

Profile of African Bush Mango (*Irvingia spp*) Marketing in Selected Southern Nigeria States

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ABSTRACT

African bush mango (Irvingia spp) serves as an important source of income for farmers and traders. Despite the identified benefits of the crop, there has been little research on improving its yield, quality, and marketing. Thus the study profiled African bush mango marketing in Imo, Abita, and Rivers states of Southern Nigeria. Purposive sampling was used to collect data from 88 marketers sampled across the states and analyzed using descriptive statistics. Most of the marketers retail the products (55.8%), sourced from wholesalers (44.6%); they need information on pricing and credit/loan (58%) while 56.8 percent of them need training on preservation and storage. Challenges identified by marketers include high cost of transportation (65.9%) and low pricing (58.0%). The study recommends that enlightenment programs be used to discourage the use of Aluminum phosphide for the preservation of Irvingia spp kernels during marketing. The high cost of transportation can be reduced through government legislative intervention.

KEYWORDS: Aluminum Phosphide, High Transportation Cost, Information Needs, Preservation, Pricing

INTRODUCTION

African bush mango (*Irvingia spp*) is a tropical African fruit tree with large production and economic potentials. *Irvingia spp* belongs to the family of Irvingiaceae; there are two species - *Irvingia gabonensis* and *Irvingia wombulu*. However; one of the differences between them is that *I. gabonensis* grows as high as 40m while *I. wombulu* can be about 25m high. The crop is highly valuable and one of the most important Non-Timber Forest Products in West and Central Africa (Chah *et al.* 2014). All parts of the African bush mango tree has several uses; its kernels are used as a thickening agent for soups relished by peoples of the West and Central African region. The kernels are also used for soap, cosmetics, and pharmaceuticals; its roots, leaves, and bark are mixed with palm oil for the treatment of diarrhea, dysentery, and so on. Moreover, fresh *Irvingia spp* bark is used as a chewing stick and the leaves are used as animal fodder (Ewane *et al.* 2009). The seeds are also used for weight control and reduction of cholesterol (Omokhua *et al.* 2012) while the leaves, stem, and bark of the trees are used in traditional medicine as a treatment for fever and stomach ache (Ekpo *et al.* 2007). Besides, the mesocarp of *I. gabonensis* is eaten raw by rural dwellers, and the trees are used as windbreaks (Kengni *et al.* 2011).

Non-Timber Forest Products contribute to the economy of forest communities as they are a source of employment generation, marketing, and value addition to forest products, trade, and source of energy (Ewane *et al.* 2009). They contribute to global trade by accounting for up to 25 percent of the income earned by about 1 billion people (Ewane *et al.* 2009). *Irvingia spp* trees as well as other indigenous fruit trees are sources of essential nutrients that contribute to rural livelihoods (Tchoundjeu *et al.* 2004). African bush mango is one of the most valued Non-Timber Forest Products as it is ranked among the first five out of 129 plant-based products (Ingram and Schure 2010; Levang *et al.* 2015). In Southwest Cameroon, despite the lack of formal markets in some villages in the region, trading of forest products such as *Irvingia spp* are being carried out as traders visit the locations to purchase high market-value forest products such as *Irvingia spp*, bush onion, and other farm products. These Non-Timber products have been noted to be important sources of income with particular reference to the livelihoods of urban dwellers involved in its trade (Tajoacha, 2008).

Specifically, the bitter bush mango has more value and commands higher prices in international/regional trade. The kernels of *I. wombulu* (bitter bush mango) are more demanded by consumers and as

