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Prospects and Challenges of Production and Marketing of Non-timber Forest Products (NTFPs) by Rural Farmers in Southwest Nigeria

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Abstract: The study assessed the prospects and challenges of producing and marketing of non-timber forest products (NTFPs) by rural households with the view to improving their socio-economic contributions to rural livelihoods. Data collection was conducted in Ondo State, Southwest Nigeria. The respondents that was sampled for the study comprise of farmers who produced NTFPs on their farms. Multistage sampling techniques was used to sample the targeted respondents. Three Local Government Areas (LGAs) were randomly selected in the State, while 2 villages were selected from each of the three LGAs making 6 study sites. Twenty respondents were sampled in each of the study sites making a total number of 120 respondents. Primary data was generated mainly from pre-tested structured questionnaires and field observations. Abouth 71.7% of the farmers operated on semi-commercial basis. The major cultivated food crop was cassava (55.3%) while cash crop was Cocoa (54.7%). All the farmers (100%) possessed multipurpose trees on their farmland and these were spared (100%) during land preparation. Many of the farmers got buyers for their NTFPs (χ^2=57.1104, p=0.0000) and the sale of the NTFPs has met their financial needs (χ^2=5.9309, p=0.0149). Middlemen were the major customers that the producers sold the NTFPs to (χ^2=4.6749, p=0.0306). The major marketing problems confronting the farmers of the NTFPs was significant (χ^2=31.1767, p=0.0083) with lack of storage facility on top follow by poor transportation, price fluctuation, middlemen low price and deforestation. There is therefore urgent assistance of the producers to embark on simple and easily-handled processing and packaging technologies to reduce wastage and add value to the products; necessary authorities should also embark on construction of rural roads within the study areas to facilitate marketing of the NTFPs thereby improving the rural livelihoods.

Key words: Multipurpose trees, Income generation, Inappropriate processing technology, Poor transportation, Mortar and pestle, Credit and advance payments

INTRODUCTION

Forests and the goods and services they provide are essential for human well-being. Humans use forests for many purposes and the products derived from forests and their benefits, are referred to as 'forest goods and services' [1,2]. Generally the services fall into four groups: supporting, provisioning, regulating and cultural services [3,4]. Although forest goods are the result of provisioning services, they are usually mentioned separately, being more tangible than the other services. This value chain includes wood and wood products such as fuelwood, paper, charcoal and wood structural products and non-wood products (Foods and plant products) such as rattan, mushrooms, nuts and fruits, honey, bushmeat, rubber and biochemicals [5].

Non-timber forest products are goods of biological origin other than timber derived from the forest or associated ecosystems, which are, consumed either directly as food, drugs or medicine or which contribute non-consumptive values to human welfare [5]. For the rural poor living in and adjacent to forests, NTFPs provide essential food and nutrition, medicine, fodder, fuel, thatch and construction materials, mulch and non-farm income. Forests often serve an important 'safety net' function, providing some measure of relief during the 'hunger periods' in the agricultural cycle through their provision of wild foods [6,7,8].

Forests and woodlands are increasingly recognized for their precious biological resources beyond timber which sustain the livelihoods of hundreds of millions of people in forest-dependent and adjacent agricultural

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communities and contribute significantly to their domestic energy, food- and health-security needs [9]. These non-timber forest resources include fuelwood and charcoal and wood used for tools, carving and other household purposes; they also include non-wood forest products (NWFPs) such as livestock fodder, gums, resins, honey, fruits, nuts, tubers, mushrooms, spices, fish, wild meat and other wild foods, plants and oils for pharmaceuticals and cosmetic products, as well as rattans and bamboos [10-15].

