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Actors' Involvement in the Processing Activities of Locust Beans (*Parkia Biglobosa*Jacq.) in Osun and Oyo States, Nigeria

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Abstract

The study assessed actors' involvement in the processing activities of locust beans in Osun and Oyo States, Nigeria. Specifically, the study described the entrepreneurial activities along the processing stage of locust beans and determined the level of involvement of actors in the processing activities of Locust beans in Osun and Oyo States, Nigeria. A multistage sampling procedure was employed to select 135 respondents for the study. A structured interview schedule was employed to elicit primary data. As part of the entrepreneurial activities of processing locust beans, all the respondents still cooked the unprocessed locust bean seeds using firewood while calabash and thick clothes were used for the fermentation process. Very few (1.5%) of the respondents produce more than 12kg (eight congos) of locust beans in a processing period. About 64 percent of the respondents had high level of involvement in the processing activities of locust beans. The study concluded that respondents are highly involved in the processing of Locust beans in the study area. Based on the findings, it is recommended that agro-industrial extension education by extension agencies on improved processing techniques should be encouraged to further enhance involvement in the processing of locust beans.

Keywords: *Entrepreneurial activities, agro-industrial extension education*

Introduction

Agriculture has huge and diverse opportunities that cannot only transform the national economy but also tremendously impact the personal lives of the farmers particularly those involved in the different entrepreneurial opportunities embedded in the sector, which is in line with the documentation of Onu, Ukoha, Njoku, Obasi and Onwuka (2024). An important aspect of the sector is the locust bean value chain industry. Locust bean tree is a perennial deciduous tree that grows to a height of 7 to 20 meters, with the potential to grow to 30 meters in certain situations. The leaves exhibit a distinct shape and venation, a dark green colour, pinnate up to 30cm long, and have up to 17 pairs of pinnae with 13–60 pairs of leaflets measuring 8–30 mm x 1.5–8 mm. Leaflets cling to an elongated stem. Pods, which are roughly 45 cm long and 2 cm wide turn

pink-brown to dark brown when fully grown, and can hold up to 30 seeds enclosed in a yellow pericarp (Ijigbade et al*.,* 2021).

It has been noted that even with the advancement of science and technology, the processing and marketing of locust beans have been fraught with challenges. Due to the aforementioned issues with the production process, the majority of processing is still done crudely by local women in their homes or in their family yards (Oyewole, 2021). However, the Forest Research Institute of Nigeria (FRIN) is in charge of a locust bean tree plantation at Otiri, Oyo State, which is located after Iseyin. This information was discovered during a reconnaissance study carried out in Oyo State in 2022. Even though this plantation is located in the state, it was found that the processors prefer to purchase the raw locust bean seeds harvested in the wild which are primarily imported from northern states like Niger State from the marketers on periodic market days. Very little research, if any, has been done in Oyo and Osun States to directly address the aforementioned findings. This makes it imperative for the assessment of the actor's involvement in the various tasks incorporated into the locust bean processing activities.

The main objective of this study was to assess the involvement of actors in the processing activities of locust beans in Osun and Oyo States, Nigeria. The specific objectives were to:

i. describe the entrepreneurial activities along the processing stage of locust beans and;
ii. determine the level of involvement of the respondents during the processing stage of the locust beans in the study area

Methodology

The study was carried out in Oyo and Osun States, Southwestern, Nigeria. A multistage sampling procedure was employed to select respondents for the study. At the first stage, Iwo and Saki senatorial zones were purposively selected from Osun and Oyo States respectively. This was based on the prominence of locust bean processors in the two zones. In the second stage, Iwo and Aiyedire LGAs were purposively selected from the Iwo Zone while Atisbo and Saki West LGAs were purposively selected in Saki Zone because of the prominence of locust bean processors. In the third stage, five communities that are involved in locust bean value chain activities were purposively selected from each LGA to give a total of twenty (20) communities. At the last stage of the selection procedure, a total of 135 respondents (locust bean value chain processors) were selected from the twenty communities using purposive sampling technique, twenty-nine (29) respondents from the five communities in Atisbo; thirty- eight (38) respondents from Saki west (in Oyo State); twenty-nine (29) respondents from the five communities in Iwo and thirty-nine (39) respondents from Aiyediire (in Osun State).

