

Research Article

Poverty Alleviation through Optimizing the Marketing of *Garcinia kola* and *Irvingia gabonensis* in Ondo State, Nigeria

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The paper examines poverty alleviation through optimizing the marketing of *Garcinia kola* and *Irvingia gabonensis* in Ondo State, Nigeria. Data for this study were collected using structured questionnaire. Two categories of pretested structured questionnaires were used to obtain information from the respondents (farmers and the marketers of the species). Data analysis was done using descriptive analysis, and Student *t*-test was used to compare the income generated by the producers and the marketers of the fruits of the tree species. In addition, analysis of variance (ANOVA), arranged in randomized complete block design, was employed to test the significance of price variable across the three market structures (i.e., farm gate price, rural market price, and urban market price). Marketing of forest fruits species is a profitable enterprise with an average profit of ₦19,123.37 per marketer per month. The analysis of variance for the two forest fruit species indicated that *Irvingia gabonensis* generated the highest annual income in rain-forest ecosystem while *Garcinia kola* generated the highest annual income in derived savanna ecosystem. Major constraints militating against these forest fruit species are poor market access and infrastructure development. The paper recommended among other things that domestication and interventions of these forest fruit species should be encouraged for proper management and sustainability.

1. Introduction

Nontimber forest products (NTFPs) as part of forestry sector in any economy have always been supportive for many rural dwellers that live within and around the forests estates. In many rural communities, the people depend solely on farming and marketing of NTFPs in order to generate income, boost their economic lives, improve their nutritional intakes and sustain their livelihood. However, the socioeconomic, nutritional, cultural factors, are importance values of NTFPs, especially to rural communities that depend on them [1–3], and were only brought to limelight in recent time. The awareness of the benefits of NTFPs has been on the increase due to the roles it play within the microlevel of the economy and high potential of the products to contribute to the livelihood of the people. In most part of developing countries employment opportunities from traditional industries are declining, people within forest reservation areas look for alternative

sources of income and often turn to the collection of these products from the nearby forest [4].

Garcinia kola (Bitter kola) fruits are harvested annually between July and October, which makes it a highly seasonal product. Bitter kola fruits are smooth and elliptically shaped, with yellow pulp and brown seed coat. *Garcinia kola* has economic value across West African countries where the seeds are commonly chewed and used for traditional ceremonies and medicines. It is highly valued for its perceived medicinal attributes, and the fact that consumption of large quantities does not cause indigestion (as cola nuts do) makes it a highly desired product [5]. The bark when soaked into water can be used as a treatment for intestinal worms and to cure stomach pain. The edible part of *Garcinia kola* fruit aids digestion when eaten raw. The potential utilization of *Garcinia kola* as hop substitutes in beer brewing has been reported [6]. The fruit constitutes an integral part of the rural livelihood of the people, and it boosts their economic status within the rural

setting. The potentials of some NTFPs like *Garcinia kola* (Bitter kola) in rural livelihood make it imperative to create awareness on the uses of the fruit as well as its economic importance.

Irvingia gabonensis fruit is harvested annually between April and June of every year. The species, commonly called Bush mango, belongs to the family of Irvingiaceae. The fruit is similar to a small domesticated mango. It is generally green but becomes yellowish when ripe, and the ripe fruit contains a lot of fibers which is good for the body. Commercially, *Irvingia gabonensis* products are highly valued in Nigeria, Cameroon, and Côte d'Ivoire. Market for the species but also not only exists within its natural range, it's also widely traded outside its natural range [3]. Although market for the species is mostly rural, it is also sold in urban centres, where it attracts higher prices. Apart from local and regional market, there is a growing international market for the products of the species. The kernel (Ogbono) is marketed in USA and Europe where about 100,000 potential consumers are found [7, 8]. In Nigeria, annual demand was estimated at 80,000 tonnes [9]. Marketing of Ogbono has the prospect of providing a considerable income generating opportunity for rural people. Currently, a cup of Ogbono costs ₦158 (about US\$1) in Nigeria.

2. Methodology

The study was conducted in two ecological zones (Rainforest and Derived Savanna) of Ondo State, Nigeria. Ondo State is one of the thirty-six states in Nigeria, located within the South-Western part of the country. The state lies between latitudes 5°45' and 7°52'N and longitudes 4°20' and 6°5'E.