Through their experience with forest-dependent communities, forestry experts have recently begun to appreciate the enormous significance of NTFPs for sustaining rural livelihoods [9]. In recent years, a growing body of scientific research has shown that, given certain basic conditions, non-timber forest resources can help communities to meet their needs on a sustainable basis [11]. There is strong evidence that the poorest of the rural poor are the most dependent on forests and woodlands to meet their domestic energy needs for cooking and heating and for a wide variety of NWFPs [14] and that the poor frequently depend on their collection as an 'employment of last resort' [15]. Regardless of the real and potential importance of NTFPs, national institutions are not carrying out standard monitoring of these resources or assessments of their socioeconomic contribution. Collection and sale of NTFPs can provide employment during slack periods of the agricultural cycle and provide a buffer against climatic risk and household emergencies [16,17]. In many rural sub-Saharan Africa communities, for example, NTFPs may supply over 50% of a farmer's cash income and provide the health needs for over 80% of the population [18].

NTFPs that enter into global trade statistics, such as bamboo, rattan, cork, gum arabic, aromatic oils and medicinal plants, can attain high prices in comparison with NWFPs traded on national markets and contribute to national economic development. Rattan, for example, is one of the most important commercial non-wood forest products in Asia [19]. More than 700 million people worldwide trade or use rattan for a variety of purposes. Domestic trade and subsistence use of rattan and rattan products is valued at an estimated USD 3 billion per annum and another USD 4 billion is generated through international trade, according to assessment made by the International Rattan and Bamboo Network [20].

Over the past several thousand years, land clearing for agriculture and other purposes has been a dominant force affecting the extent and condition of the world's forests [21]. According to Bryant *et al* [22] 'Almost half of Earth's original forest cover is gone, much of it destroyed within the past three decades.' Forests and their conservation or loss influences climate and climate in its turn is a key driver of the changes in forest ecosystems. Nevertheless, many of the ecosystem services and a large part of the nontimber forest products are not accounted for in national product calculations [4] but yet have value. For example, carbon sequestration is a service provided by plants and algae-a part of biodiversity-occurring in forests. While this service had no assigned value until the 1990s, in 2008 the carbon market grew to a worth of over USD 60 billion [23,24].

Despite their importance to forest-dependent people worldwide, accurate information on marketing and use of NTFPs is limited and often mixed with agricultural production statistics. The study therefore assessed the prospects and challenges of producing and marketing of non-timber forest products (NTFPs) by rural households in Ondo state, southwest Nigeria with the view to improving their socio-economic contributions to rural livelihoods.

MATERIALS AND METHODS

Data collection was conducted in Ondo State, Southwest Nigeria. Ondo State is located in the tropical high rainforest of Nigeria. This state houses diverse NTFPs both on the farm and in the wild. The respondents that was sampled for the study comprise of farmers who produced NTFPs on their farms. Multistage sampling techniques was used to sample the targeted respondents. Three Local Government Areas (LGAs) were randomly selected in the State, while 2 villages were selected from each of the three LGAs making 6 study sites (Table 1). Twenty respondents were sampled in each of the study sites making a total number of 120 respondents.

Primary data was generated mainly from pre-tested structured questionnaires and field observations. The NTFPs produced by the farmers were identified while the socio-economic potentials and contributions of selected NTFPs to the producers were also determined in the sampled areas.

Table 1: Study sites in the five States of South western Nigeria

S/N	LGA	Communities	Sample size (n=120)
1	Akoko SW	Supare/Akowonjo	20
		Ota-Agege	20
2	Owo	Ago-paanu	20
		Ago Iwoye	20
3	Akoko SE	Epinmi	20
		Ipe	20

RESULTS

Farm Composition and Activities of the NTFPs Producers: As shown in Table 2, the NTFPs producers operated their farming systems on semi-commercial (71.7%) basis. The major cultivated food crop was cassava (55.3%) while cash crop was Cocoa (54.7%). All the farmers (100%) possessed multipurpose trees on their farmland and these were spared (100%) during land preparation.

Table 3 contains some of the identified edible NTFPs with high socio-economic potentials in Ondo State. The table also contain the botanical and common names of the NTFPs, the part used and their utilisations.

