



# Effects of commercial processing of selected non wood forest products on rural livelihood and resource sustainability in Oyo state

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## ABSTRACT

This study was conducted with a view to identify the socio-economic characteristics of processors of *Vitellaria paradoxa* and *Parkia biglobosa*; to examine the role of the rural dwellers in the sourcing and processing of *V. paradoxa* and *P. biglobosa*; to examine the different benefits that accrue to commercial processing of *V. paradoxa* and *P. biglobosa* and to investigate strategies put in place for sustainable use of *V. paradoxa* and *P. biglobosa* in the study area. Three (3) Local Government Areas were purposively selected for the study and purposive random sampling method was adopted for the selection of respondents. Primary data were obtained through the use of questionnaires while secondary data was gathered from relevant literature. Data collected were analyzed using descriptive statistical tools and gross margin analysis. The result showed that 90% of *Vitellaria paradoxa* and 94.3% of *Parkia biglobosa* processors were female. Majority of the processors of *V. paradoxa* (77.1%) and *P. biglobosa* (58%) fell within the age range of 21-40 years. Fruits of *V. paradoxa* (84.3%) and seeds of *P. biglobosa* (77.1%) were obtained from processors farmlands as a result of the relative availability of the trees on their farmlands. The remaining processors of *V. paradoxa* (15.7%) and *P. biglobosa* (22.9%) had no trees on their farmlands so they gathered the fruits and seeds from and around forest lands. 84.37% of *V. paradoxa* and 88.5% of *P. biglobosa* processors indicated that income was the main economic benefit derived from this business while social benefits highlighted by the respondents ranged from produce been used as food, medicine, condiment and cosmetic. The result also showed that processors of *V. paradoxa* incurred more costs, produced more output and had a higher average gross return in processing than *P. biglobosa* processors. The RORI for the processing business in the study area was 51% and 96%. To promote sustainability the people have adopted local means of sustaining production by preventing indiscriminate livestock grazing and bush burning.

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## Introduction

### Forests, Non-Wood Forest Products and Livelihood

Forests have been valued for many products and benefits they provide (i.e. food, fodder, medicine, fuel wood, timber, etc) and as a source of income from harvesting, processing and trade in these items. Forests also help to protect land, water and the biological resources and they play an important role in maintaining the productivity of agricultural lands and environmental systems (Pimentel, 1997). Rural people extract and produce a variety of NWFPs from forests either to consume or to generate income and the sustained extraction and processing of NWFPs by local people provide an alternative to deforestation of the forest whereby attention is shifted from timber (Hedge, *et al.* 1996). Livelihoods connote the means, activities, entitlements, assets by which people do make a living through natural or biological means (land, water, flora, fauna), social (community, family, participation, empowerment) and human resources (knowledge, creation of skills) (Terry *et al.* 2004). The sustenance of livelihoods could make significant contribution to alleviating or eradicating poverty and at the same time protect environmental resources (Dovie, 1999).

*Parkia biglobosa* (Jaeq) Benth and *Vitellaria paradoxa* C.F.Gaertn have been widely recognized as important indigenous

multipurpose fruit trees with very high commercial and nutritional values in most ecological zones of Nigeria (Oni, 1999). Farmers deliberately maintain these trees on their farms mainly for their fruits and nuts. They are valued for the array of multipurpose roles they play in the sustenance of the rural economy providing food, medicine, tannin, gum, windbreak, bee food, stabilization of degraded environment, livestock feed and many other domestic uses in their area of occurrence. Demand for these trees and their products is increasing and a growing number of people are enhancing their income and livelihood through processing of seeds and fruits of *P. biglobosa* and *V. paradoxa*. These resources are being used by man and they continue to play important roles in rural well being through processing, employment and trade as well as providing a wide range of other socio-economic benefits. Many studies and investigations have demonstrated that these resources are important over a wide range of systems, and they have been incorporated into livelihood strategies of most rural people (Scoones, *et al.* 1992; Emerton, 1996; Statz, 1997; Dounias, 2000; Shackleton, *et al.* 2002). For example, in Arica, building of man power for women to sustainably utilize environmental resources have been documented (Chikoko, 1999).

