KNOWLEDGE OF FOOD SAFETY PRACTICES AMONG LOCUST BEANS PROCESSORS IN OYO STATE

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ABSTRACT
The African locust bean is an important local food condiment used as flavor for soups and stews in Nigeria; however, it is fast losing its popularity due to poor safety practices among locust beans processors. Hence, this study examined the knowledge of safety practices among locust beans processors in Oyo state. Multistage sampling procedure was used to select 98 respondents for this study. Structured questionnaires were used to collect information on respondents' socio-economic characteristics, attitudeas well as knowledge of food safety practices. Data were analysed using descriptive statistical analysis using frequency and percentage. The average age of respondents was 38 years with majority in their active years of between 31 and 40 years of age. Most (55.1%) having unfavourable attitude towards food safety practices. More than half (62.2%) of the processors had low knowledge on food safety practices on locust beans processing. The study concluded that locust beans processors' knowledge of food safety practices were low and it is recommended thattraining and sensitization programmes should be conducted by health workers, extension agents, NGOs and other relevant stakeholders in the enterprise to boost locust beans processors' level of awareness and knowledge of food safety practices to prevent health risk associated with food borne diseases.
Keywords: Knowledge, Food safety, Locust beans, Processors

INTRODUCTION

Locust bean is a local seasoning or condiment used in soups and stews. It is a very popular soup ingredient, which is globally referred to as African locust bean with the botanical name as *Parkiabiglobosa.*Locust bean seed is the matured fruit seed that comes from the parkia tree. The most valuable parts of the locust bean are high in lipid (29%), protein (35%), carbohydrate (16%), and is a good source of fat and calcium for rural dwellers. It is harvested and processed into a fermented product known as '*Iru*', '*Ogiri'* and '*Dadawa*' in Yoruba, Igbo and Hausa languages respectively (Odunfa, 1985). Nutritionally, African locust beans are important particularly in the third world countries where the need for protein supplementation is high for both adults and infants.

Locust beans can only be eaten after processing to remove toxins and anti-nutrients, major processing techniques involve harvesting, decorticating, de-pulping and drying to obtain the locust bean seeds that represent the major raw material from this important crop (Olaoye, 2010). Sadiku (2010) asserted that the methods used for processing locust beans vary from one locality to another depending on the culture of the people, their beliefs, taste, and practice of their fore parents who were involved in the same vocation.

According to World Health Organisation, (2011) food safety is a scientific discipline describing handling, preparation, and storage of food in ways that prevent food borne illness. Health risk associated with the occurrence of food borne diseases in Nigeria is widely spread in rural areas because rules of personal hygiene and other principles of food safety are violated in rural areas more than in urban areas (FSS, 2009). Traditional methods are employed during the production of condiments in West Africa (Sanni, 1993) where food processing carried out in an unhygienic environment using rudimentary equipments without considering Good Manufacturing Practice (GMP) may subject the product to contamination which causes grievous health hazards to the consumers. Oguntoyinbo, Huch, Schillinger, Holzapfel, Sanni, and Franz (2010) further characterized microbial diversity of fermented condiments in West Africa, and the identified dominant bacteria was *Bacillussubtilis using the* Hazard Analysis Critical Control Points (HACCP).

Hazard Analysis Critical Control Points (HACCP) is a systemic approach for identification of hazard and prevention strategy for the improvement of food safety without necessary reliance on end-product testing (Cormier, Mallet, Chiasson, Magnusson, and Valdimarsson, 2007). Therefore, implementation of HACCP that can identify hazards, risk assessment and procedure to ameliorate risk, prevent and control hazards will be useful to improve the safety of condiments in West Africans agreeing with WHO/FAO requirement for implementation of HACCP. It is unfortunate that locust bean is fast losing its popularity to some other less nutritive flavoring agents (FIIRO, 2013). This situation may be a result of short life of the product, the product odor and the poor product quality due to the processing practices. Locust bean processing has been facing a lot of challenges despite the dawn of science and technology.

Processing is still largely done in a traditional and crude way by women; the production has not increased substantially due to problems associated with processing operations which makes most consumers see locust beans as not being hygienic for consumption.

There are numerous studies on food safety training which have been identified as a way to assure public health. However, there is limited studies focusing on knowledge of food safety practices among locust beans processors in the study

area. It therefore becomes necessary to carry out a study on the knowledge of food safety practices among locust beans processors in Oyo state.

The general objective was to assess the knowledge of food safety practices among locust beans processors in Oyo state and the specific objectives were to:

i. describe the socio-economic characteristics of locust beans processors in the study area,
ii. assess the respondents' knowledge on food safety practices of locust beans processors; and
iii. examine the attitude of locust beans processors towards food safety practices.