Producers' Level of Farming and NTFPs Production Variables: As shown in Table 4, the indigenous multipurpose trees that the farmers have on their farm (χ^2= 8.1096, p=0.0173) and the spared indigenous multipurpose trees on farm (χ^2=11.6680, p=0.0029) were significant and depended on the producer's level of farming (majority of which were semi-commercial).

Although majority of the producers engaged in the processing and/or storage of the NTFP, but this was not significantly depended on the level of farming (χ^2=0.6971, p=0.7057). Conversely, engaging in the selling of the NTFPs by the producers was significant, thereby depended on the farming level (χ^2=7.6484, p=0.0218).

Factors Affecting Production and Trade of the NTFPs by the Rural Farmers: As indicated in Table 5, not giving of the NTFPs on credit (χ^2=0.1320, p=0.7163) and not receiving of advance payment (χ^2=0.8436, p=0.3584) by majority of the producers were not significant with the selling of the NTFPs by the producers.

Getting buyers to buy the NTFPs by the farmers (most of which was through family member selling at the market) was significant (χ^2=57.1104, p=0.0000). Likewise, the affirmation that the sale of the NTFPs has met financial needs of the farmers (χ^2=5.9309, p=0.0149) and middlemen as major customers that the producers sold the NTFPs to (χ^2=4.6749, p=0.0306) were significant.

Table 2: Farm composition and activities of the producers of the selected NTFPs Ondo State, Nigeria

S/N	Variables	Frequencyn = 120	%	Mode
1	Level of farming			
	-Mainly Subsistence	30	25	Semi- Commercial
	-Semi-commercial	86	71.7	
	-Commercial	4	3.3	
	-Mechanized	0	0	
2	Major cultivated food crops			
	-Maize	14	11.7	Cassava
	-Cassava	66	55.3	
	-Yam	12	10.0	
	-Vegetables	16	13	
	-Others	12	10	
3	Major cultivated cash crops			
	-Cocoa	66	54.7	Cocoa
	-Kola	26	21.7	
	-Orange	12	10.0	
	-Oil palm	12	10.0	
	-Others	4	3.6	
4	Possession of indigenous multipurpose tree on farmland			
	-Yes	120	100	Yes
	-No	0	0	
5	Spared the multipurpose tree or plant it			
	-Spared	120	100	Spared
	-Personally plant	0	0	

Table 3: Some identified edible NTFPs on farmlands and their utilisations in Ondo State, Nigeria

S/N	Botanical Name	Common and Local names	Parts used	Uses
1	*Artocarpus altilis*	Breadfruit	Fruit	Fruit eaten after cook; medicinal
2	*Cola acuminata / nitida*		Seed	Stimulant
3	*Chrysophylum albidum*	Star apple Agbalumo (Yor.)	Fruit	Fruit eaten after ripe
4	*Garcinia kola*	Bitter-kola, Orogbo (Yor.)	Seed	Eaten raw; medicinal; cultural celebration
5	*Irvingia gabonensis*	Bush mango; Oro abeje (Yor.)	Fruit	Soup condiment
6	*Ivirngia wombulu*	Bush Mango Apon / Ogbono (Yor.)	Fruit	Soup condiment
7	*Ocimum gratissimum*	Efinrin (Yor.)	Leaf	Spice, Medicinal
8	*Parkia biglobosa*	Locust beans; Iyere / Igba (Yor.)	Seed	Soup spice
9	*Piper guineenis*	Iyere	Seed, Leaf	Spice, Control of Agric crop pest
10	*Ricinodendron heudelottii*		Seed	Condiment
11	*Spondias mombin*	Iyeye	Fruit	Fruit eaten fresh, or made into juice
12	*Tetracarpidium conophorum*	Walnut, Awusa (Yor.)	Seed	Eaten after cook
13	*Tetrapleura tetraptera*		Fruit	Condiment
14	*Thaumatococcus danielli*	Wrapping leaf Ewe iran	Leaf	Wrapping food
15	*Vernonia amygdalina*	Bitter leaf Ewuro (Yor.)	Leaf, stem, root	Soup, Medicinal
16	*Vitellaria paradoxa*	Shea butter, Ori / Emi (Yor.)	Fruit, seed	Fruit eaten raw; seed use as making soap, jam,cooking oil, etc
17	*Xylopia aethiopica*		Seed	Condiment
18	*Zingiber officinale*	*Ginger*	*Root*	Medicinal

