

**AWARENESS AND KNOWLEDGE LEVEL OF LOCUST BEAN PROCESSING TECHNIQUES
AMONG RURAL WOMEN IN SELECTED LOCAL GOVERNMENT AREAS OF KWARA STATE,
NIGERIA**

¹Adefalu, L.L., ¹Adisa, R.S., ¹Aderinoye-Abdulwahab, S.A., ²Balogun, M.A. and ¹Owolabi, O.A.

¹Department of Agricultural Extension and Rural Development, Faculty of Agric., University of Ilorin, Nigeria

²Department of Home Economics and Food Science, Faculty of Agriculture, University of Ilorin, Ilorin, Nigeria

Corresponding Author's E-mail: adefalulateef@yahoo.com

Phone number: 08063468477

ABSTRACT

This study analyzed the awareness of locust-beans processing techniques among rural women in selected LGAs of Kwara State, Nigeria. Four-stage sampling technique was used for selection of respondents. The first stage involved purposive selection of two Local Government Areas (LGAs) based on their prominence in locust bean production in Kwara state. Snow-ball sampling technique was employed to identify the most prominent locust bean processor in each of the selected communities. Each of the identified locust bean processor was used to identify ten locust bean processors in their respective domains, giving a total sample size of 120. Data were subjected to both descriptive and inferential statistics. The results showed that the mean age of women processor in the study was 41 years, a little above half (55.0%) of them had no formal education, household size was 7 persons, average processing experience stood at 31.5 years, while the average monthly income of the processors was ₦7,001.00 per. Only 18.3% of the processors indicated awareness of FRIN method while none of them had attempted using it. Respondents' knowledge level on the use of appropriate processing techniques using 5 point likert-type scale shows that salting ranked 1st, while washing after de-hulling was poorly ranked (9th). Limited credit facility was the most severe constraint militating against high productivity of locust bean. Pearson correlation analysis showed that age ($p=0.05$, $r=0.245$) was significant and positively related to the constraint faced in locust-bean production while educational level ($p=0.004$, $r=-0.367$) and household income ($p=0.001$, $r=-0.405$) were significant but inversely related to constraint to locust-bean production among respondents. The study therefore concluded that processing of locust-bean is mostly done using traditional method, while low literacy and income levels were probably responsible for poor adoption of improved methods of processing locust bean. Extension agents are therefore encouraged to carry out awareness campaign on the advantages inherent in the use of improved locust bean processing methods so as to enhance productivity.

Key words: Locust bean, processing techniques, improved methods, rural women

INTRODUCTION

Nigeria is blessed with abundant agricultural produce but poverty is still widespread in the country and has increased since 1990s. Above 70% of Nigerians live on less than 1.25USD per day (International Fund for Agricultural Development, 2009). The situation is further worsened simply because local condiments such as *dawadawa/iru*, with high nutritional value are gradually been neglected at the expense of foreign condiments like cubes of different brands even though, they are more expensive with less nutritional values compared to the latter. Although, what people eat vary, just as there are different ethnic groups with different culture, the consumption of dawadawa cuts across ethnic groups and even transcends international borders. Notwithstanding, every region has its own peculiar food which may depend primarily on culture, heritage, tradition and religious belief (Abdel et al., 2009; Adebayo et al., 2010).

African locust bean processing into food condiment has been an age-long occupation in the rural areas and has served as a means of income generation and food security among women. However, locust bean processing has suffered a low occupational

