Journal of Agriculture and Social Research, Vol. 13, No.1, 2013

PROCESSING, UTILIZATION AND CHALLENGES OF AFRICAN LOCUST BEAN (P*arkia biglobosa, Jacque Benth*) IN ARIGIDI AKOKO, ONDO STATE, NIGERIA

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ABSTRACT
The study examined the processing, utilization and challenges of African locust bean (Parkia biglobosa) in Arigidi Akoko in Akoko Northwest Local Government Area of Ondo State. A total of 3,446 locust bean sellers were identified and 5% of the sellers were sampled given the total of 172 respondents: 80 at Imo Arigidi, 50 at Arigidi Oja, and 42 at Agbaluku which are the three major settlements in the town. Data were collected using a structured questionnaire and subjected to descriptive statistical tools. The Socio-economic analysis shows that locust bean processing and trade are dominated by females (97.7%) with trace percentage of male (2.3%). This could be traced to preference of women in processing operations. The prevalent method of processing is manual or traditional. Majority of the respondents (48.8%) believed the processing method is strenuous and it takes a lot of time. However 32% of the people considered it simple and less stressful but 2.3% perceived the activities to be simple, stressful and time-consuming. Similarly, 59.9% of the respondents only submitted that the processing method could be learnt while 57.6% of the respondents specified the number of days in which the processing method could be learnt (1-7 days). The processing/utilization challenges include unavailability of the product in large proportions in the study area, lack of water supply, stressful nature of the processing, poor packaging, lack of storage facilities, etc. Based on the results of the study it can be concluded that locust bean processing is a thriving occupation and therefore a sustainable livelihoods for the people of Arigidi Akoko. For promotion of the occupation or the locust bean trade in the area, modernized processing techniques, provision of boreholes by relevant government agencies to ensure potable water supply for processing activities and encouragement of plantation establishment should be considered.

Key Words: African locust bean, utilization/processing, marketing, Ondo State, Tasboos
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INTRODUCTION

In the arid and semi-arid regions of Africa, *Parkia biglobosa* (African locust bean) is very important for food security particularly during food shortage and drought periods (Kourouma *et al*, 2011). They added that it is a food species whose importance is recognized both regionally and internationally because in some societies on the African continent it is not an ordinary food item but a therapeutic food and a source of income.

Approximately 90 percent of the poorest people rely on forests for subsistence and income generation through small and medium forest enterprises (SMFEs) (Now-wood News, 2009). In view of this, the development of SMFEs represent an opportunity for strengthening the livelihoods of these people and conserving the natural resource base through sustainable forest management and processing of timber and non-wood forest products. There is a growing awareness of the contributions of Non-Timber Forest Products (NTFPs) to household economies, food security, national economies and conservation of biodiversity. In other words, Non-wood News (2010) observed that NWFPs play a significant role in addressing the food security and health needs of rural and forest-dependent populations who are suffering from hunger in the world today. It is therefore undeniable that NWFPs provide succour for rural communities in terms of subsistence as well as revenue generation. *Parkia biglobosa* seeds have been identified as typical examples of such NWFPs and this is in conformity with FAO (2000) which stated the difference between the commonly used NTFPs and NWFPs. It was clearly stated that the term NWFPs differs from the commonly used NTFPs in excluding all wood while NTFPs include wood for uses other than timber.

P. biglobosa (named after the famous Scottish botanist and surgeon Mungo Park by Robert Brown in 1926) has long been widely recognized as an important indigenous multipurpose fruit tree whose uses include food, medicine, manure, tannin, shade, wind-breaks, bee food, stabilization of degraded environment, livestock feeds, fuel, fibre, fish poison and several other domestic uses (Sadiku,2010). African locust bean, as it is commonly known, is a tree legume that belongs to the family MIMOSOIDEAE. It is a wide spread savannah tree. The locust beans are the mature seeds that come from the parkia pods. The pods are harvested and processed into the fermented product known as '*Iru'*, *'Dawadawa*' and '*Ogiri*' in the Yoruba, Hausa and Igbo Languages respectively (Sadiku, 2010). It is characterized by its fruits, which are elongated pods, 5-11 inches long and found in clusters. It flowers from December to March and brings out fruits from February to July. The immature fruits are green and brown when it is mature. The mature seeds are made up of husk which is embedded in dark brown pod.