Measurement of variables

The dependent variable for the study was the actors' involvement in the processing activities of locust beans. Two indicators used to measure involvement were: the extent of involvement and the forms of labour of involvement in the locust bean processing stage adapted from Torimiro, Alabi and Olawore (2021) and Odetunde (2022). A list of fifteen (15) specific activities embedded in the processing stage was provided in which each processor indicated their extent of involvement on a 4-point

Likert-type scale of Always involved (AI), Often involved (OI), Seldomly involved (SI) and Never involved (NI) with a score of 3,2,1 & 0 respectively. To obtain the mean score for the respondents' extent of involvement in the processing of locust beans, the sum of the scores derived from their responses was computed. The mean score for each activity was generated and used for ranking. For the forms of labour for processing, a list of fifteen (15) specific activities embedded in processing stage was provided in which each processor indicated the forms of labour employed for involvement in each activity. Responses were measured on a 4-point Likert-type scale of not involved (NI), advisory service (AS), hired labour (HL) and direct labour (DL), with score of 0,1,2 & 3 respectively. A measure of the form of labour involved in processing locust beans was determined by adding up the scores that were obtained from the respondents' responses. Mean score for each form of labour employed for processing activity was generated.

The overall involvement score (minimum and maximum score) for the processors was generated by summing up the obtained score from the two indicators (extent of involvement and forms of labour employed for involvement) using the compute variable icon on SPSS. Equal interval was used to categorize the respondents into 3 groups namely: low, moderate and high levels of involvement in the processing activities of locust beans.

Results and discussion

Sources of the Locust Beans Seeds

Results in Table 1 show that all (100.0%) respondents got the unprocessed locust bean seeds from the local markets, 5.9% got from importers and 4.4% from natural forests. This implies that all processors get the unprocessed seeds by purchasing from markets such as periodic markets which can be attributed to the fact that the periodic markets are easily accessible to the processors while some still get theirs directly from those that import the seeds specifically from the northern part of Nigeria with few getting the seeds from natural forests.

All (100.0%) of the respondents who are processors still cook the unprocessed locust bean seeds using firewood**.** This may be because the duration of time required to adequately cook locust bean seed is much and also the respondents are still used to the traditional method of processing locust beans. However, due to the consumption of large volumes of firewood which is a pressing challenge to some processors in Oyo State, 30.4 percent of the respondents usually add wood ash or river sand for boiling the unprocessed locust bean seeds to hasten the cooking time of the locust bean seeds. This implies that a larger percentage of the respondents do not add wood ash or river sand for cooking the seeds. This can be traced to the fact as affirmed also by Oyewole (2021) that the methods used for processing locust beans vary from one locality to another depending on the culture of the people, their belief systems, tastes and practices of their parents who were involved in the same vocation. About 75 percent of the respondents affirmed that the duration of cooking of the locust beans is twelve hours. A larger percent (76.3%) indicated that the seeds were well cooked by the changes in the colour of the seed coat to dark brown colour and through the changes of the texture of the locust bean seed coat.

Result in Table 1 shows that 77.8 percent of the respondents dehull the cooked locust beans using mortar and pestle while 22.2 percent carry out dehulling by crushing the cooked locust beans with legs inside a big bowl. This is an indication that the processors still employ traditional and crude methods of processing locust beans. The

above agrees with the documentation of Oyewole (2021) that the majority of processors in Oyo State carry out dehulling traditionally using hand or feet, or using of mortar and pestle. After the dehulling process, 68.9 percent of the respondents indicated that washing and sieving of the dehulled locust beans were carried out using a plastic sieve. This implies that a larger percentage of the respondents use plastic sieves for washing and sieving locusts. This may be due to the availability and affordability of the plastic sieve and because the washing and sieving process involves the use of water which may result in rusting if an iron sieve is used and invariably affects the quality of locust bean condiment produced.