### Commercial processing of Non-wood forest products

Commercial processing of forest resources is defined as the entire process from production, through collection or cultivation to sale of a product in exchange for cash, or sometimes for barter, resulting in the product leaving the community of origin. However, commercial processing of NWFPs is important for several reasons:

- It enables rural dwellers and poor urban households to diversify their source of incomes, which contribute to their food security and livelihood sustenance.
- It increases the economic value of NWFPs thereby increasing the awareness and incentives for local communities to conserve many forest products.
- At the local level, it increases rural employment, especially for women and minorities.
- It increases the awareness of decision makers and donors of the value of forests products other than timber and therefore may encourage them to reorient their policies and approaches in a way that integrates both timber and NWFPs.
- It provides more opportunities for regional trade within Africa and between Africa, Europe and North America.

Oyo state is endowed with abundant resources of socio-economic benefits including *Vitellaria paradoxa* and *Parkia biglobosa*. The roles of these forest resources in promoting rural welfare, employment, livelihood sustenance and sustainable forest management in the state are not fully appreciated because most times traditional forest management tended to focus on production of timber and fuelwood (Chikamai and Odera, 2002). Recent studies have reported that *V. paradoxa* and *P. biglobosa* are among the commodities that provide both social and economic benefits to rural populations at both subsistence and commercial levels (Bonkougou, 2002). They have been widely recognized as important indigenous multipurpose trees in various ecological zones of Nigeria (Oni, 1999). The various parts of the trees have been reported to have economic importance with the seeds and fruits being the most exploited and utilized (Oni, 2006). Commercial processing of *V. paradoxa* and *P. biglobosa* acts as an engine for rural growth and contributes to improved national and domestic economies (Rohadi, et al. 2004). In Burkina Faso for example, shea (kernels and butter) is the third most important in national export (Schreckenber, 2004). However, despite the importance of these resources in Oyo state, their significance in general and socio-economic values in particular is undervalued, this is because most of the commodities often go unrecorded due to the previous tendency where emphasis was on wood/timber and non-wood forest resources were considered only as minor/incidental. Also, despite Oyo state being a major processor of these resources (FAO, 1990) and with a wealth of traditional knowledge, her share in processing of these resources remains negligible. This study therefore investigated the contribution of commercial processing of *V. paradoxa* and *P. biglobosa* on the socio-economic well being of rural dwellers and sustainable use of the resources. It would serve as a tool for policy makers towards sustainable forest management of these resources in the study area.

### Methodology

#### Study Area

The study was carried out in the savanna eco-zone of Oyo State. This is a large rural area located in the North Western part of the state and is made up of ten (10) Local Government Areas collectively referred to as 'Oke-Ogun' area. The region lies between latitude 7<sup>0</sup>N and 9<sup>0</sup>E, longitude 2<sup>0</sup>N and 4<sup>0</sup>E and is

geographically bounded by Kwara state to the North and Benin Republic to the West. The area is inhabited by about 1.5 million people according to the 2006 population census (NPC, 2006) with a total land area of 13,537 Km<sup>2</sup>. The rainfall is between 1000mm and 1500mm annually with well drained and rich ferruginous tropical soils which favors the production of crops.

### Data Collection and Sampling Procedure

Three (3) Local Government Areas (i.e. 30% of the total Local Government Areas) were purposively selected for the study because of the prevalence of the processing activities of concern in these areas. Primary data were obtained through the use of questionnaires administered to processors of *V. paradoxa* and *P. biglobosa* while secondary data were gathered from relevant literature. Random sampling method was adopted for the selection of respondents from the three (3) Local Government Areas. Each Local Government Area was divided into wards and 50% of the number of wards was randomly sampled. Ten (10) respondents were randomly selected from each ward making a total of one hundred and forty (140) respondents.

### Data Analysis

Data collected were analyzed using descriptive statistical tools such as frequency tables, percentages and charts. Gross Margin analysis and rate of return on investment were also used to determine the profitability of processing of *V. paradoxa* and *P. biglobosa* in the study area.

Gross margin is expressed as:  $GM = TR - TVC$ ..... i

Rate of returns on investment (RORI) is given as =  $GM/TVC$ .....ii

Where

GM = gross margin; TR = total revenue; TVC = total variable costs

### Results and Discussion

#### A. Socio-Economic characteristics of respondents

Sixty three (90%) of *Vitellaria paradoxa* and 94.3% of *Parkia biglobosa* processors were female. Majority of the processors of *V. paradoxa* (77.1%) and *P. biglobosa* (58%) fell within the age range of 21-40 years. The result also showed that 67.1% of *V. paradoxa* and 74.3% of *P. biglobosa* processors had primary school education with the number of years of experience in processing of *V. paradoxa* (90%) and *P. biglobosa* (82.9%) as over 12 years.