2.1. Data Collection and Analysis. Data for this study were collected using two sets of structured questionnaires. Market information from traders who market the products of the species in selected rural and urban markets was collected, which indicated the rate of supply, demand, prices, and income generation on the forest fruit species. Farmers with *G. kola* and *I. gabonensis* trees on their farms, home gardens, or fallow field were selected and the questionnaire administered to them. Total of 60 questionnaires were administered to farmers while 120 questionnaires were administered to traders. This was complemented with focus group discussion as well as participatory observation. Data collected from the field were analysed using descriptive statistical tools such as mean, frequency, and percentages.

2.2. Linear Statistical Model. In addition, analysis of variance (ANOVA) arranged in randomized complete block design was also employed to test for significant difference parameters (e.g., price, etc.) from the three market structure (farm gate price, rural market price, and urban market price) in the two ecological zones.

The linear statistical model for randomized complete block design (RCBD) is

$$Y_{ijk} = \mu + B_i + T_j + \Sigma_{ijk}, \quad (1)$$

where Y_{ijk} is individual observation for the treatment in the block, μ is general mean, B_i is ecological zones (rainforest and derived savanna ecological zones), T_j is market structure (farm gate, rural and urban markets), and Σ_{ijk} is experimental error.

3. Result

3.1. Age Distribution of the Respondent

3.1.1. Market Assessment. The age range of traders of the two forest fruits tree species in rainforest and derived savanna ecosystems is between 21 and 60 years (Table 1). However, there were indications that majority of the traders are middle aged, especially those involved in the sale of *I. gabonensis* products. For example, results in Table 1 show that between 80 and 93% of traders of *I. gabonensis* in the rainforest ecosystem are between 31 and 50 years old while between 55% and 70% of traders of *G. kola* are between the same age ranges. A good percentage of traders (45% and 20% in rural and urban markets, resp.) of *G. kola* in the rainforest ecosystem are over 50 years old. In the derived savanna ecosystem, the traders are between the age of 31 and 60 years old, except for *I. gabonensis* in urban markets (Table 1). Similar to the results for rainforest, majority of *I. gabonensis* traders are within the 31–50 years age bracket. Over 45% of the traders of *G. kola* in both urban and rural markets in the derived savanna are over 50 years old (Table 1).

3.1.2. On-Farm Assessment. The age range of farmers of these forest food tree species in rainforest and derived savanna ecosystems is between 31 and over 60 years (Figure 1). The results in Figure 1 indicated that elderly people are mostly involved in the production of forest fruit species. In both ecological zones, between 70 and 90% of the farmers are 50 years and above (Figure 1). The results indicated that between 33.3% and 48.4% of the farmers are above 60 years old which indicated that the farmers of forest fruit species are elderly people. The result also shows that middle-aged people are not fully involved in the production of forest fruit species, as only about 4.2% and 9.7% of the farmer's are aged between 31 and 40 years in the two ecological zones of Ondo State (Figure 1).

3.2. Gender of the Respondent

3.2.1. Market Assessment. The result reveals that the female folks are more involved in the marketing of the forest food tree species as shown in Tables 2(a) and 2(b), 10.5% and 89.5% of traders of *Irvingia gabonensis* in rural markets in rainforest ecosystem are males and females, respectively, and all traders (100%) of the species in urban markets in rainforest are female (Table 2(a)). The same trend was observed for *Garcinia kola* trade, where about 9.1% males and 90.9% females were observed to be involved in the sale of the species in rural markets while only female's (100%) are involved in the sales of the fruit in urban. Results (Table 2(b)) revealed that only females are involved in marketing all these forest fruits

TABLE 1: Age distribution of respondent (traders) for market assessment in the two ecological zones (%).

Ecological zone	Age range	<i>Irvingia gabonensis</i>		<i>Garcinia Kola</i>	
		Rural market	Urban market	Rural market	Urban market
Rainforest	21-30 yrs	5.3	6.7	0.0	0.0
	31-40 yrs	36.8	60.0	18.2	40.0
	41-50 yrs	47.4	33.3	36.4	30.0
	51-60 yrs	10.5	0.0	46.4	20.0
	>60 yrs	0.0	0.0	0.0	10.0
Derived Savanna	21-30 yrs	0.0	6.2	0.0	0.0
	31-40 yrs	43.8	12.6	15.4	13.3
	41-50 yrs	50.0	56.2	38.4	40.0
	51-60 yrs	6.2	25.0	23.1	13.3
	>60 yrs	0.0	0.0	23.1	33.4

TABLE 2: (a) Gender and religious status of respondent for market assessment in rainforest ecosystem. (b) Gender and religious status of respondent for market assessment in derived savanna ecosystem.