Based on the findings of the study as presented in Table 1, all (100.0%) of the respondents indicated that after cooling the re-boiled locust beans, to proceed with the processing activities, calabash and thick clothes are used for the fermentation process while 33.3 percent indicated that fermentation of locust bean is carried out with the use of fermentation baskets and sacks. The finding negates that of Ijigbade et al. (2021) whose research finding revealed that the fermentation of locust beans is carried out by wrapping the locust beans with pawpaw leaves, followed by packing the wrapped beans in nylon. For the duration of fermentation, 98.5 percent affirmed that the fermentation process takes between 24 and 48 hours (1 and 2 days) to be completed. The finding negates that of Ijigbade et al. 2021 that the fermentation of locust beans requires between five and six days to be completed. Table 1 also shows that 22.2 percent of the respondents indicated that the aroma that emanates from processed locust beans was distinct, 69.6 percent revealed that the fermentation calabash or basket used was warm while 8.2 percent indicated that the colour of the locust beans was darker and the fermentation calabash or basket was warm. This implies a larger proportion of the respondents who are processors in the study area affirmed that the fermentation calabash and basket being warm is an indication that the locust bean seeds are well fermented. As presented in Table 1, after fermentation, some of the respondents (77.8%) attested to the fact that salt is being added to the locust beans. For those that indicated that they add salt to processed locust beans, 65.2 percent add salt to serve as a preservative, 8.2 percent add salt to serve as both sweetener and preservative while the rest 4.4 percent add salt to locust beans based on special request as some individuals do not like salt to be added to their locust beans. Based on the results of this study, 1.5 percent produce an average of ten *congos* (one congos =1.5kg) of locust beans per processing period. This implies that very few percent of the respondents produce more than eight *congos* of locust beans per period of processing. This can be attributed to the fact that the majority of the respondents are yet to adopt mechanization such as the use of dehulling machines, separator among others that could have increased their production capacity.

As presented in Table 1, all the respondents who are processors store processed locust beans before selling out to marketers and end users. Some store the processed locust beans to be sold on periodic market days with very few percent (5.9%) of the respondents who store the locust bean processed in plastic containers. This implies that the processors in the study area are knowledgeable about the need to store the locust bean condiments in different mediums such as containers, calabash and carved boxes.

Table 1: Entrepreneurial activities of the processors along the locust beans value chain

Activities	Percentage
*Sources of raw materials (unprocessed) locust bean seed	
Natural forests	4.4
Importers	5.9
Markets	100
Boiling of the unprocessed seeds	
Firewood	100
Addition of wood ash/river sand for cooking the seeds	
Yes	30.4
Reasons for adding wood ash	
to hasten the cooking time of the locust bean	30.4
Duration of cooking in hours	
between 9 and 12 hours	25.9
12 hours and above	74.1
Signs that the seeds are well cooked	
through the texture	23.7
Through texture and colour	76.3
Shelling / dehulling of cooked locust bean	
mortar & pestle	77.8
crushing with leg inside a big bowl	22.2
Washing and sieving of seeds after shelling	
Plastic sieve	68.9
*Materials mostly used for fermentation	
Calabash and thick clothes	100
Basket and sacks	33.3
Time of fermentation	
Between 24 - 48 hours	98.5
between 48 – 72 hours	1.5
Sign to know the locust bean seed is well fermented	
Aroma will be distinct	22.2
Fermentation calabash and basket will be warm	69.6
Through the colour of the locust beans and the fermentation calabash & basket will be warm	8.2
Additives (salt) in processing into fresh *iru*	
Yes	77.8
Reasons for adding salt	
As preservative	65.2
As sweetener and preservative	8.2
Based on special request	4.4
Average quantity of locust bean product per processing period (in *congos*)	
7	30.4
8	68.1
10	1.5
*Storage of processed locust bean before selling	
In plastic container	5.9
Calabash	65.2
Box	28.9

*Multiple responses

Source: Field Survey, 2023

Extent of Involvement in the Processing Activities of Locust Bean

The result in Table 3 shows that the processors' extent of involvement in the locust bean value chain activities were: Handpicking ($\bar{x}$ = 3.00), fermentation ($\bar{x}$ = 3.00), initial boiling of the seeds ($\bar{x}$= 2.99), reboiling ($\bar{x}$= 2.99), sourcing of raw materials such as firewood for the processing activities ($\bar{x}$ = 2.94), packaging of the processed locust

beans ($\bar{x}$= 2.39), dehulling of the seeds ($\bar{x}$= 2.39), cleaning of the seeds ($\bar{x}$= 2.38), moulding and pressing of locust beans ($\bar{x}$ = 2.38), adding preservatives such as salt ($\bar{x}$ = 2.38), depodding ($\bar{x}$ = 2.36), washing of the seeds ($\bar{x}$ = 2.37), drying ($\bar{x}$ = 2.37), grinding of the processed dried locust beans into powdery form ($\bar{x}$ = 1.76). The respondents were not involved in any form of branding of locust bean products. This may be because the respondents were ignorant of the need to brand their locust beans as a means of value addition.