status as the processors are somewhat associated with poverty despite the widespread demand for their products. Traditionally, processing of Africa locust bean seed among the rural women and children still remains tedious, time consuming and highly labour intensive (Olaoye, 2011). Several challenges are faced in the processing techniques of locust-bean seeds to food condiment (*dawadawa/iru*). These include among others, production of locust bean seed on a small scale due to the local processing method used, associated with high wood consumption and poor hygienic practices employed by the processors. This situation is capable of making the consumers of indigenous foods including condiments such as *dawadawa* to be suspicious of the level of hygiene employed in the production process (Adefalu and Favole, 2014). Consequently, the usage and consumption of this condiment may decline, especially among the growing urban population leading to rapid increase in the patronage of imported condiments. In view of the foregoing, this study therefore sought to analyze the locust bean processing techniques among rural women in Kwara State, Nigeria. Specifically, the study described the socioeconomic characteristics of locust bean processors in the study area, examined

the available locust bean processing techniques in the study area, determined the knowledge level of the respondents on the use of locust bean processing techniques and analyzed the constraints to the use of improved locust bean processing techniques among respondents. The study also tested a hypothesis to ascertain if a relationship exist between selected socio-economic characteristics of respondents and the constraints to locust bean production.

Review of available locust bean processing techniques

According to Sadiku and Olajide (2010), six main methods of locust bean processing have been identified and they are discussed below:

Ajibode method: Under this method, the yellow pulp is removed by soaking the pulp-coated seeds for 30 minutes in sun before being soaked in water for 10 minutes and later pounded in mortar with little coarse sand to remove pulp. Washing after pounding is done via a sieve that is almost completely immersed in water. If traces of pulp still remain, pounding is done once more followed by final washing and cleaning of the seeds. De-hulling which is the next stage is the removal of the testa from cotyledon. This is done by soaking the seeds in water for 10-20 hours, followed by cooking which is done for 8 hours with the addition of wood ash and pounding in mortar with little coarse sand to facilitate effective de-hulling. Washing follows de-hulling to recover the milk colored cotyledons. With the addition of potash (K_2CO_3), the clean cotyledons are further parboiled for 30 minutes, packed and kept in a warm cupboard for fermentation.

Saki method: The process employed is similar to that of Ajibode method, except for the addition of wood ash during cooking. Parboiling is done for 35 minutes with the addition of potash.

Forestry Institute of Nigeria (FRIN) method: This method is also very similar to the Ajibode method except that pre-dehulling cooking is done for 6 hours; parboiling of cotyledons is done for 45 minutes; while potash and salt (NaCl) are added during parboiling.

Traditional method: The same procedure as found in the Saki method is employed for this method except that no chemical substance or preservatives is added during processing.

Steam method: This method involves steaming the seeds for four and a half hours immediately after pod shelling, that is seeds coated with the pulp. In the laboratory, a steamer is improvised using cooking pot and metal sieve. The water level in the

pot does not reach the base of the sieve and steamed with the pot covered. This method ensures no direct cooking of seeds in water. The steamed seeds are de-hulled by pounding in a rough-surfaced mortar without any addition of coarse sand. Parboiling follows for 30 minutes without addition of potash. The clean beans or cotyledons are fermented for 72 hours. All the methods were carried out in the laboratory under hygienic conditions, using plastic bowls and buckets, cooking pots, coarse sand, hygrometer, thermometer, clean water, electric/kerosene stoves, sieve, weighing balance, measuring cylinders, beakers, small wooden mortar and pestle. Fermentation was done at an average ambient temperature of 28°C and 86% relative humidity. The coarse sand used for pulp removal and de-hulling was thoroughly washed and dried before use. Samples of products were analyzed at the International Institute of Tropical Agriculture, Ibadan.

Improved method: This method differs from the Ajibode method because there is 8-10 minutes pre-cooking of the seeds before pulp removal. De-pulped seeds are soaked in water for 72-96 hours, washed and cooked for 3 hours without wood ash before de-hulling. Parboiling of cotyledons takes 30 minutes before being fermented. In this method, some seeds are collected after 15 minutes of parboiling (before the addition of potash) for fermentation as the non-marshy type. However, it is important to note that Kabba and Yam-flour/Shaff methods were discovered on the field in the course of the field work. Kabba method of processing locust bean does not require fermentation and hence, the final product is coarse while yam-flour method employs the use of yam flour instead of sand to facilitate the process of de-hulling of the locust bean.