(a)				
	<i>Irvingia gabonensis</i>		<i>Garcinia kola</i>	
	Rural market	Urban market	Rural market	Urban market
Gender				
Male	10.5	0	9.1	0
Female	89.5	100	90.9	100
Religion				
Christianity	100	86.7	100	100
Traditional	0	0	0	0
Islam	0	13.3	0	0
(b)				
	<i>Irvingia gabonensis</i>		<i>Garcinia kola</i>	
	Rural market	Urban market	Rural market	Urban market
Gender				
Male	0	0	0	0
Female	100	100	100	100
Religion				
Christianity	56.2	87.5	38.5	60.0
Traditional	0	0	0	6.7
Islam	43.8	12.5	61.5	33.3

species in rural and urban markets in the derived savanna ecosystems.

3.2.2. *On-Farm Assessment.* The results of on-farm assessment indicated that more males are involved in the farming of the tree species (domestication) than the female across the sampled communities in both ecosystems. Figure 2 shows that between 76.2% and 92.3% males are involved in the

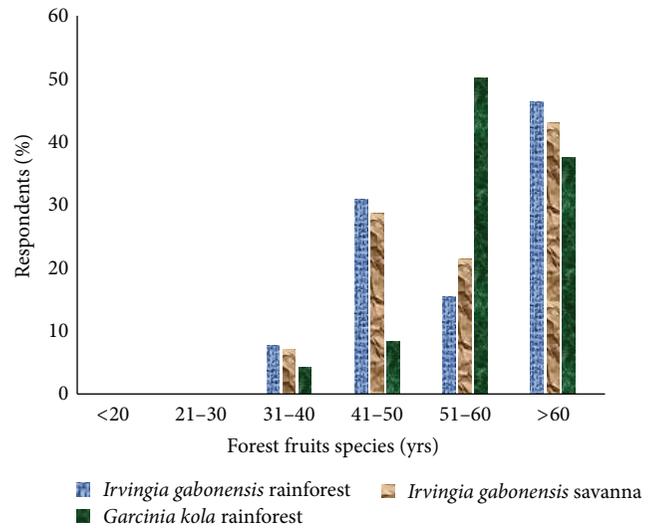


FIGURE 1: Age distribution of respondent for on-farm assessment in the two ecological zones.

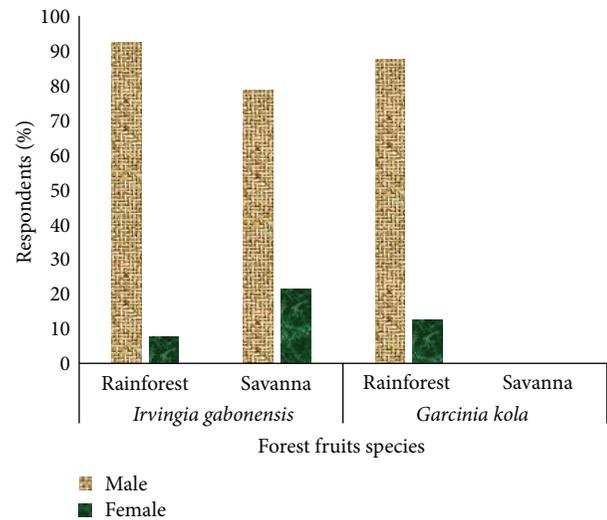


FIGURE 2: Gender distribution of on-farm respondent in the two ecological zones.

conservation and/or planting of trees of *I. gabonensis* and *G. kola* in the rainforest and derived savanna ecosystems while the percentage of females involved in domestication of the species ranged between 7.7 and 23.8%. No farmer is involved in the planting/conservation of *G. kola* in derived savanna (Figure 2) because the ecosystem is outside the natural range of the species.

3.3. *Income Generation (in Naira) from Sale of the Species.* Annual income generated from sale of the species ranged from $\text{N}50,000.00$ to >math>\text{N}200,000.00</math> (\$316.50 to \$1265.80) in the derived savanna ecosystem and >math>\text{N}50,000.00</math> to >math>\text{N}200,000.00</math> (\$316.50 to \$1265.80) in the rainforest ecosystem as shown in Table 3. Generally, higher income is generated from the sale of the fruits of the three species by

TABLE 3: Income generated (in Naira) from sale of forest fruit species.

