agricultural produce in West Africa (Awono *et al.*, 2009; Amusa *et al.*, 2017).

Trade network starts with the producers who are mostly subsistence farmers and/or collectors that

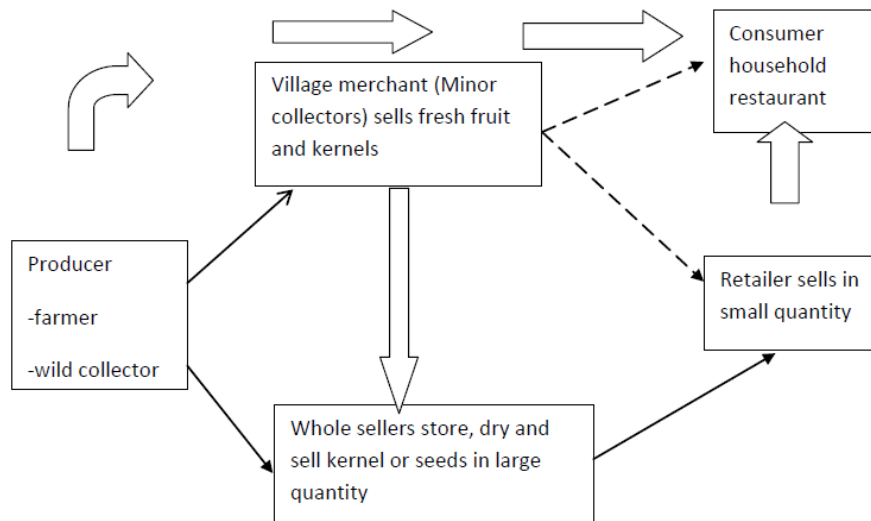


Fig. 3: Marketing channels of *Irvingia gabonensis* in Iguenben LGA

Profit Margin of *Irvingia gabonensis* Kernel In Igueben Local Government Area of Edo State, Nigeria

Profit margin for kernel was highest in Ekpon (₦6,433) and least in Igueben (₦3,210). Rate of Return on Investment (ROI) indicated the rate at which capital invested can be recouped. ROI calculated showed minimum of 72.30 % in Igueben and highest (224.38 %) in Ekpon (Table 2). Total marketing cost included; transportation, processing, storage and weekly market rate paid by traders to the local council. Results showed that the business is profitable even though it varies

slightly among the five communities. Trade of the kernels is profitable at the local and national markets; this trend has been reported in West African regions for *Gnetum africanum*, *Piper guineensis* and many other NTFPs (Agbugba and Thompson, 2015). Proceeds from trade in NTFPs have the capacity to support family income, improve quality of living and sustained rural livelihood in sub - Saharan West African countries. Integration of *I. gabonensis* in farmlands as multipurpose trees will be a panacea to sustainable supply (Baig *et al.*, 2008) considering the escalated rate of natural forest loss in the tropics.

Table 2: Profit margin on the sales of *Irvingia gabonensis* kernel in Igueben Local Government Area of Edo State, Nigeria

Community	Total cost (30 kg)	Total sales of kernels/seed (30 kg)	Profit margin	ROI %
Ewokhimin	3,576	8,775	5,199	145.39
Ewossa	4,773	9,375	4,602	96.42
Ekpon	2,867	9,300	6,433	224.38
Ebelle	3,857	8,850	4,993	129.45
Igueben	4,440	7,650	3,210	72.30

Note: 90 kg of fresh fruits yields approximately 30 kg of dried kernel

Sensitivity Analysis of *I. gabonensis* Kernel Trade at Igueben Local Government Area of Edo State, Nigeria

Sensitivity analysis showed how the variation in cost or benefit affect profit margin in an enterprises. It is also a systematic change in variable in a model to evaluate the effect of such

changes in the output. Sensitivity analysis of the trade in *I. gabonensis* kernel showed that profit will be threatened at Ewokhimi, Ewossa, Ebelle and Igueben communities if the sales price reduced by 60 % (-1.85, -21.43, -8.22 and -31.08) respectively, the profit will be negative, while, the trade in Ekpon will be threatened at 80 % (-35.12) reduction in sales price (Table 3).

Table 3: Sensitivity analysis of *I. gabonensis* kernels ROI at reducing sales price

Community	Total Cost Price	Total Sales Price	ROI %	20 %	40 %	60 %	80 %
Ewokhimin	3,576	8,773	145.39	96.31	47.23	-1.85	-
Ewossa	4,773	9,375	96.42	57.13	17.87	21.43	-
Ekpon	2,867	9,300	222.38	159.50	94.63	29.75	-35.12
Ebelle	3,857	8,850	129.45	83.57	37.67	-8.22	-
Igueben	4,440	7,650	7230	37.83	3.38	31.08	-

Sensitivity Analysis of *Irvingia gabonensis* Kernel at Increasing Cost

The sensitivity analysis calculated on ROI showed that the viability of the business will be threatened at various degrees of increase in cost in the selected communities; Ewokhimi (160 %), Ewossa (100 %), Ebelle (140 %), Ekpon (240 %) and Igueben (80 %) (Table 4).

Table 4: Sensitivity analyses on ROI at % increase in cost price for *I. gabonensis* kernels

Community	Total		ROI %	80 %	100 %	120 %	140 %	160 %	220 %	240 %
	Cost	Sales								
Ewokhimin	3,576	8,773	145.39	36.33	22.69	11.54	2.24	-5.62	-	-
Ewossa	4,773	9,375	96.42	9.12	-1.79	-	-	-	-	-
Ekpon	2,867	9,300	224.38	80.21	62.19	47.45	35.16	24.76	1.37	-4.59
Ebelle	3,857	8,850	129.45	27.47	14.75	4.30	-4.39	-	-	-
Igueben	4,440	7,650	72.30	-4.28	-	-	-	-	-	-

CONCLUSION

Collection and sales of *I. gabonensis* kernel is all round the year, the trade generate income for collectors and traders which is used to solve other pressing needs of the family. Rural employments are created for collectors, processors and marketers of bush Mango fruits. Retailers at the rural and urban centres generate income from sales and distribution of processed kernels. Bush mangoes are important part of NTFPs which provides cash or income for the poor rural communities, particularly in Igueben LGA of Edo State, Nigeria. It is also noted that the NTFP has capacity to sustain livelihood among the rural populations. Integration of *I. gabonensis* in farmlands as multipurpose trees will be a panacea to sustainable supply considering the escalated rate of natural forest loss in the tropics.

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