Gender specialization was pronounced in that women were more involved in the processing activities across the area. This observation is consistent with the findings of previous studies that women are the major people involved in the collection, processing and marketing of non timber resources in Nigeria, reasons been that income from these activities are generally regarded as being marginal and are thus traditionally considered to be women and children's affairs (Okafor, 1993; Arowosoge and Popoola, 2006). FAO (2008) estimated that about 80% of the volume of available non-wood forest resources in the market is processed by women in both urban and rural areas and that women often dominate forest gathering and processing activities both for household products and income (FAO, 1991b). Age distribution showed that the processors were in their active age; this is because the process is tedious and only able bodied persons can be involved in the activity. Most of the respondents are well experienced in this business which they have been for a long time. This is supported by Adeokun et al (2002) who confirmed that years of stay in a business could enhance transaction and profit.

**Table 1: Demographic characteristics of respondents**

	<i>Vitellaria paradoxa</i> processors		<i>Parkia biglobosa</i> processors	
	Freq	Percentage (%)	Freq	Percentage (%)
<b><u>SEX</u></b>				
FEMALE	63	90.0	66	94.3
MALE	7	10.0	4	5.7
<b><u>AGE (YEARS)</u></b>				
≥ 20	14	20.0	8	11.4
21-40	54	77.1	58	82.9
41-60	2	2.9	4	5.7
<b><u>MARITAL STATUS</u></b>				
MARRIED	53	75.7	61	87.2
SINGLE	14	20.0	8	11.4
DIVORCED	2	2.9	1	1.4
WIDOWED	1	1.4	0	0
<b><u>EDUCATIONAL STATUS</u></b>				
NONE	23	32.9	18	25.7
PRY	47	67.1	52	74.3
SEC	0	0	0	0
TERTIARY	0	0	0	0
<b><u>FAMILY SIZE</u></b>				
0-5	63	90.0	66	94.3
6-11	7	10.0	4	5.7
≥ 12	0	0	0	0
<b><u>TRIBE</u></b>				
YORUBA	54	77.1	52	74.3
“BARBA”	16	22.9	18	25.7
<b><u>PRIMARY OCCUPATION</u></b>				
TRADING	0	0	2	2.9
FARMING	70	100.0	68	97.1
ARTISAN	0	0	0	0
<b><u>SECONDARY OCCUPATION</u></b>				
FARMING	0	0	0	0
TRADING	7	10.0	4	5.7
ARTISAN	0	0	0	0
NONE	63	90.0	66	94.3
<b><u>YEARS OF EXPERIENCE</u></b>				
0-5	0	0	0	0
6-11	7	10.0	12	17.1
≥ 12	63	90.0	58	82.9

Source: Field survey, 2011

**Table 2: Sourcing and processing of *V. paradoxa* and *P. biglobosa***

	<i>Vitellaria paradoxa</i> processors		<i>Parkia biglobosa</i> processors	
	Freq	Percentage (%)	Freq	Percentage (%)
<b><u>SOURCE</u></b>				
FOREST	11	15.7	16	22.9
FREE AREAS	0	0	0	0
FARMLAND	59	84.3	54	74.1
PLANTATION	0	0	0	0
<b><u>METHOD OF COLLECTION</u></b>				
HARVESTING	4	5.7	0	0
PURCHASE	16	22.9	18	25.7
BOTH	50	71.4	52	74.3
<b><u>METHOD OF PROCESSING</u></b>				
LOCAL	70	100	70	100
MODERN	0	0	0	0
<b><u>AVE NO OF BAGS PER PROCESSING</u></b>				
0-5	0	0	0	0
6-11	6	8.6	4	5.7
≥ 12	64	91.4	66	94.3
<b><u>REASON FOR PROCESSING</u></b>				
FOR SALE	68	97.1	70	100
CONSUME	0	0	0	0
BOTH	2	2.9	0	0
<b><u>REL AVAILABILITY</u></b>				
INCREASING	0	0	0	0
DECREASING	69	98.6	70	100
CONSTANT	1	1.4	0	0
<b><u>FREQUENCY OF COLLECTION</u></b>				
DAILY	0	0	0	0
WEEKLY	0	0	0	0
MONTHLY	0	0	0	0
SEASONALLY	70	100	70	100