	<i>Irvingia gabonensis</i>		<i>Garcinia kola</i>	
	Rural market	Urban market	Rural market	Urban market
Rainforest				
<50,000	0.0	0.0	0.0	0.0
50,000–100,000	0.0	0.0	0.0	10.0
100,001–150,000	36.8	33.3	27.2	0.0
150,001–200,000	31.6	13.3	45.5	20.0
>200,000	31.6	53.4	27.3	70.0
Derived savanna				
<50,000	37.5	0.0	38.5	0.0
50,000–100,000	12.5	0.0	0.0	0.0
100,001–150,000	18.8	18.8	15.4	33.3
150,001–200,000	31.2	25.0	46.1	40.0
>200,000	0.0	56.2	0.0	26.7

the marketer in urban markets than rural markets. For example while between 53.4 and 70.0% of traders in urban markets in the rainforest ecosystem generated over ₦200,000.00 (\$1265.80) per annum, only between 27.3 and 31.6% of traders in rural markets generated as much in the rainforest ecosystem. In the derived savanna ecosystem, no trader in the rural markets generated higher income than ₦200,000.00 (\$1265.80) per annum. In the rainforest ecosystems majority of urban market traders earned between ₦150,000.00 and >₦200,000.00 (\$949.40 and \$1265.80) while in rural markets, majority earned between ₦100,000.00 and ₦200,000.00 (\$632.91 to \$1265.80). In the derived savanna majority of urban market traders earned between ₦100,000.00 and >₦200,000.00 (\$632.91 and \$1265.80) while in rural markets, majority earned between <₦50,000.00 and ₦200,000.00 (\$316.50 to \$1265.80) as shown in Table 3. The result indicated that a high percentage (up to 37.5%) of traders in the derived savanna ecosystem generated low annual income of ₦50,000 (\$316.50) for *Irvingia gabonensis*, while 38.5 generated low annual income of ₦50,000 (\$316.50) for *Garcinia kola*.

3.3.1. On-Farm Assessment. The producers (farmers) of the forest fruit species generated less income than the traders of the forest fruit species across the two ecological zones of Ondo state. The result of income generation shown in Figure 3 indicated that between 32.1% and 30.8% of the farmers in the two ecological zones generated annual income of less than ₦50,000 (\$316.50) for *Irvingia gabonensis*, while 25% earn the same amount for *Garcinia kola* in rainforest ecosystem. Higher percentage of farmer (between 25% and 54.2%) had annual income generation of between ₦50,000 to ₦150,000 (\$316.50 to \$949.40) from the sale of the fruits in the two ecological zones as shown in (Figure 3). No farmer generates any income from the sales of *Garcinia kola* in derived savanna (Figure 3) because the ecosystem is outside the natural range of the species.

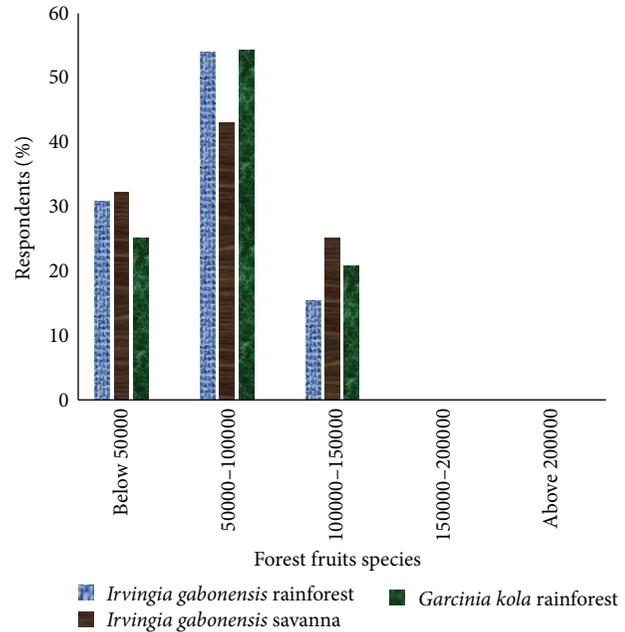


FIGURE 3: Total annual income generated (in Naira) from forest fruits.