Yor. = Yoruba language of southwest Nigeria

Source: Field survey, 2007 - 2008

Table 4: Dependent levels of the producers' level of farming and NTFPs production variables in Ondo State, southwest Nigeria

S/N	Variables	Total n=120	Chi-square (Pearson)	p-level
1	Have indigenous multipurpose trees on farm			
	(a) Yes	106	8.1096	0.0173 *
	(b) No	14		
	Sub-total	120		
2	Spared indigenous multipurpose trees on your farm or self-plant			
	(a) Spared	112	11.6680	0.0029 **
	(b) Self-plant	8		
	Sub-total	120		
3	Engage in the processing and/or storage of the NTFPs			
	(a) Yes	66	0.6971	0.7057 ns
	(b) No	54		
	Sub-total	120		
4	Engaged in the selling of the NTFPs			
	(a) Yes	114	7.6484	0.0218 **
	(b) No	6		
	Sub-total	120		

Significant at $p < 0.05$; ** Significant at $p < 0.01$; ns Not significant

Table 5: Dependent levels of selling of the NTFPs by the farmers and method of payment, meeting financial needs and marketing problems in Ondo State, southwest Nigeria

S/N	Variables	Total n=120	Chi-square (Pearson)	p-level
1	Given of the NTFPs on credit to the middlemen			
	(a) Given NTFPs on credit	40	0.1320	0.7163 ns
	(b) Have not given NTFPs on credit	80		
2	Received of advanced payment from middlemen			
	(a) Received advanced payment on sale	58	0.8436	0.3584 ns
	(b) Not received advanced payment on sale	62		
3	Getting buyers for the NTFPs			
	(a) Personally take to the market	5	57.1104	0.0000 **
	(b) Family member sell at the market	60		
	(C) Middlemen come to buy at the farm	48		
	(d) Sell through Association	2		

Table 5: Continued

4	The sale of the NTFPs has met financial needs			
	(a) Have met financial need	106	5.9309	0.0149 *
	(b) Have not met financial need	14		
5	Major consumers that NTFPs were sold to			
	(a) Household	26	4.6749	0.0306 *
	(b) Middlemen	94		
6	Major problems encountered in the marketing of the NTFPs by farmers			
	(a) Poor transportation	34	31.1767	0.0083 **
	(b) Lack of storage Facility	43		
	(c) Price fluctuation	14		
	(d) Increase in Household consumption	2		
	(e) Middlemen low price	9		
	(f) Unavailability of market out let	5		
	(g) No buyer	3		
	(h) Deforestation	10		

* Significant at $p < 0.05$; ** Significant at $p < 0.01$; ns Not significant

The result of the analysis on the major marketing problems confronting the farmers of the NTFPs was significant (χ^2=31.1767, p=0.0083) ranking lack of storage facility on top follow by poor transportation, price fluctuation, middlemen low price and deforestation in decreasing order.

DISCUSSION

As pressures on the agricultural land base increase, leading to progressive fragmentation of farm holdings and overuse of arable land, the ability of farm households to achieve food self-sufficiency from their land has been declining widely. Rural populations are becoming increasingly reliant on farm and non-farm income in order to meet their food and other needs. Forest product activities have repeatedly been found to provide one of the main sources of non-farm income to rural households [25,26]. Products of farm trees are therefore important sources of farm income [27].

Farming Practices and NTFPs Production in Ondo State: Farming dominated the activities carried out by the rural dwellers of the state. Although this is done on small scale level, mainly subsistence and for the production of food crops like cassava, maize, yam, cocoyam, plantain, banana, etc. In addition to the production of food crops, cash crops like cocoa, kolanut, oranges and oil palm are also produced in the study areas. Whichever the case, the contribution of NTFPs to the socio-economic benefits of the farmers could not be over-emphasised. Another feature of the farming characteristics in the study areas is that it was dominated by the adult and old male, most of whom are married.