Source: Field survey, 2011

**Table 3: Socio-economic benefits accrued to processors of *V. paradoxa* and *P. biglobosa***

	<i>Vitellaria paradoxa</i> processors		<i>Parkia biglobosa</i> processors	
	Freq	Percentage (%)	Freq	Percentage (%)
<b><u>ECONOMIC BENEFIT</u></b>				
INCOME	59	84.3	62	88.5
EMPLOYMENT	1	1.4	2	2.9
BOTH	10	14.3	6	8.6
<b><u>SOCIAL BENEFITS</u></b>				
FOOD	38	54.2	54	77.1
MEDICINE	24	34.3	13	18.6
CONDIMENT	2	2.9	3	4.6
COSMETIC	6	8.6	0	0
<b><u>ANNUAL INCOME ('000)</u></b>				
50-100	0	0	0	0
100-150	2	2.9	3	4.3
150-200	11	15.7	8	11.4
>200	57	81.4	59	84.3

Source: Field survey, 2011

**Table 4: Average cost incurred in processing of *V. Paradoxa* and *P. biglobosa* per annum**

<i>V. Paradoxa</i>		<i>P. biglobosa</i>	
Materials (VC)	Cost (₦)/annum	Materials (VC)	Cost (₦)/annum
Fruits of <i>V. paradoxa</i>	312,000.00	Seeds of <i>P. biglobosa</i>	193,660.06
Fire wood	101,650.02	Fire wood	53,000.00
Water	24,970.00	Labour	86,420.00
Labour	96,167.80	Transportation	66,820.00
Transportation	83,260.00	Packaging materials	8,000.50
Packaging materials	11, 600.00	Containers	4,952.32
Containers	6, 424.50	Sieve	3,200.08
		Salt	2,480.00
<b>Total variable cost (TVC)</b>	<b>636,072.32</b>		<b>529,232.42</b>

Source: Field survey, 2011

**Table 5: Returns and Profitability Analysis from processing of *V. Paradoxa* and *P. biglobosa* per annum**

Output	AvQty/Kg	AvPrice/Kg	AGR (₦)	ATVC (₦)	AGM (₦)	RORI (%)
Shea butter	16bags (800Kg) (1 bag=50kg)	1,561	1, 248,960	636,072.32	612,887.00	96
“Iru”	13bags (650Kg) (1 bag=50kg)	1229.60	799,290	529,232.42	270,057.58	51

Source: Field survey, 2011

**Table 6: Strategies for sustainability**

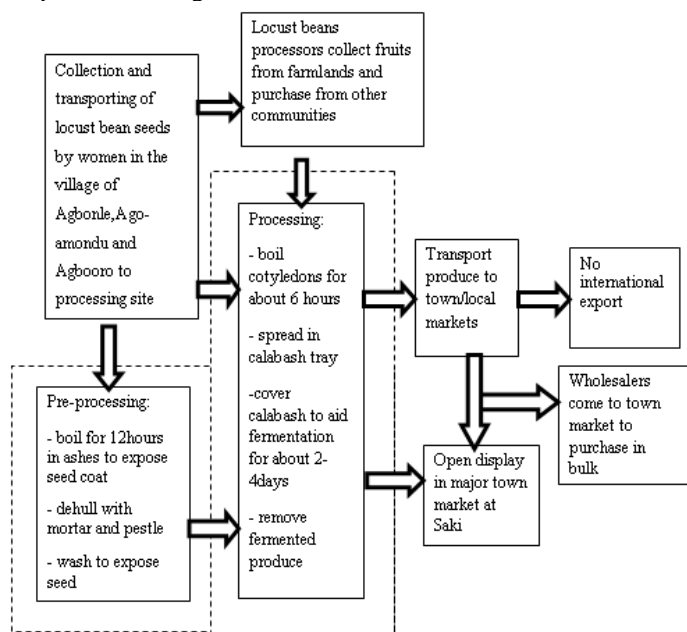
	<i>Vitellaria paradoxa</i> processors		<i>Parkia biglobosa</i> processors	
	Freq	percentage (%)	Freq	percentage (%)
<b><u>PLANTING TREES</u></b>				
NO	63	90.0	66	94.3
YES	7	10.0	4	5.7
<b><u>LENGTH OF TREE GROWTH (YEARS)</u></b>				
≥ 5	0	0	0	0
6-10	2	2.9	1	1.4
> 10	68	97.1	69	98.6
<b><u>METHOD OF HARVESTING</u></b>				
TREE FELLING	0	0	0	0
HANDPICKING	70	100	68	97.1
CLIMBING	0	0	2	2.9
<b><u>PATTERN OF OWNERSHIP</u></b>				
INDIVIDUAL	0	0	4	5.7
COMMUNITY	65	92.9	66	94.3
GOVERNMENT	5	7.1	0	0

Source: Field survey, 2011

### B. Sourcing and processing of *V. paradoxa* and *P. Biglobosa*

The roles of rural dwellers in sourcing and processing of *V. paradoxa* fruits and *P. biglobosa* seeds are presented in table 2.