METHODOLOGY

The study area: The study was carried out in Kwara State, Nigeria. Its capital is Ilorin and other prominent towns in the State include Offa, Omuaran, Oro, Jebba, Patigi, Lafiagi, Shonga and Kaiama. The State is located between Latitude 8° 30'N and Longitude 5° 0'E. The primary ethnic groups in Kwara State are Yoruba, Nupe, Fulani, Baruba and Hausa while the population of the State stood at 2,371,089 (National Population Commission, 2006). Agriculture is the main source of the state's economy and the main cash crops are cotton, cocoa, coffee, kolanut, tobacco, beniseed, walnut, and palm produce and few other food crops like cashew, rice, and yam. Mineral resources in the state are gold, limestone, marble, feldspar, clay, granite rocks and quartz. There is abundant spread of African locust-bean tree (*Parkia biglobosa*) across the length and breadth of the state, while

locust-bean processing is a common vocation in most of the rural communities.

Sampling procedure: Four stage sampling technique was used for selection of respondents for the study. The first stage involved selection of two Local Government Areas (LGAs) which were purposively selected based on their prominence in locust bean production in the State. These are Asa and Ilorin east LGAs. The next stage involved the purposive selection of six communities from each of the two LGAs. The Kwara State Agricultural Development Programme (KWADP) could not provide a sampling frame for locust bean processors as they did not have registered association. Therefore, snow-ball sampling technique was employed to identify one most prominent locust bean processor each from the 12 selected communities. Finally, each of the identified prominent locust bean processors was later used to identify nine other locust bean processors in their respective domains, giving a total sample size of 120.

Analytical techniques

Data obtained was subjected to both descriptive and inferential statistics. The descriptive statistics that was employed for analysing data were frequency counts, percentages, mean scores and five point Likert scale, while the inferential statistics was Pearson product moment correlation. The formula is presented below:

$$r = \frac{N\sum xy - (\sum x)(\sum y)}{\sqrt{[N\sum x^2 - (\sum x)^2][N\sum y^2 - (\sum y)^2]}}$$

Where:

- N = number of pairs of scores
- $\sum xy$ = sum of the products of paired scores
- $\sum x$ = sum of x scores
- $\sum y$ = sum of y scores
- $\sum x^2$ = sum of squared x scores
- $\sum y^2$ = sum of squared y scores

RESULTS AND DISCUSSION

Table 1 shows that a typical locust bean processor in the study is an average of 41 years. However, 48.3% of the respondents were within the age bracket of 46-56 years while only 8.3% were within the age bracket of 68-78 years; 88.3% of the respondents were Muslims while 11.7% of them were Christians. In terms of education, 55% of the respondents had no formal education, 20% indicated Quranic education while 25% of the respondents had primary education. The low literacy level among the respondents could have a serious implication for adoption of improved technologies. The distribution of the respondents based on their household size shows that 51.7% had between 4 and 6 persons, but the average household size among the respondents was 7

Table 1: Socio-economic characteristics of the respondents

Variables	Freq (N=120)	%	Mean
Age			
35-45	24	20	41
46-56	58	48.3	
57-67	28	23.3	
68-78	10	8.3	
Religion			
Islam	106	88.3	11.7
Christianity	14	11.7	
Educational level			
No formal education	66	55.0	20.0
Quranic education	34	20.0	
Primary	30	25.0	
Household size			
4-6	62	51.7	8
7-9	52	43.3	
10-12	6	5.0	
Average monthly income			
4,000-6,000	48	40.0	7,001.00
6,001-8,001	22	18.3	
8,002-10,002	30	25.0	
≥10,003	20	16.7	
Experience			
20-30	28	40.0	31.5
31-41	46	18.3	
42-52	34	28.3	
53-63	12	10.0	