A lot of research work has been done on the production of African locust bean seeds and related aspects such as storage, preservation, processing, time taken to be cooked, packaging and other areas (Non-Wood News, 2009). Also efforts have been made to scientifically study the traditional processing, marketing, physical and chemical changes, and the micro-organisms involved in the processing of African locust bean (Campbell-Platt, 1980; Odunfa, 1981; and Babalola, 2012). However, since Arigidi people are not only known to depend on "Iru" for their household delicacies over the years but are also seen as the major processors of the product in Ondo State, it is of paramount importance and worthwhile to carry out a study that would eventually improve the processing and utilization of the product by examining the processing stages, identifying challenges experienced in the activities and consumption of locust bean in the study area with a view to suggesting improvement measures.

METHODOLOGY

The study area is Arigidi Akoko in Akoko Northwest Local Government Area of Ondo State and is geographically located on Latitudes 7^{o} 33^{1} N-$7^{o}45^{1}$N and longitudes 5^{o}37E-5^{o}57'E.

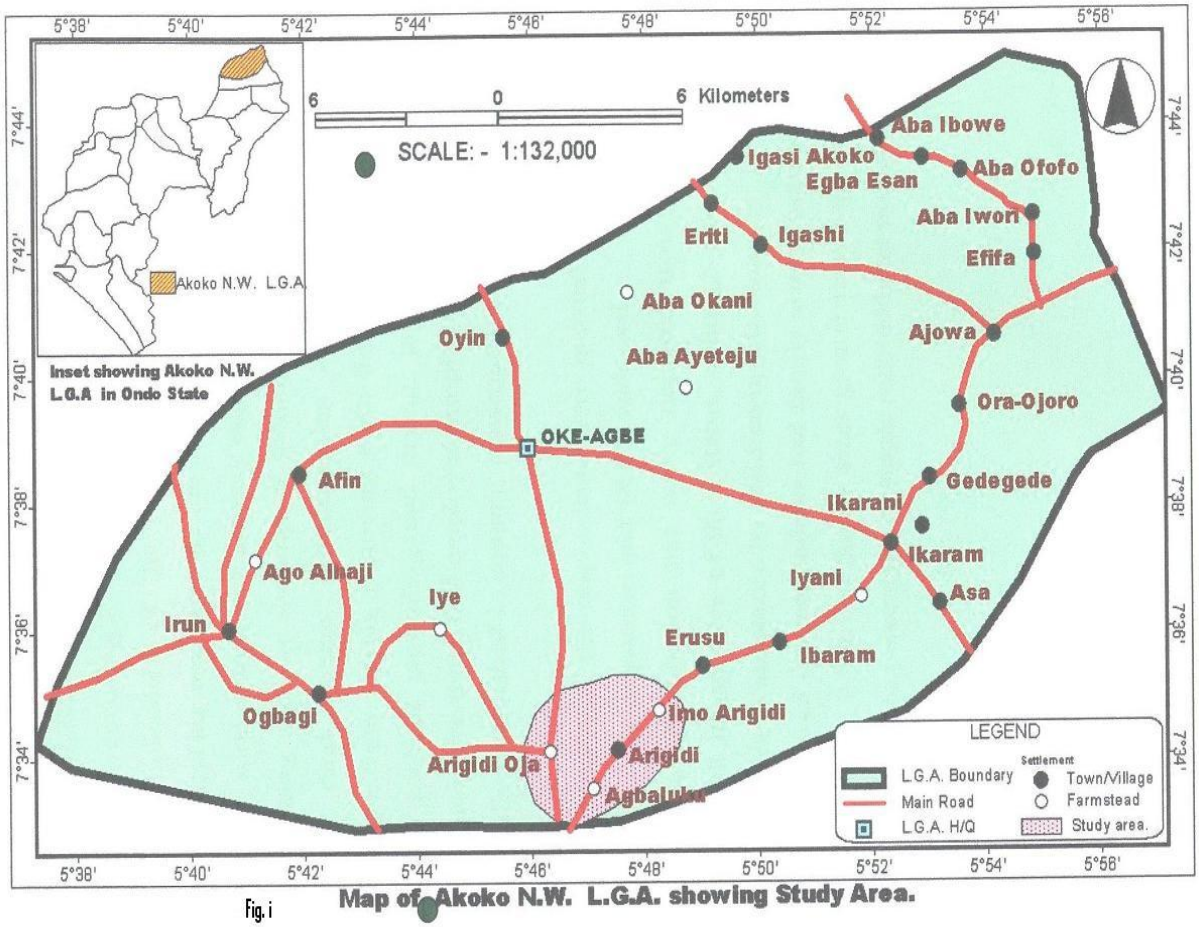


Fig. i **Map of Akoko N.W. L.G.A. showing Study Area.**

Identification of concerned respondents was done through locust bean sellers' association in Arigidi, visitation to the processing sheds and household consultations. The respondents were made up of processors of locust bean, processed locust bean sellers, and raw locust bean sellers.