Considering the grand mean score being 2.38, this implies that the majority of the respondents were often involved in the processing activities of locust bean as a whole in the study area. Conversely, despite the findings of this study that revealed that majority of the respondents are often involved in the processing of locust beans in the study area, this doesn't affect the availability of the different locust bean products in the study area. For most of the local actors, processing locust beans targets local market days. However, some people now process locust beans everyday targeting the young marketing agents that sells directly by road sides to motorists and customers on the move like in Gbongan and Ipetu Junction along Ibadan- Ife Road in Osun State.

Table 3: Extent of involvement in the locust bean processing activities

Activities	Mean score	Standard deviation
Sourcing of raw materials	2.94	0.24
Depodding (shelling of matured pods)	2.36	0.48
Cleaning of the seeds	2.38	0.49
Boiling of the seeds	2.99	0.09
Dehulling of the seeds	2.39	0.49
Washing of the seeds	2.37	0.49
Handpicking the seeds	3.00	0.00
Reboiling	2.99	0.12
Fermentation	3.00	0.00
Moulding and pressing	2.38	0.49
Drying	2.37	0.50
Adding preservatives such as salting	2.38	0.49
Grinding	1.76	0.97
Packaging	2.39	0.92
Branding	0.00	
Grand mean	2.38	

Source: Field survey, 2023

Forms of labour for involvement along the processing stage of locust beans

Results in Table 4 show that some of the respondents were involved by using direct labour for fermentation ($\bar{x}$ = 2.99), adding preservatives ($\bar{x}$ = 2.97), sourcing for raw materials ($\bar{x}$ = 2.94), reboiling ($\bar{x}$ = 2.77). On the other hand, a considerable percentage of the respondents were involved by hiring labour for the dehulling of the seeds ($\bar{x}$ = 2.30), grinding ($\bar{x}$ = 2.09), packaging ($\bar{x}$ = 2.07), drying ($\bar{x}$ = 2.07), handpicking of the seeds ($\bar{x}$ = 2.07), moulding & pressing ($\bar{x}$ = 2.02), cleaning of the seeds ($\bar{x}$ = 2.00),

depodding ($\bar{x}$ = 2.00), and washing of the seeds ($\bar{x}$ = 2.00). None of the respondents employed any form of labour for branding activities of the locust bean products since branding is not being carried out in the study area as presented also in the findings in Table 4. With the grand mean score of 2.18, considering the scale of measurement, the findings imply that the majority of the respondents were involved in the processing activities of locust beans by employing hired labour.

Table 4: Forms of labour employed along the processing stage of locust beans

Activities	Mean score	Standard deviation
Sourcing of raw materials	2.94	0.24
Depodding (shelling of matured pods)	2.00	0.00
Cleaning of the seeds	2.00	0.00
Boiling of the seeds	2.36	0.48
Dehulling of the seeds	2.30	0.46
Washing of the seeds	2.00	0.00
Handpicking of the seeds	2.07	0.26
Reboiling	2.77	0.42
Fermentation	2.99	0.09
Moulding and pressing	2.02	0.12
Drying	2.07	0.26
Adding preservatives such as salting	2.97	0.17
Grinding	2.09	0.29
Packaging	2.07	0.26
Branding	0.00	
Grand mean	2.18	

Source: Field survey, 2023

Level of involvement of the respondents in the processing of the locust beans

As shown in Table 5, among the processors, 63.2%, 29.3% and 7.5 percent had high, moderate and low involvement respectively. Considering the processing stage, despite the challenges such as the hike in the price of inputs such as unprocessed locust bean seeds and firewood as well as the strenuous activities attached to processing of locust beans as observed during the field observation, this does not really affect the level of involvement in processing activities.

Table 5: Level of involvement of the respondents in the processing of the locust beans

Level of involvement	Percentage
Low	7.5
Moderate	29.3
High	63.2

Source: Field survey, 2023

Conclusions and Recommendation

Respondents were highly involved in the processing activities of the locust beans. To further enhance the involvement of respondents in the processing of locust beans in the study area, it was therefore recommended that due to the existence of Locust bean tree plantation in Otiri, Oyo State, more awareness should be created by agricultural research institutes and government to the locust bean processors to enhance patronage of the locust bean seedlings from those in charge of the plantations. Also, agro-industrial extension education by extension agencies on improved processing techniques for locust bean processors should be encouraged.

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