such commands a higher price than *I. gabonensis* due to its slimy nature which is required in its use as soup thickener. African Bush Mango (particularly *I. wombulu*) is being exported from Nigeria to Europe and the United State of America (USA). In Nigeria, the annual demand for *Irvingia* kernels was 80,000 tonnes in year 2000 (Nwoboshi 2000); this value would have more than doubled in recent times due to increased population and urbanization. This further reveals the relevance of the crop to sustain livelihoods. Regardless of its economic importance and attendant health benefits, *Irvingia spp* are mostly found in the wild and are not grown commercially (Lowe et al. 2000); only 10 percent of the harvested kernels are from planted trees (Ladipo 2000). They are found in compound farm or homesteads or in traditional agro-forestry (Omokhua et al. 2012). Despite these identified benefits of the African bush mango, there has been little research on improving its yield, quality, commercialization and marketability for full exploitation of its economic potentials (Dansie et al. 2012) especially in the Southern part of Nigeria. Not much research has been carried out on *Irvingiaspp* marketing in Nigeria with the exception of Babalola and Agbeja (2009), Awe et al.(2012), Ike(2010) and Arowosoge(2017); most of the studies have concentrated effort on its use as a forest product (Abbiw 1990; Leakey et al. 2003), efficiency of products and processing of the seeds (Ike 2008). Marketing of *Irvingia spp* is vital as it determines the income and welfare of marketers that influences their future investment and business decisions (Ike 2010).

From the literature reviewed so far on the marketing of *Irvingia* in Nigeria, none of them has profiled the African bush mango marketing attributes as was done by this study.

Objectives of the Study

The general objective of the study was to:

Profile African bush mango marketing in selected states of Southern Nigeria - Imo, Abia and Rivers states

The specific objectives include:

1. Describe the marketers' socio-economic characteristics

2. Enumerate the information and training needs of the marketers
3. Give a list of African bush mango packaging, preservation and storage methods
4. Enumerate identified challenges in marketing African bush mango in the study area

MATERIAL AND METHODS

The survey was conducted in January 2017, in 3 states of Southern Nigeria where African bush mango marketers are predominant. Three states found on the coordinates- Imo (5.6°N, 7.1°E), Abia (5.4°N, 7.5°E) and Rivers (4.8°N, 6.9°E) were purposively selected thereafter; senatorial districts in each state where African bush mango is produced or found in the wild were selected. Lastly, markets in the sampled locations were visited where 88 *Irvingia spp* marketers were purposively sampled altogether. Structured interview schedule which covered all aspects of the set objectives was used to elicit information from the sampled African bush mango marketers in the locations to have an overview of the *Irvingiaspp* marketing situation in the states. The data obtained was analyzed using descriptive statistics (frequency and percentages).

RESULTS AND DISCUSSION

Socio-economic Characteristics of African Bush Mango Marketers

Finding from Table 1 reveals that most of the marketers were female (54.5%), 45.5 per cent had secondary education while 72.7 per cent were married. Half of the respondents were aged 30-49 years and 56.8 percent have up to 5 family members. This result shows that *Irvingia spp* marketing in Southern Nigeria is mostly carried out by literate females who were married and still in their active age. The study of Arowosoge (2017) on marketing and utilization of *Irvingia spp* in Ado-Ekiti Southwest Nigeria revealed that 93.4 per cent of the sampled traders were female, 65.6 per cent had secondary education, while 50.8 per cent were between the ages of 41-50 years.

Table 1
Socio-economic characteristics of *Irvingia spp* marketers

<i>Variable</i>	<i>Frequency</i>	<i>Percentage</i>
<i>Sex</i>		
Male	40	45.5
Female	48	54.5
<i>Marital Status</i>		
Married	64	72.7
Single	20	22.7
Divorced	2	2.3
Widowed	2	2.3
<i>Age (in years)</i>		
20-29	17	19.3
30-39	23	26.1
40-49	21	23.9
50-59	15	17.1
60 and above	8	9.1
Prefer not to say	4	4.5
<i>Family Size</i>		
1-5	50	56.8
6-10	29	33.0
11-15	4	4.5
>15	-	-
Prefer not to say	5	5.7
<i>Educational Status</i>		
No formal education	4	4.5
Primary education	11	12.5
Secondary education	40	45.5
Tertiary education	29	33.0
Others	4	4.5

Source: Field survey, 2017

Occupational Characteristics of *Irvingia spp* Marketers

Fifty-eight percent of the marketers (Table 2) were engaged in other ventures apart from African bush mango marketing with 56.9 per cent involved in trading of other crops particularly grains such as rice, beans, egusi melon, dried pepper, gari. This implies that *Irvingia spp* kernels are not sold as a stand-alone item but are sold with other food items. This is supported by the finding of Arowosoge (2017) which affirmed that African bush mango marketers in Ado-Ekiti had melon as one of the

products they sold in addition to crayfish, stockfish, and vegetables.