3.4. Comparison of Income Generated from Marketing of Forest Fruits Species. The results of analysis of variance indicated that there are significant differences between the average annual incomes generated by respondents from the sale of the fruits of the three species within the two ecological zones of the study as well as between the various market types as shown in Tables 4(a) and 4(b). The results showed a significant difference in income generated from the sale of the fruits of the species as one moves from farm gate (on farm) through rural markets to urban markets. The analysis indicated that income generated was significantly highest in urban markets in the two ecological zones, and it was found to be significantly higher than income obtained from rural markets and farm gates. The difference in income generated was more noticeable in rainforest than in derived savanna ecosystem. For example, while average annual income generated at urban markets in the rainforest ecosystem was ₦191,667.00, (\$1213.10), and it was only ₦66,667.00 (\$422.00) at farm gate, a difference of over 300% (Table 4(a)). The difference in annual income generation at urban markets ₦123,330.00 (\$780.60) and farm gates ₦75,000.00 (\$474.70) in derived savanna ecosystem was about 200%. Annual income generated from rural markets in the two ecological zones was significantly higher than that of on-farm (farm gate) income generation, which is the least and less than ₦100,000.00 Naira (\$632.91 USD) per annum within the two ecological zones (Table 4(a)). The results also show higher-income generation in rainforest ecosystem than derived savanna for the market analysis and reverse being the case for on-farm analysis which reveals that derived savanna had the higher income than the rainforest ecosystem. The analysis of variance for the two forest fruit species within the two ecological zones is presented in Table 4(b). *Irvingia gabonensis* generated the

TABLE 4: (a) Results of analysis of variance for mean annual income generated (in Naira) and assessed vertically in the two ecological zones and the three market types. (b) Results of analysis of variance for annual income (in Naira) generated from the sales of the two forest fruit species assessed vertically in the two ecological zones.

(a)			
Ecological zones	On farm	Rural market	Urban market
Rainforest	66,667	123,333	191,667
Derived Savanna	75,000	111,667	123,330

Significantly different from each other at $P > 0.05$ level of significance.

(b)			
Ecological zones	<i>Garcinia kola</i>	<i>Irvingia gabonensis</i>	
Rainforest	133,330	191,667	$(P > 0.05)$
Derived Savanna	135,000	98,333	

Significantly different from each other at $P > 0.05$ level of significance.

highest annual income in rainforest ecosystem ₦191,667.00 (\$1213.10) of Ondo state while *Garcinia kola* generated the highest annual income in derived savanna ecosystem ₦135,000.00 (\$854.43). *Irvingia gabonensis* generated significantly higher income in rainforest than derived savanna ecosystem, and *Garcinia kola* generated significantly higher income in derived savanna ecosystem than rainforest.

4. Discussion

Most of the respondents (54%) are females involved in the sales of forest fruits species, indicating that forest fruits marketing is a female dominated enterprise, and male's are the major collectors and also involved in the production. Majority of the marketers (72%) are within the active labour age range of 20–50 years. Majority of the marketers used "size and sweetness" as the standard measure of selling. Prices of forest fruits are arrived through bargaining power of the sellers and buyers as attested to by 70% of the respondents. About 54% of the respondents claimed that forest fruits are not always available throughout the year due to their seasonal nature and perishability. The most common method of informing buyers of forest fruits is through open display as attested to by 58% of the respondents. The most common strategy of optimising forest fruits marketing among respondents is by processing before sales as attested to by 38% of the respondents. Forest fruits marketing is a profitable enterprise with an average monthly profit of ₦19,123.97 (\$121.04) per marketer per month and in turn can alleviate poverty within the household, and this is support of Adebisi 2004 findings [5]. The results of this study revealed that the production, collection, and marketing of *I. gabonensis* and *G. kola* constitute major economic contribution to the livelihood of the people in the rainforest and derived savanna ecological zones of Ondo State. The use of these two forest fruits species adds crucial

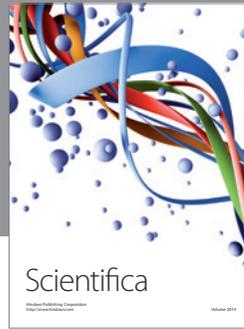
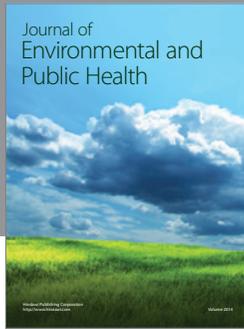
dimension to a diversified livelihood base of the rural populace and thereby reducing poverty. Thus, they act as safety net particularly when there is a shortfall in agricultural production and thus fill the gap of food shortage and reduce malnutrition.

5. Recommendations

Forest fruit species contribute significantly to the people's economy and livelihood. Thus, priority should be given to the conservation of the mother trees to ensure sustainable production of the fruits while effort should be made towards their domestication. Currently in the study area, especially in the rainforest ecosystem, domestication of the forest fruit species is inadequate. It is therefore recommended that forest management strategies and interventions should be designed for domestication of the forest fruit species in the two ecological zones to properly address the management and sustainability of the resource base of the species.

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