The producers of the selected NTFPs operated semi-commercial farming practice with few operating commercial farming practice, while none operated mechanized farming system. This result shows the low level adoption of modern technology in the farming system practiced by the producers of the NTFPs in Southwest Nigeria. The indigenous multipurpose trees that the farmers have on their; the spared indigenous multipurpose trees on farm; and engaging in the selling of the NTFPs by the producers depended on the level of farming. In contrast, engaging in the processing and/or storage of the NTFP by the producers did not depend on the level of farming.

Majority of the respondents keep indigenous tree species that yield NTFPs on their farm most of which were spared during land preparation. As indicated by Ndoye *et al.* [28], these NTFPs supplement household food, income generation, medicinal benefits, provide employment for a large number of people from the farm level to market place and also serves as safety net in term of crop failure or low farm output. The multipurpose trees were also used as farm boundary to provide both land and food security. Production and collection of NTFPs in homestead garden has therefore become part of rural livelihood, while allowing NTFPs multipurpose trees on fallow land not only provide valuable NTFPs but also serve various soil improving purposes.

Farmers' Involvement in Marketing of NTFPs: In addition to their production of the NTFPs, the farmers also engaged in the marketing of the products and this was confirmed to have met financial needs of the producers. This shows how important the trade of the NTFPs is to the rural farmers in addition to the sale of

agricultural products. Most of these trading activities were done in both the wet and dry seasons of the year depending on the NTFPs. However, apart from the quantity consumed by the producer and their family members, bulks of the produce were sold to the middlemen instead of selling directly to consumers. Meanwhile, exchange of the NTFPs take place at different locations ranging from the middlemen coming to purchase from the producer on their farm, at home or in local market. Also, family members of the producer take the NTFPs to local market where they meet the middlemen for transaction. In situation where the family member takes the NTFPs to the local market for sale, better bargain and price were obtained than the middlemen coming to buy from them at home or on the farm, although in case the market is far from their residence or farm, the transportation cost will be paid by the producer.

Basically, involvement of producers in the trade of NTFPs is usually a household affair and most of the income generated through the sale of NTFPs is spent on household commitments such as school fees and materials and contracting out the household work during non–cash crop season, when villagers are able to use their profits to participate in family ceremonies. The extra income derived from the sale of the NTFPs is thus important to meeting social and educational obligations for the rural poor from resource farmer to forest dweller [29].

Payment Methods for NTFPs as a Determinant of Poverty Level: Most of the producers indicated that selling of the NTFPs has met their financial needs and contributed to their household income. It is believed that most producers of NTFPs were in extreme poverty and the middlemen exploit them during transaction. One way of confirming this is if the producer actually gives the NTFPs on credit or collect advance payment prior to the season or fruiting of the produce. In a case the producers are paid in advance, often with commodities at inflated prices, this can lead them into a vicious cycle of borrowing and repayment.

From the study, it was discovered that some of the producers of *Irvingia spp* collected advance payment from the middlemen. Advanced payment in most cases is done on standing *Irvingia spp* (Bush mango) trees. Actually, it is the village merchant who offered to pay in advance to the farmers so as to secure the tree prior to fruiting season. After payment, it means that the tree has been leased for the fruiting season and nobody (including the farmer and his family members) could collect dropped fruits or harvest from the tree except the buyer. This method of payment has its risk to both the producer and the buyer. If there is heavy fruiting for the season, the farmer cannot demand for more money from the buyer but in case of less fruiting, the buyer bears the loss.

Challenges Facing the Producers of NTFPs: The results of the analysis on the major production problems confronting the producers of the NTFPs were significant. Only a small percentage of what is harvested from the forest is eventually utilized, meanwhile, a larger percentage is wasted during storage and processing. Lack of modern technology for processing and storage is one of the major problems associated with the production of NTFPs. Most of the raw NTFPs got rotten during storage because they were not appropriately processed. This leads to wastage of the resources and time spent in collection.