About half of the marketers have 1-10 years' experience in the business; 67.8 per cent belonged to a group/association; the main business of this group being marketing (40.7%) (Table 2). In a similar study, most of the *Irvingia spp* marketers (59.02%) had 1-10 years of experience in marketing the product. Years of experience in a business venture and membership of a market-based group is expected to improve the business of the *Irvingia spp* marketers in the study area.

Table 2
Occupational characteristics of *Irvingia spp* marketers

<i>Variable</i>	<i>Frequency</i>	<i>Percentage</i>
<i>Main Occupation is African Bush Mango Marketing</i>		
Yes	37	42.0
No	51	58.0
<i>Other Income Generating Activities</i>		
Trading of other crops	29	56.9
Civil servant	13	25.5
Artisan	-	-
Others	9	17.6
<i>Years Of Experience In African Bush Mango Marketing (In Years)</i>		
<1	2	2.3
1-5	24	27.3
6-10	21	23.9
11-15	16	18.2
>15	22	25.0
Prefer not to say	3	3.4
<i>Membership Of Group/Association</i>		
Yes	59	67.8
No	28	32.2
<i>Main Business Of The Group/Association</i>		
Cooperative society	16	27.1
Marketers' association	24	40.7
Religious group	11	18.6
Others	8	13.6

Source: Field survey, 2017

African Bush Mango Marketers' Attributes

As shown in Table 3, most of the sampled marketers were retailers (55.8%) of African bush mango which they sourced mostly from wholesalers (44.6%). This implies that most of the *Irvingia spp* in markets visited were sold directly to consumers. Similarly, Babalola and Agbeja (2009) in their study noted that 43.3 per cent of the marketers sold the bush mango through retail outlet.

These marketers also sourced the product from farmers (27.2%) and from outside the study locations (Bayelsa, Cross River, and Ebonyi (Abakaliki) states, as well as countries such as the Republic of Benin, Cameroon, and Cote d'Ivoire (21.7%). This result implies that most of the *Irvingia* kernels retailed in the markets were from various sources both within and outside Nigeria. *Irvingia*

spp is known to be found in the wild in parts of West and Central Africa. Arowosoge (2017) reported that African bush mango sold in Ado-Ekiti was obtained from farmers and wild collectors in Southeast Nigeria. Moreover, Nkwatoh *et al.* (2010) observed that in Ejagham forest reserve of Southwest Cameroon, bulk buyers of *Irvingia spp* kernels were Nigerians who moved from house to house purchasing the kernels. Over 6years, the volume of *Irvingia spp* kernels traded between Cameroon and Nigeria was over 1 million tonnes (Nkwatoh *et al.* 2010).

There are specified measuring units for the sale of *Irvingia spp* kernels in the study area most of the marketers (61.4%) use milk tin and plastic paint containers. This could be because most of them sell in retail to consumers who purchase the products in small units.

Table 3
African bush mango marketing attributes

<i>Variable</i>	<i>Frequency</i>	<i>Percentage</i>
<i>Level of Marketing</i> *		
Assembler	2	1.9
Wholesale	44	42.3
Retail	58	55.8
<i>Source of Produce for Marketing</i> *		
Farmers	25	27.2
Assemblers	6	6.5
Wholesalers	41	44.6
Others	20	21.7
<i>Measuring Unit for Buying and Selling</i>		
Mudu (local name)	2	2.3
Jute bags	6	6.8
Basket	16	18.2
Sack	7	7.9
Others	54	61.4
Undisclosed	3	3.4

Source: Field Survey, 2017 * -multiple response variables

Information and Training Needs of *Irvingia spp* Marketers

As regard the marketers' information and training needs (Table 4), pricing and credit/loan information were the most sought after by 58 percent of the marketers respectively. This implies that among other factors, most of the marketers base their pricing on information received about prevailing market prices in other locations. Also, they require information on the source of produce, preservation, and storage during the marketing of produce (56.8%), market channel (55.7%) among others. Most of the marketers need to be enlightened

on the proper means of preservation of the kernels as they use Aluminum phosphide to preserve and keep the *Irvingia spp* kernels in storage, a process which is injurious to human health.