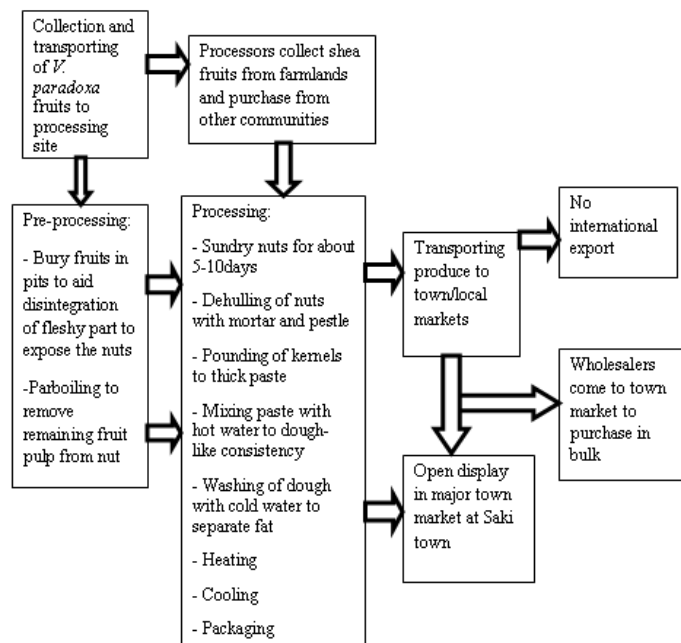
Majority of *V. paradoxa* (84.3%) and *P. biglobosa* (77.1) processors obtained their fruits and seeds from farmlands as a result of the relative availability of the trees on their farmlands. This is in line with Tekleheimanot (2003) who reported that these forest species form part of the very common agro-forestry parkland system in the regions where they occur. The remaining processors of *V. paradoxa* (15.7%) and *P. biglobosa* (22.9%) had no trees on their farmlands so they gathered the fruits and seeds from and around forest lands. 71.4% of *V. paradoxa* and 74.3% of *P. biglobosa* processors employed self harvesting and purchasing as means of obtaining the products. This was because processing was done in large quantity as a result what they collect from their farmlands is augmented by purchasing products from people who were primarily into collection/harvesting of the products as a business, hence they travel out of their villages to neighbouring towns and communities to purchase the fruits/seeds. All the processors also stated that this activity was done on a seasonal basis because the fruits/seeds of *V. paradoxa* and *P. biglobosa* are not available all year round. All the processors employed the traditional method of processing with 91.4% of *V. paradoxa* and 94.3% of *P. biglobosa* processors producing an average of about 12 bags or more of the produce (a bag is equivalent to 50kg) per season. This low average production as recorded from this study was attributed to the seasonal effect of the species as well as it being tedious and time consuming. Respondents also claimed not to be aware of machines that could do most of the work been done manually. The reason for processing as indicated was for sale usually done by open display at the local/town markets. The stages involved in processing of *V. paradoxa* and *P. biglobosa* are presented in figures 1 and 2.



**Fig 1: Processing stages of *Parkia biglobosa* seeds**

The production method involved boiling for about 12hrs to expose the seed coat using firewood and de-hulling with legs or pestle/mortar. The de-coated seeds are then boiled in water for about 6 hrs. Finally, the boiled seeds are spread in a calabash trays covered with thick clothes to aid fermentation for 2 to 4 days. The end produce is transported to the main market at Saki

(usually held on Thursdays) where they are displayed openly to customers.



**Fig 2: Processing stages of fruits of *Vitellaria paradoxa*.**

The fruits are buried in pits to allow the removal of the fleshy part then boiled to expose any pulp remaining. The nuts are then sun dried for 5-10 days or roasted in a traditional oven. The nuts are then de-hulled with pestle and mortar to expose the kernels which are later pounded into a thick paste. The paste is mixed with hot water to dough like consistency which is later washed with cold water to separate the solid fat i.e. shea butter. The end produce is transported to the main market where they are displayed openly to customers.

### C. Socio-economic benefits derived from processing of *V. paradoxa* and *P. biglobosa*:

The socio-economic benefits obtained by processors of *V. paradoxa* fruits and *P. biglobosa* seeds are presented in table 3.