However, a simple random sampling procedure was used for the study based on the identified number of concerned respondents obtained during the reconnaissance survey. A total of 3,446 concerned respondents were identified in the whole of Arigidi Akoko metropolis: 1,601 were recorded at Imo Arigidi; 1001 at Arigidi-Oja while 844 were recorded at Agbaluku, these being the three major communities in the town. Then a comprehensive field survey which entails detailed appraisal of the various aspects of the objectives was carried out through the use of structured questionnaire. At 5% sampling intensity of concerned respondents, 80 respondents were randomly selected in Imo Arigidi, 50 in Arigidi-Oja and 42 in Agbaluku respectively, bringing the total number of respondents sampled in the entire town to 172. The data obtained were analyzed using descriptive statistical tools such as tabular presentations and a flow chart to present data gathered on processing stages after necessary comparison of responses. But the identified challenges were itemized and discussed.

RESULTS AND DISCUSSION

Socio-economic Characteristics of Respondents

Table 1 revealed that locust bean processing and trading are predominantly a female occupation; consequently 97.7% of respondents interviewed were females. The study also revealed that those between ages 41 and 50 years were 30.2%. Those in the category of 50 years and above were 26.79% while 22.1% of them had ages ranging from 21-30. Those with ages between 31 and 40 were 16.3% and those below 20 years were 4.7%. This trend suggested that the occupation is mainly an occupation of the aged people in the area, although the youths were also not left out in the race for survival. Most respondents (66.3%) were married, even though the marital status distribution has really depicted that the locust bean processing occupation is for all irrespective of their marital statuses. However married people are more advantageous because they are assisted by their children in processing operation. Majority of the respondents had primary and secondary education. Specifically 45.3% had secondary education, 40.7% had primary education, 1.2% had National Certificates of Education, 1.2% had National diplomas but 11.6% had no formal education, It is generally believed by the respondents that the processing operation does not require high level of education. On respondents' occupation, it was discovered that majority of the respondents were traders. Babalola (2012) *P. biglobosa* has important socio-economic and cultural values especially for local folks which include therapeutic, nutritional and domestic energy values, therefore a wide cross-section of rural communities get involved in the production as well as consumption of its bean regardless of age, sex, educational background, religious affiliation, etc.

The study also indicated that 68.5% of the respondents sourced for raw locust bean items within the community whereas 16.3% procured their raw items from Keffi in Nassarawa State, 7.0% sourced theirs from Abuja, 40% from Patuji and 3.5% from Abuji both in Kogi State. Generally more than half of the respondents (68.6%) who sourced their raw locust bean items locally were processors while the rest were non-processors. The latter were those who travel to the North to buy the product. This is in agreement with Keay (1989) who observed that in Nigeria, *P. biglobosa* can be found predominantly in the Savanna Zone.

Table 1: Socio-economic characteristics of respondents

	Frequency	Percentage
Gender		
Male	4	2.3
Female	168	97.7
Age Class		
Below 20	8	4.7
21-30	38	22.1
31-40	28	16.3
41-50	52	30.2
Above 50	46	26.7
Marital Status		
Single	16	9.3
Married	114	66.3
Divorced	4	2.3

Separated	6	3.5
Widowed	32	18.6
Education		
Primary	70	40.7
Secondary	78	45.3
NCE	2	1.2
ND	2	1.2
Nill	20	11.6
Occupation		
Trader	154	89.5
Civil Servant	4	2.3
Artisan	10	5.8
Student	4	2.3
Sources of Raw Materials		
Raw wholesalers (in Arigidi)	118	68.6
Abuja	12	7.0
Patuji	8	4.7
Keffi	28	16.3
Abuji	6	3.5

Field Survey, 2007

Perception of Activities involved in Processing of Locust Bean

About 49% of the respondents perceived the processing of locust bean seeds as stressful and time consuming, 32.0% described it as simple and stressful, 2.3% viewed it as stressful, time consuming and simple while only 0.6% opined that it is simple in table 2. Thirty-two percent (32%) did not respond and this could be attributed to the number of non-processors (55%) since non-processors in the town are noted for buying and selling the raw bean.