Inadequate transportation couple with bad road network of the NTFPs to market was another major problem. This problem leads to:

- Spoilage of the packed NTFPs on the way to the market;
- Additional cost of transportation;
- Disappointment of the middlemen and customers due to change in the scheduled or agreed period of delivery;
- Lost of interest in production by the collector and farmers;
- Lost of product quality (freshness, aroma, appearance, taste, etc)

The implication of these problems on the production and trade of the NTFPs needs urgent solution. Many of the perishable products like the fruits of *Irvingia* spp. and the processed *P. biglobosa* are either wasted or destroyed if not consumed on time. Therefore the problem of inadequate storage facility does support food security, long term supply and transporting of the products to a far market.

Due to lack of transportation, resulting from bad road network in many of the rural areas, the available transport tends to exploit the producers of the NTFPs by levying exorbitant fare. This inflates the unit selling price of the products by the time it gets to the final market. Many of the middlemen sometimes discourage from going to buy the products in far villages despite of large production and availability. Some even abandoned the products if they discover the transport fare will prevent them from making enough profit.

At present, *I. gabonensis* and *I. wombolu* are widespread in West and Central Africa and would not be considered to be endangered species. Bush mango is maintained on tree and field crop farmland [30] and due to its valuable produce is unlikely to be cleared from this niche. Studies have shown that NTFPs are faced with problem of deforestation most especially *Irvingia* spp. [31,32]. This fact is also ascertained by some of the producers and collectors of the selected NTFPs. The current pressure on land for farming and timber for wood has been contributing to this problem.

However, the natural habitat for *Irvingia* spp., humid lowland forest, is being cleared for agricultural land and its products are often over-exploited. If wild *Irvingia* trees are lost, this will put an even greater strain on the limited produce of cultivated trees. In addition, potentially valuable genotypes could be lost and an important source of seedlings would be depleted [33]. So, although the bush mango itself is not greatly threatened, its habitat needs to be protected to preserve the genetic variation in the two species and to prevent the trees from becoming endangered.

Income-earning activities based on production and marketing of forest products may be seasonal or year-round, or they may be occasional when supplementary cash income is needed [34]. There are several dimensions to the seasonality of NTFPs income-generating activities. Some are governed by seasonally induced cash needs, such as the need for income to buy food during the `hunger period' between harvests, or to purchase farm inputs and other domestic activities. Other activities are seasonal, largely because the crop or material can be gathered only at certain times of year. The fluctuation in timing of other forest product activities is dictated by the seasonality of other activities, such as demand for baskets needed at harvest time and the surge in demand for many items as agricultural incomes peak. Some activities are also linked to fluctuations in availability of labour and to decline in agricultural and planting seasons.

CONCLUSION

The role of forest-based activities as a source of income that people can fall back on in times of crop failure or shortfall, or to cope with some other form of emergency is very important. In other to further enhance the contributions of NTFPs to rural livelihoods in the state and other parts of southwest Nigeria, there should be awareness and encouragement of the producers and gatherers to embark on simple and easily-handled processing technologies through relatively simple and available technologies. This will also reduce spoilage and wastage of the NTFPs and add value, uniformity and improve quality of the processed NTFPs. The concerned authorities should therefore organise skill upgrading programmes for value addition, packaging, storage, account and other management skills for the producers and traders is pertinent.

Poor transportation constitutes serious problem to the trade of NTFPs. There is therefore urgent need for construction of rural roads within the study areas. The dominant means of transportation is by public transport, many places with high potential NTFPs are not easily accessible while the available transports in such an area charge high fare. This problem is couple with spoilage of perishable NTFPs if not transported to the market on time. Current deforestation of the rainforest has direct impact on the production of the NTFPs and must be curbed. This is to increase the production and available quantity of the NTFPs from the wild. Finally, there is need for diversification of the products processed to create more market opportunities and accrued benefits.

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