Source: field survey, 2015

persons which is typical of a rural community in Nigeria. The average monthly income as indicated in Table 1 shows that 40% of the respondents earn ₦4,000-₦6,000 while only 16.7% earn between ₦13,000 and ₦15,000. A typical locust bean processor in the study area earns ₦8,000 monthly. This shows that money earned by the locust-bean processors was far lower than the national minimum wage of ₦18,000 (Tee, Oguiche and Ikyangba, 2009) compared to the stress of the activities but it is manageable to survive in a rural community as they mostly live with less than 1.25 USD per day (IFAD 2009). In terms of work experience, 40% of the respondents indicated 20-30 years of experience while 10% of them indicated 53-63 years of experience. The mean years of working experience among the respondents was 39 years. This is a clear indication that these women take up locust-bean processing early on in their lives and possibly hold-on to the job for as long as they live.

Table 2 presents the processing technique currently in use by the respondents, those that they have used

before, those that they have only heard about and those that they have never heard anything about. The table shows that 63.3% of the respondents have once used Ajibode method, while 36.7% of the respondents have only heard of it, all the respondents have heard of Saki method (100%) but none of the respondents are neither using it as at the period of the field work nor reported that they have used it before. The result also shows that 61.7% of the respondents have heard of improved method while only 6.7% have once used it, The yam-flour shaft is known to be currently used in just a particular community (Olukolu community) and

this is probably the reason for the low level of usage in the study.

Respondents' knowledge level of locust bean processors on the use of processing techniques

The variable washing after de-hulling is compulsory ranked first and this implied that the processors view this task as very relevant and highly necessary to ensure a healthy and neatly processed locust bean. Their knowledge level of this fact is further proved by the result of the variable de-hulling can be skipped. This variable ranked last signifying that processors are not of the opinion that such a task

Table 2: Respondents' awareness of processing techniques in the study area

Processing techniques	Currently in use	Once used	Only heard of it	Never heard of it
Ajibode	0 (0.0%)	76 (63.3%)	44 (36.7%)	0 (0.0%)
Saki	0 (0.0%)	0 (0.0%)	120(100.0%)	0 (0.0%)
Improved	38 (31.7%)	8 (6.7%)	74 (61.7%)	0 (0.0%)
Steam	0 (0.0%)	0 (0.0%)	0 (0.0%)	120 (100.0%)
FRIN	0 (0.0%)	0 (0.0%)	22 (18.3%)	98 (81.7%)
Traditional	66 (55.0%)	54 (45.0%)	0 (0.0%)	0 (0.0%)
Kabba	0 (0.0%)	0 (0.0%)	120 (100.0%)	0 (0.0%)
Machine	6 (5.0%)	0 (0.0%)	114 (95.0%)	0 (0.0%)
Shaft	10 (8.3%)	46 (38.3%)	64 (53.3%)	0 (0.0%)

Source: field survey, 2015

Table 3: Knowledge level of respondents on the use of locust bean processing techniques (n=120)

Areas of Knowledge	SA (5)	A(4)	U (3)	D (2)	SD (1)	Mean	Rank
Seed selection is required	20(16.7%)	100(83.3%)	0(0.0%)	0(0.0%)	0(0.0%)	4.17	4 th
Pre-boiling is optional	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	120(100.0%)	1.0	8 th
Cooling is important	50(41.7%)	30(25.0)	0(0.0%)	34(28.3%)	6(5.0%)	3.7	6 th
De-hulling can be skipped	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	120(100.0%)	1.0	8 th
Washing after de-hulling is compulsory	102(85.0%)	18(15.0%)	0(0.0%)	0(0.0%)	0(0.0%)	4.85	1 st
It is necessary to separate seed from the coat	90(75.0%)	30(25.0%)	0(0.0%)	0(0.0%)	0(0.0%)	4.75	2 nd
Seeds are subjected to another round of boiling	80(66.7%)	40(33.3%)	0(0.0%)	0(0.0%)	0(0.0%)	4.67	3 rd
Fermentation of boiled seeds requires patience	8(6.7%)	112(93.3%)	0(0.0%)	0(0.0%)	0(0.0%)	4.07	5 th
Salting is for preservation	4(3.3%)	30(25.0%)	70(58.4%)	16(13.3%)	0(0.0%)	3.18	7 th