Table 2: Perception of Activities involved in Processing of Locust Bean

Description	**Frequency**	**Percentage**
No response	55	32.0
Simple	1	0.6
Stressful/Time consuming	84	48.8
Simple/stressful	8	4.7
Stressful/Time Consuming/simple	4	2.3
Total	**172**	**100.00**

Source: Field Survey, 2007

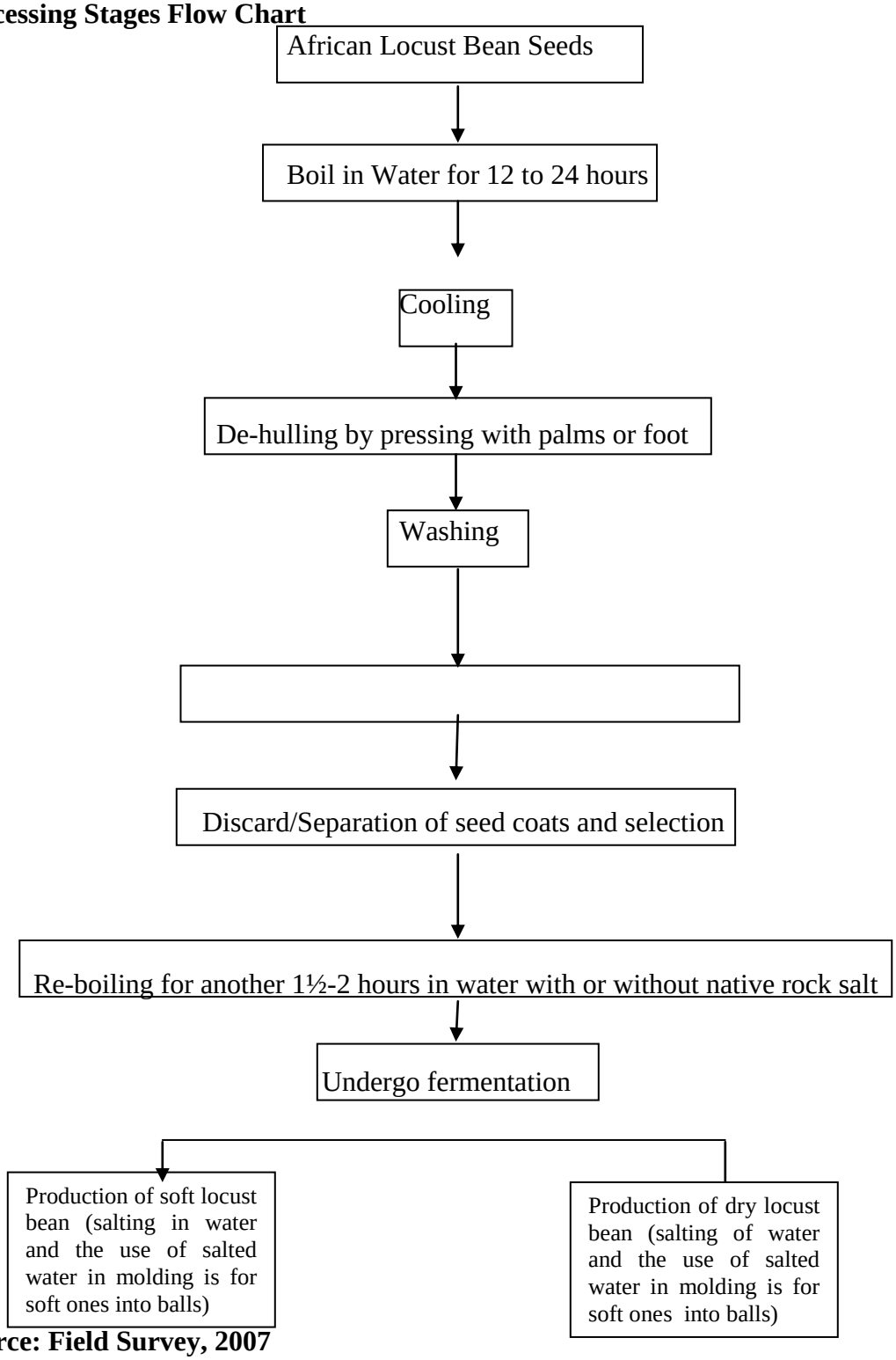
Methods of Processing

The prevailing method of processing of African locust bean in the study area is manual or traditional. All the respondents (processors) stressed that none of them have ever made use of electric machines in processing.