Furthermore, most marketers need training on preservation and storage in the course of marketing their produce (56.8%) as well as on health and nutrition (46.6%). Identified training need on preservation and storage is derived from the fact that most of the marketers use dangerous chemicals for preservation and storage of the kernels, a practice which needs to be replaced with healthier preservatives.

Table 4
Information and Training needs of *Irvingia spp* marketers

<i>Options</i>	<i>Information needs</i>		<i>Training needs</i>	
	<i>Frequency</i>	<i>Percentage</i>	<i>Frequency</i>	<i>Percentage</i>
Source of produce	50	56.8	-	-
Pricing information	51	58.0	31	35.2
Market channel	49	55.7	30	34.1
Packaging methods	30	34.1	32	36.4
Handling methods	24	27.3	30	34.1
Preservation and storage during marketing of produce	50	56.8	50	56.8
Processing	22	25.0	30	34.1
Credit/loan	51	58.0	37	42.0
Health and Nutrition	36	40.9	41	46.6

Source: Field Survey, 2017

African Bush Mango Preservation/Storage

About half of the African Bush Mango marketers have the product kept in their custody for a period less than a month (46.6%) (Table 5) before the consignment is sold off. Also, most of them (60.2%) store the product together with wrapped Aluminum phosphide in a well-aerated room. Some other marketers keep dry pepper fruits in a bag containing the product or they store the product in an open bowl within a room. Marketers also opined

that African Bush Mango should be turned every 2 days for proper aeration and kept in well-aerated room/place to avoid spoilage. On the contrary, a study by Tchoundjeu *et al.* (2005) reported that bush mango kernels are preserved by sun drying. The same study reported that 78 per cent of the respondents stored African bush mango kernels for between 6 months to 1 year as they opined that after this duration of time the kernels taste soapy and are no longer fit for human consumption.

Table 5
African bush mango preservation/storage

<i>Variables</i>	<i>Frequency</i>	<i>Percentage</i>
<i>Duration of Storage</i>		
<1 month	41	46.6
1-5 months	19	21.6
6-10 months	12	13.6
11-15 months	7	8.0
Over 15 months	1	1.1
Undisclosed	8	9.1
<i>Storage</i>		
Warehouse	16	18.2
Others (Aluminum phosphide, dry pepper fruits)	53	60.2
Undisclosed	19	21.6

Source: Field Survey, 2017

Packaging Materials for African Bush Mango

The majority of the marketers (68.2%) (Table 6) prefer using the 50kg used rice bag as packaging material. This preference is because it reduces the risk of contamination, provides accuracy in measurement, eases the carriage during

transportation, and allows for adequate aeration. Environmental friendliness is another reason for preferring the use of a 50kg used rice bag. Besides, most of the marketers (70.5%) were not aware of the use of the plastic crates as an alternative packaging material for the reduction of damages and improved shelf life of the product.

Table 6
Packaging materials for African bush mango

<i>Variables</i>	<i>Frequency</i>	<i>Percentage</i>
<i>Packaging Materials</i>		
Jute bag	2	2.3
Bag (50kg used Rice bag)	60	68.2
Basket	7	7.9
Plastic crates	7	7.9
Others	6	6.8
Undisclosed	6	6.8
<i>Awareness of the Use of Plastic Crate</i>		
Yes	16	18.1
No	62	70.5
No response	10	11.4

Source: Field Survey, 2017

Challenges in African Bush Mango Marketing

Challenges faced by respondents involved in African bush mango marketing in the study area (Table 7) include the high cost of transportation (65.9%), low pricing (58.0%), activities of middlemen (52.3%), and improper grading/scale (43.2%). The current bad road networks as well as the distance the marketers have to travel to purchase the bush mango kernels are contributory factors to high transportation costs. This is corroborated by the finding of Njoku (2017) which reported that inadequate transport facilities, bad roads, and high transport costs are a major challenge to *Irvingia spp* marketing in Njaba Local Government Area of Imo

state. Also, activities of middlemen in the study area which influence market prices are supported by the findings of Arowosoge (2017) which revealed several intermediaries along the bush mango value chain. The study revealed that this could be reduced by providing adequate access to roads to facilitate the transportation of African bush mango kernels to the markets.