Source: field survey, 2015

Score is the summation of frequencies as per the Likert scores. Given that 5 indicates the highest knowledge level and 1 the least possible score, then the highest score possible is 600 while the least score possible is 120. Hence, the nearer to 600 the higher the knowledge level of the respondent to the particular variable, while the nearer to 120, the lower their level of knowledge of the variable in question.

Table 4: Severity of constraints faced by Locust bean processors

Constraints	Most severe (4)	Severe (3)	Moderately severe (2)	Not severe (1)	Score	Rank
Poor credit facility	120(100.0%)	0(0.0%)	0(0.0%)	0(0.0%)	480	1 st
Poor storage system	2(1.7%)	0(0.0%)	20(16.7%)	98(81.7%)	146	7 th
Seasonal water source	0(0.0%)	4(3.3%)	26(21.7%)	90(75.0%)	154	6 th
Bad odour	0(0.0%)	0(0.0%)	0(0.0%)	120(100.0%)	120	8 th
Drudgery	120(100.0%)	0(0.0%)	0(0.0%)	0(0.0%)	480	1 st
Bad pricing	88(73.3%)	32(26.7%)	0(0.0%)	0(0.0%)	448	3 rd
Lack of association	44(36.7%)	74(61.7%)	2(1.7%)	0(0.0%)	402	4 th
Poor packaging	0(0.0%)	4(3.3%)	28(23.3%)	88(73.3%)	156	5 th

Source: Field survey, 2015

should be avoided, hence, the result further goes to show that de-hulling is necessary and the locust bean should equally be washed to remove impurities. From the table, it is obvious that women processors are not inclined towards salting as a means of preservation as more than half of the respondents are undecided while only about 3% are favourably disposed to salting. This variable is ranked very low and this could mean that they are well versatile with the processing unit and they all claim that it's only a marketer that preserve her dawadawa/iru after production. It could be assumed that the processors have an in-depth knowledge of the processing units in that they believed it is necessary to separate seeds from coat (2nd in rank) while the seeds will be subjected to another round of boiling (ranked 3rd). It is therefore safe to conclude that the processors in this study have mastered the art of locust bean processing and they apply a level of dexterity in carrying out their task.

Constraints limiting the use of improved locust beans

Table 4 shows the level of severity of the constraints faced by the respondents. The constraints were ranked using the parameters: most-severe as the highest in rank with a score of 4, severe has a score of 3, while moderately-severe was scored 2 and not-severe is 1. The locust bean processors in the study perceives drudgery and poor credit facilities immediately followed by bad pricing as the most limiting challenges. It has been observed that rural women do not get to sell dawadawa/iru at higher price compared to the level of energy input in its processing (Akande *et al.*, 2010) and this serves as low source of income to the rural women locust-bean processors (Adisa, Olatinwo and Simeon, 2011). Bad odor ranked the last among the constraints. This could possibly imply that the women processors have grown used to the odour so much so that it no longer pose any source of worry to them. Another reason why it may not be a problem to the processors is because

most of them were born into the business except in rare cases where they believe a menstruating woman that touches the locust bean gives it a foul smell (Shao, 2002)

Hypothesis

Testing hypothesis: There is no significant relationship between some selected socio-economic characteristics and the constraints to locust-bean production among the respondents:

Pearson correlation analysis in Table 5 shows that age ($p=0.05$, $r=0.245$) was significant and positively related to the constraint faced in locust-bean production among the respondents in the study area. The implication of this result is that the older a typical rural woman locust-bean processor becomes, the more likely she is predisposed to the constraints faced by them in locust-bean production. For example, an aged locust bean processor will be highly affected by drudgery and may not be able to cope with the demands of locust bean processing. Furthermore, such a woman is not likely to have the energy to negotiate out of bad pricing. Educational level ($p=0.004$, $r=-0.367$) and household income ($p=0.001$, $r=0.405$) were significant but inversely related to constraint to locust-bean production among respondents. Thus, the higher the educational level

Table 5: Relationship between selected socioeconomic characteristics of respondents and constraints faced in the production of locust-bean in the study area

Variables	Coefficient (r)	p-values	Decision
AGE	.245	.050*	S
REL	.003	.980	NS
EDU	-.367	.004**	S
H/SIZE	-.145	.271	NS
INCOME	-.405	.001**	S
EXP	.266	.040*	S

** Significant at the 0.01 level * Significant at the 0.05 level (2-tailed)

and household income, the less the constraint faced by the processors. This means that the less educated women may have the least access to credit facilities whilst women with low household income would not have the means to maneuver out of drudgery.

CONCLUSION AND RECOMMENDATION

The study found that the women processors very much aware of the various methods of processing locust bean and therefore draws a conclusion based on the findings that the women have mastered the art, are conversant with the processing techniques and they engage in their tasks with dexterity. It was further established that processing of locust-bean is laborious and time consuming due to the use of traditional method of processing that majority of the rural women use during this process. The processors were found to have low literacy level which could signify a serious implication for adoption of improved technology. The study therefore recommended that relevant stakeholders such as rural development based NGOs should make frantic effort to supply the rural areas with processing machines such as de-hullers and press cookers to ease the stress and to increase production as this would go a long way in reducing the drudgery. Locust bean processors in the area could also be encouraged to form themselves into cooperative groups in order to increase their access to credit facilities as well as engage in workshops to educate themselves on how to deal with bad pricing and other challenges facing locust bean production.

REFERENCES

- Abdel, A.A. & Dardir, H. A. (2009). Hygienic quality of local traditional fermented skimmed milk (laban rayb) sold in Egypt. *World Journal of Dairy and Food Sciences* 4(2) 205-209
- Adebayo, G. B., Otunola, G. A. & Ajao, T. A. (2010). Physicochemical, microbiological and sensory characteristics of kunu prepared from millet, maize and guinea corn and stored at selected temperature, advance *Journal of Food Science and Technology* (1), 2010, 41-46.
- Adefalu, L. L. & Fawole, O. (2014). Analysis of indigenous food consumption among teenagers in Ife East Local Government Area, Osun State, Nigeria. *Nigerian Journal of Agriculture, Food and Environment* 10(3):77-82
- Adisa, R. S., Olatinwo, K. B. & Simeon, O. A. (2014): Economic analysis and constraints of traditional processing of African locust bean in Kwara State. *Kasetsart Journal of Social Sciences*. Vol 35; 124 - 133 (2014).
- Sanni, M. S., (2014). Kwara on kaleidoscope available at <http://www.theheraldnews.info/kwara-on-kaleidoscope>.
- International Fund for Agricultural Development (IFAD), (2009). Rural poverty portal.
- National population commission Nigeria (2006)
- Olaoye, J. O. (2011). Development of small scale equipment for de-pulping locust bean seeds. *International Journal of Engineering & Technology*, 11(6), 173-186.
- Sadiku, O. A. (2010). Processing methods influence the quality of fermented Africa locust bean (Iru/Ogiri/Dadawa) *Parkia biglobosa: Journal of Applied Sciences Research*, 6 (11): 1656-1661.
- Tee, T.N., Ogwuche, J.A. & Ikyaagba, E.T. (2009). The role of locust bean and iron wood trees in human nutrition and income in Nigeria. *Pakistan J. Nutrition*. 8(8): 1172-1177.