Processing Stages

The identified processing stages involved in processing of African locust bean can be presented as follows:

Processing Stages Flow Chart



Source: Field Survey, 2007

About 61.0% of the respondents disagreed with the use of native rock salt in softening the seeds during second boiling while 38.98% stressed the need to use native rock salt in softening the seeds during second boiling. This observation is supported by Babalola (2012) that processing of locust bean into *Iru* would give a very good and high nutritive quality if no chemical substances such as wood ash additives as preservatives are added as processing catalysts; however, consumers are divided over chemically processed Iru and *Iru* processed using solely the steam method i.e. without additives or the so-called native rock. Also all the processors were of the opinion that the use of new baskets in fermentation process could be responsible for the production of soft *Iru* called *Iru pete* and very old baskets for the production of dry *Iru* called *woro* in the study area.

Possibilities of Learning Processing Method

As submitted by 59.3% of the respondents (Table 3), the locust bean processing method could be learnt, although 32.0% did not respond to the question at all. Despite the silence of the 32 % (55 respondents), a negligible percentage (8.7%) said no. In other words, those who did not respond could have been gatherers and sellers of raw locust bean who were not involved in processing. Though the processing of African locust bean takes a great deal of time as well as labour, but the fact remains that the processing skills can be easily acquired i.e. in fact the involvement of children in the art gives credence to this finding (Babalola,2012)..

Table 3: Possibilities of Leaning Processing Method

Response	Frequency	Percentage
No response	55	32.0
Yes	102	59.3
No	15	8.7
Total	172	100.0

Source: Field Survey, 2007

Identified Number of Processors (Respondents) Interviewed

Table 5 depicts that 68.6% of the respondents were processors of locust bean while the remaining 31.4% of the respondents were only marketers of the raw bean seeds. This may be so because of the people's inclination in the area toward the processing aspect.

Table 4: Identified Number of Processors (Respondents) Interviewed

Respondents	Frequency	Percentage
Raw marketers	54	31.4
Processors	118	68.6
Total	172	100.0

Source: Field Survey, 2007

Taboo Associated with Processing Stages:

All the processors attributed some taboos to the processing of locust bean. Among those identified are: (1) that ripe plantain should not be roasted under the pot or drum when the

bean is being boiled, (2) smoking of fresh bush meat like grass cutters, rats, squirrels e.t.c. should not be done when boiling locust bean, (3) dipping of oil and pepper stained container into the cooking pot while the boiling is in progress, (4) and the smoking/roasting of palm fruit at the time of boiling was also seriously kicked against. Violation of any of these taboos according to the respondents would decolorize the finished product from the normal brown-yellow colour to more yellowish colour; that is, after fermentation it would not blend well making the moulding exercise impossible. Such violation would also affect the taste of the bean and may render it palatable. In line with cultural influence, Sadiku (2010) noticed that the methods used vary from one locality to another depending on the culture of the people, their beliefs, taste and practice of the fore parents who were involved in the vocation. The variations in the processing of Iru in turn bring about variations in the quality of the product.

The Role of Assistants in Processing

The importance of assistants in any business whatsoever cannot be overstated. Family assistants have been employed to meet market demand. All the married processors (with children) interviewed especially those with grown-up children admitted that their children do assist them in virtually all the processing operations. Another category of assistants identified were only restricted to the people that sell outside the area of production such as Akure, Owo and Ado-Ekiti.

It is a common knowledge that Parkia bean processing is a chain activity which is labour-intensive, as it involves collection of the ripe fruits, dehusking and seed removal, seed drying and storage, seed separation and dehauling, etc.. As a result, the processing of Parkia bean seed is traditionally carried out by families using basic utensils (Adedokun, 2006). Like other NTPFs, women and children are also principally responsible for gathering of *Iru.* Those who do not have such household assistance available do hire labour. The processors who hired labour stated that they often take half bag (after processing) to market for their assistants who usually stay behind to continue processing. In other words, they mean that for each processed bag taken to market half is given to an assistant as his or her own share or benefit.

Danger Associated with Processing Operation

The processors observed that much danger is not associated with processing operation if appropriate caution is taken to avoid fire and hot water hazards.

Uses of Locust Bean in the Study Area

All the respondents confirmed the positive reaction of people towards utilization of this product reflecting the impressive patronage rate. Moreover, it was also observed that the commonest use of the product in the area was as condiment. Apart from that, locust bean can be used in cooking food like jollof rice, porridge, etc. However, locust bean is being used popularly as a condiment in many African countries; for example, in Togo, Nigeria, Mali and Benin Republic, the food condiment from *P. biglobosa* seeds is the main seasoning sauce (Kourouma *et al,* 2011) But given the fact that the species is highly valuable from its roots to leaves, the medicinal applications which include the treatment of parasitic infections, circulatory system disorders, disorders of respiratory system, and skin diseases, inter alia are the most diversified.