Moreover, Babalola and Agbeja (2009) observed that the lack of good storage and low pricing of the products were major challenges in African bush mango marketing in Southwest Nigeria.

Table 7
Challenges in African Bush mango marketing

Challenges	Frequency	Percentage
Improper handling	27	30.7
High cost of transportation	58	65.9
Inadequate storage facilities	39	44.3
Activities of middlemen	46	52.3
Inadequate packaging methods	31	35.2
Low pricing	51	58.0
Improper grading/scale	38	43.2
Perishability	24	27.3
Market levies	35	39.8
Others	8	9.1

Source: Field Survey, 2017

CONCLUSION

The study concludes that *Irvingia spp* kernels are mostly marketed in Southern Nigeria by literate married females who are still in their active age. A larger percentage of these *Irvingia spp* marketers' belong to a group such as marketers association and this is expected to improve the marketing of the product in the study area. African bush mango kernels are sourced from within and outside the country and mostly retailed in the markets surveyed. There are agreed measuring units by the marketers such as plastic paint containers and milk tins. Marketers need information on pricing and credit/loan as well as training on preservation and storage. Some

marketers use Aluminium phosphide for the preservation of the kernels, a substance harmful to human health. 50kg used rice bag is used to package *Irvingia spp* kernels to reduce the risk of contamination and for ease of carriage as the marketers are not aware of the use of improved packaging methods using plastic crates. The high cost of transportation, low pricing, and activities of middlemen are major challenges faced by the marketers.

RECOMMENDATIONS

From the foregoing analysis, it seems imperative that the use of Aluminum phosphide for the preservation of the kernels be discouraged. Thus enlightenment programs that portray health

implication of usage of harmful substances in preserving the kernels in the course of marketing are recommended. Awareness of the use of plastic crates in contrast to the use of bags is important since plastic crates will ensure more aeration which the product needs so that it does not go rancid. To ameliorate the challenge of the high cost of transportation identified by the African bush mango marketers; government intervention is required to reduce the cost of transporting the product. It will further enhance the accessibility of the rural areas from where the produce and products are obtained.

To ameliorate the challenge of storage of *Irvingia spp*, research effort could be geared towards improving the storage methods currently being used by *Irvingia spp* marketers. Marketers should also be encouraged to make use of their social capital (being members of marketers' group) by acting as a team to control the transaction cost involved in the marketing of African bush mango in the selected states of Southern Nigeria.