*V. paradoxa* (84.37%) and *P. biglobosa* (88.5%) processors indicated that income was the main economic benefit derived from this business. FAO (1990) reported that many non-wood forest products provide both social and economic benefits to rural communities. Economic benefits are usually measured in monetary terms as income from employment in the sector. Social benefits highlighted by the respondents ranged from produce being used as food, medicine, condiment and cosmetic. Fruits of *V. paradoxa* provides a high quality oil (shea butter) used for cooking soup, stew and eating yam, for lightening as body cream and as medicinal condiment to treat catarrh and rheumatism (in old people) in addition to using it as baby oil. *P. biglobosa* seeds provide a pungent nutritious spice or condiment ('Iru') which is added to soups and stews. This is in line with Chikamai *et al* (2002) who stated that the social benefits of non-wood forest products are reflected in the many local uses they offer to the communities. Average variable costs and returns accruable to processors of *V. paradoxa* and *P. biglobosa* and profitability analysis are presented in Tables 4 and 5.

The average variable costs per annum incurred by the processors of *V. paradoxa* fruits are: fire wood, water, labour, transportation, packaging materials (leaves and polythene) and the depreciated values of the fixed items which are the containers (calabash bowls and drums). For processors of *P. biglobosa* the average variable costs per annum include: locust bean seed,

transportation, labour, salt, wrappers (leaves and polythene) and the depreciated value of container and sieve. Table 5 shows the estimated revenue from processing of *V. paradoxa* fruits using the product of the average selling price per kg (N1561.00) and the average quantity produced (800kg). Revenue from processing of *P. biglobosa* seeds were also estimated using the product of the average selling price per kg (N1229.60) and the average quantity produced (650kg). The average gross margin per annum for processing of *V. paradoxa* fruits and *P. biglobosa* seeds were N1, 248,960 and N799, 290 respectively. This showed that processors of *V. paradoxa* incurred more costs, produced more output and had a higher average gross return in processing than *P. biglobosa* processors. This is attributed to the fact that shea butter processing was more laborious and more expensive because of the importance and value attached to it by the people; it is referred to as "semi-gold" in the study area. The Rate of return on investment for each of the enterprise in the study area was 51% and 96%. RORI being an indicator of profitability showed that the business is highly profitable since the higher the RORI, the higher the profitability (Akinyemi, et al. 2009).

#### Strategies for sustainability

Ninety percent (90%) of *V. paradoxa* and 94.3% of *P. biglobosa* processors indicated that they were not into planting of the trees as a measure to ensure sustainability. They also indicated the time of growth of the trees as over 10 years at 97.1% and 98.6% for *V. paradoxa* and *P. biglobosa* respectively. Harvesting of fruits and seeds of *V. paradoxa* and *P. biglobosa* was by hand picking from the ground at 100% and 97.1% respectively. *V. paradoxa* (92.9%) and *P. biglobosa* (94.3%) processors also indicated that the trees were owned by the community.

*Vitellaria paradoxa* and *Parkia biglobosa* trees were not planted by the local people because they believe that the trees germinate and grow on their own. Eboh (1997) reported that only a few cases of domestication of non-wood forest products exist especially in developing countries. This could probably be due to the long gestation period of the trees as well as the people not being aware of the implications of not planting of the trees as a result of their low level of education. However, the people believe that since the trees are on their farmlands and because of the usefulness of the fruits and seeds in their processing enterprise, they naturally protect them from over exploitation and other harmful disasters such as excessive grazing by livestock and fires. Also, the local people adopted a method of harvesting which they consider as "not destructive" and sustainable by handpicking fruits and seeds from the ground usually done by women and children. Eboh, (1997) reported that though the harvesting of fruits and seeds of these resources does not necessitate tree felling, the potential of unsustainable harvesting and extraction of other parts of the plants i.e. for fuel wood, medicinal purposes, timber etc has led to reduced regeneration potentials and degradation of the resource in developing countries.

#### Conclusion

The following conclusions can be drawn from this study:

➤ Married women were more involved in the processing activities across the area because in both urban and rural areas

they often dominate forest gathering and processing activities both for household products and income and it is seen as a profitable enterprise.

➤ Most of the processors had *V. paradoxa* and *P. biglobosa* trees on their farmlands from which they obtain their fruits and seeds.

➤ To promote sustainability the people have adopted local means of preserving or sustaining production by preventing indiscriminate livestock grazing and bush burning which indirectly sustains the resources and the processing enterprise.

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