About 10.5% of the respondents identified the medicinal use of locust bean. It was gathered that the processed bean when mixed with honey or eaten raw serves as a laxative and improve eye sight. All the respondents affirmed that the product has no side effect when used as medicine. Besides the medicinal aspect Alabi *et al* (2005), the oil also has a very high saponification value which qualifies it as a useful material for the soap industry.

Perception of Available Substitutes for Locust Bean in the area

Almost all the respondents (95.3%) surveyed as indicated in table 5 could not identify any substitute for locust bean. It could be deduced that the people in this area believe that no other condiment can take the place of *Iru* in cooking. Some investigations were also made on the use of Maggi condiment but it was vividly revealed that Maggi condiment and *Iru* condiment were not the same. This result confirms the findings of Sadiku (2010) that even urban dwellers, let alone local people, have refused to accept industrially processed locust bean (*Dawadawa cube)* as a substitute for the locally processed locust bean because they observe that the natural flavor and aroma in traditional *Iru* is lost in the *Dawadawa cube.*

Consequently the respondents described it as very nutritious and good for human consumption; as such, its value is highly appreciated by the people. For instance, it is considered more important than meat. Owing to its very high consumption rate, it is a very lucrative business, as it is eaten by all and sundry such that inhabitants of the area generally believe "no Iru, no soup".

Table 5: Perception of Available substitute for locust bean in the area

RESPONSE	FREQUENCY	PERCENTAGE
No response	8	4.7
Nothing	164	95.3
Total	172	100.0

Source: Field Survey, 2007

Challenges Associated with Processing and Utilization of Locust Bean

Processing- The study identified five challenges affecting the processing of locust bean in the area:

1. Availability of raw materials – It was gathered that the sellers of raw locust bean travel to the North to buy the locust bean seeds. This is because the bean is not available in the area and where it is available it is seasonal. This is due to the fact that *P. biglobosa* trees are not productive even when found in the study area. Traveling long distances to procure raw material contributes to the high price of the product.
2. De-hulling of the seeds – This is a stressful processing activity because of the hard nature of the seeds. Mostly assistants are required at this stage, which is why children are being depended upon in processing the product; if there are no children in a family assistants are sought elsewhere.
3. Cost of purchasing firewood for cooking – It was gathered that firewood is becoming expensive in the area and the cooking of the bean consumes a lot of

wood. This is why the cost has to be included in marketing the product after processing.

4. Problem of water – most of the processors complained about water, especially during the dry season in spite of water being identified to be important throughout the stages of processing. As such, it was observed that processors go to streams to wash their bean early in the morning to avoid competition later in the day.
5. Storage: All the processors do not have access to storage facilities. This has been affecting them in marketing, especially those marketing their product outside the area.

Utilization – The main challenge being faced by the processors is poor packaging. However the product enjoys good patronage despite poor packaging.

Materials used in Packaging

The processors revealed the use of dry cocoa leaves; dry banana/plantain leaves as wrappers in preparing their product for sale. The use of immature palm fronds and plantain/banana stem peels as the ropes for tying each local package was also confirmed. The quantity of leaves used depends on the quantity of the locust bean. It must also be stressed that balls of processed bean are arranged inside wooden boxes (big or small) in layers to maintain the balled shapes formed at the moulding stage. All this is done for easy marketing.

CONCLUSION AND RECOMMENDATIONS

The study showed that majority of the respondents relies on the processing and sale of *P. biglobosa* for living. Despite its importance as an item for food and income generation, the source of the bean is outside the area. The processors as well as non-processors are mainly females. Unfortunately the trade is not growing because it lacks modern technology which affects all its aspects. But the producers still believe that their present technique is the best simply because they have got no option or alternative except to make do with what they have. Above all, locust bean processing as well as marketing is a veritable economic empowering tool to combat poverty particularly among the women population.

RECOMMENDATIONS

- Given how essential water is in processing African locust bean, boreholes should be provided by government near processing sheds.
- The processing techniques should be modernized for efficient production and improved shelf life.
- Locust bean product should be converted into powdery form and packaged into various sizes in plastics for easy distribution.
- Plantation establishment should be encouraged among small holding farmers by relevant government authorities given locust bean economic viability and potential for poverty alleviation.

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