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REFERENCES

- Abbiw DK (1990). *Useful Plants of Ghana: West African Uses of Wild and Cultivated Plants*. Kew: Intermediate Technology Publications and the Royal Botanic Gardens.
- Arowosoge OGE (2017). Marketing and utilization of *Irvingia* Kernels 'ogbono' in Ado-Ekiti Metropolitan Area of Ekiti State, Nigeria. *Journal of Agriculture and Ecology Research International*, 13(1): 1-10.
- Awe F, Imoagene E, Osadebe CO, (2012). Evaluation of *Irvingia* kernels marketing in selected markets in Akure, Ondo State, Nigeria. *International Journal of Agriculture and Forestry*, 2(3): 113-116.
- Babalola FD, Agbeja BO (2009). Marketing of *Irvingia spp* (Bush mango) in Southwest Nigeria: prospects and challenges. *Research Journal of Agriculture and Biological Sciences*, 5(6): 944-953.
- Chah JM, Ani NA, Irohibe JI, (2014). Exploitation of Bush Mango (*Irvingia wombolu* and *Irvingia gabonensis*) among rural household in Enugu State. *Nigeria Journal of Agricultural Extension*, 18(2): 44-56.
- Dansi A, Vodouhe R, Azokpota P, (2012). Diversity of the neglected and underutilized crop species of importance in Benin. *The Scientific World Journal*, 19 pages. doi:10.1100/2012/932947.
- Ekpo IW, Amor ID, Morah FNI (2007). Seed oils and nutritive studies on the seeds of *gabonensis* and *wombolu* varieties of *Irvingia gabonensis*. *The Nigerian Academic Forum*, 13(1): 1-137.
- Ewane M, Ingram V., Awono A. (2009). Market chain baseline for bush mango (*Irvingia spp.*) in the Southwest and Eastern Regions of Cameroon. *CP/RAF/408/EC*, December 2009, 114 pages.
- Ike PC (2008). Estimating production technical efficiency in *Irvingia* Seed (Ogbono) species farmers in Nsukka Agricultural Zone in Enugu State, Nigeria. *Journal of Sustainable Tropical Agricultural Research*, 28: 1-7.
- Ike PC (2010). Structure, causality and price transmission tests in the marketing of *Irvingia* seed (Ogbono) in Enugu state, Nigeria. *Journal of Sustainable Development*, 7(1): 62-69.
- Ingram, V., Schure, J. (2010). Review of non timber forest products (NTFPs) in Central Africa. Yaoundé: CIFOR.
- Kengni E, Kengue J, Ebenezer EBK, Tabuna H (2011). *Irvingia gabonensis, Irvingia wombolu, Bush Mango. Conservation and Sustainable Use of Genetic Resources of Priority Food Tree Species in Sub-Saharan Africa*. Bioversity International, Rome.
- Ladipo DO (2000). Harvesting of *Irvingia gabonensis* and *Irvingia wombolu* in Nigerian Forests: Potentials for the Development of Sustainable Systems. Paper Presented at the Seminar Harvesting of Non-Wood Forest Products, Menemen-Izmir, Turkey, 2-8 October, 2000.
- Leakey RRB, Schreckenber K, Tchoundjeu Z (2003). The participatory domestication of West African Indigenous Fruits. *International Forestry Review* 5: 338-347.
- Levang, P., Lescuyer, G. Noumbissi, D. (2015). Does gathering really pay? Case studies from forest areas of the east and south regions of Cameroon. *Forest, Trees and Livelihoods* 24(2): 128-143.

- Lowe AJA, Gillies CM, Wilson J, (2000). Conservation genetics of bush mango from central/west Africa: Implications from random amplified polymorphic DNA analysis. *Molecular Ecology*, 9: 831-841.
- Njoku, ME (2017). Economics of *Irvingia* marketing in Njaba Local Government Area of Imo state, Nigeria retrieved from www.ajol.info on 1st September, 2020.
- Nkwatoh AF, Labode P, Iyassa SM, (2010). Evaluation of *Irvingia* (*I. gabonensis* and *I. wombulu* .Bail) Trade: A major Non-Timber Forest Product in the Ejagham Forest Reserve of South West Cameroon. *Ethiopian Journal of Environmental Studies and Management*, 3(1): 70-77.
- Nwoboshi LC (2000). Meeting the Challenges of Deforestation in Nigeria through Effective Reforestation. In: B Oguntala (Ed.): *Proceedings of the 1996 Annual Conference of the Forestry Association of Nigeria*, Minna, Nigeria.
- Omokhua GE, Ukoima HN, Aiyeloja AA (2012). Fruits and seeds production of *Irvingia gabonensis* (O' Rorke) and its economic importance in Edo Central, Nigeria. *Journal of Agriculture and Social Research (JASR)*, 12(1): 149-155.
- Tajoacha A. (2008). *Market chain analysis of the main non-timber forest products from the Takamanda/Mone Forest Reserves, southwest province of Cameroon* [Post-graduate diploma thesis]. Dschang, Cameroon: University of Dschang.
- Tchoundjeu Z, Atangana AR, Degrande A (2005). Indigenous methods in preserving Bush Mango Kernels in Cameroon. *American Journal of Applied Sciences*, 2(9): 1337-1342.

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