METHODOLOGY

The study area, Oyo State, which was formed in 1976, is an inland state in south-western Nigeria, with its capital at Ibadan. It is bounded in the north by kwaraState, in the east by Osun State, in the south by Ogun State and in the west partly by Ogun State and partly by Republic of Benin. The state covers approximately 28,454 square kilometers (oyostate.gov.ng, 2020). The landscape consists of old hard rocks and dome shaped hills, which rise gently from about 500 meters in the southern part and reaching a height of about 1,219 metre above sea level in the northern part (oyostate.gov.ng, 2020). Some principal rivers such as Ogun, Oba, Oyan, Otin, Ofiki, Sasa, Oni, Erinle and Osun River originated in this highland. Multi-stage sampling procedure was used to select sample for the study. The first stage involved purposive sampling of two geographical zones in Oyo State which were Oke-Ogun and Oyo zones due to the favourable vegetation for locust beans tree production and high number of processors in the areas. Also 30% of local government areas from the two zones to make a total of four LGAs and lastly simple random sampling was used to select 50%of the list of processors generated from each LGA to give a total of 98 respondents.Socio-economic characteristics such as age, marital status, religion, level of education, monthly income from locust beans processing, type and size of locust beans processed were measured using nominal, ordinal as well as interval levels of measurement, while respondents attitude towards food safety was measured using items of positively and negatively worded statements on a five point likert-type scale of strongly agree (5), agree(4), undecided (3), disagree (2) and strongly disagree (1) for all positive responses and the reverse were for all negative responses. Respondents' attitudes were determined by computing the scores from the attitude scale as indicated by each respondent, and respondents' attitude were classified as favourable and unfavourable. Finally, respondents' knowledge of locust beans practices was measured by asking them response to 25 knowledge statements by the respondents. The items were measured by assigning zero to incorrect response while the correct responses were assigned the score of (1). The overall mean score was obtained. The respondents above the mean score were categorised with having high knowledge, while those below the mean score were categorised with low knowledge. Data obtained were analysed using descriptive analysis.

RESULTS AND DISCUSSION

Socioeconomic characteristics

Distribution of respondents' socioeconomic characteristics on Table 1 reveals that54.1% were in the age range of between 21 and 40 years, with mean age of37.7years. The distribution indicated that majority of the respondents were in their active and productive years which afford them the required strength for tasks involved in locust beans processing. This is also in line with Oladoja, Adisaand Ahmed-Akinola, (2006) who stated that most Nigerian farmers are within this age group, and they are the economically active part of the population. Most of the respondents (72.4%) were married, which implies that they had the support of their family members for daily processing activities which can make the production of locust beans sustainable as interested family members can easily take to the enterprise. Majority (75.5%) of the respondents were Muslims, a lower percentage (23.5%) of them were Christians, and this implies that the two orthodox religions (i.e. Christianity and Islam) were the major religions being practiced by the respondents in the study area. However, this further shows that religion does not serve as a barrier to locust bean processing as people from various types of religions were free to engage in the enterprise. Also, more than half of the respondents (57.1%) completed primary education. This suggests that the occupation offered less attraction to well-educated people in the study area. Forty eight percent of the respondents were involved in small scale processing. This was largely because many of the respondents process manually which consequently limited the quantity they can produce. The mean processing experience was 16years. This implies that the processes involved in locust beans production is clearly known to them through experience. Also, it implies that the average processor in the study area has sufficient experience in the profession and could be expected to give reliable information concerning locust beans processing. A little below average (45.9%) of the respondents earned less or equal N10,000 monthly from locust beans production, the mean monthly income was N 23, 535, this implies that locust beans processing was a veritable potential economic empowering tool to combat poverty in the study area. Most (94.9%) of the locust beans processors produced both mashed and loose type (*irupete and iruworo*), this implies that both mashed and loose type of locust beans are mostly processed in the

study area. Majority (90.8%) of the respondents made use of traditional equipment in processing.

Table 1: Distributions of respondents on selected socio-economic characteristics (n=98)

Variables	Frequency	Percentage	$\bar{x}$
Age (in years)			
≤ 20	5	5.1	
21-40	53	54.1	37.7
41-60	38	38.8	
≥60	2	2.0	
Marital status			
Single	10	10.2	
Married	71	72.4	
Divorced	7	7.1	
Widowed	10	10.2	
Religion			
Christianity	23	23.5	
Islam	74	75.5	
Traditional	1	1.0	
Educational Qualification			
No formal education	12	12.2	
Primary	56	57.1	
Secondary	30	30.6	
Monthly income from locust beans processing			
≤10000	45	45.9	
10001-20000	28	28.6	23535.7
20001-30000	9	9.2	
≥30000	16	16.3	
Enterprise size			
Small	47	48.0	
Medium	32	32.7	
Large	19	19.4	
Processing experience (in years)			
1-10	33	33.7	
11-20	47	48.0	15.6
21-30	16	16.3	
≥30	2	2.0	
Type of locust beans processed			
Mashed	3	3.1	
Loose	2	2.0	
Both	93	94.9	
Type of equipment used			
Traditional	89	90.8	
Modern	8	8.2	
Both	1	1.0	

Source: Field survey, 2017

Attitude of respondents towards food safety practices

Result of attitude of respondents towards food safety practices as presented in Table 2a indicates most of the respondents were in agreement that they are willing to obtain more food safety knowledge on locust beans processing (53.1%), food safety practices are essential in order to prevent food borne diseases (48.0%), engaging in safety practices is time consuming (41.8%), food safety practices are not for small scale processors (34.7%) and that personal hygiene of locust beans processors is very important for locust beans safety (26.5%). Also, majority of the respondents were in agreement that food safety practices are expensive; therefore, one can do without it (31.6%) and that they are willing to change the way they handle locust beans when they know that they are incorrect (30.6%). This result implies that the attitude of the respondents towards food safety practices is not favourable, and this could probably be due to the fact that they have low awareness of locust beans related food safety practices.

Table 2a: Distribution of locust beans processors on attitude towards locust beans related safety practices

Statements	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Food safety practices are essential to prevent food borne diseases.	48.0	46.9	4.1	1.0	0.0
Sneezing or coughing over unprotected products should be avoided during locust bean processing	32.7	54.1	3.1	9.2	1.0
Personal hygiene of locust beans processors is very important for locust beans safety.	32.7	26.5	20.4	13.3	7.1
Locust beans safety and quality practices are important issues to me.	27.6	64.3	4.1	2.0	2.0
Locust beans processors should not expose their products to prevent food contamination.	27.6	45.9	16.3	10.2	0.0
Food safety practices are not for small scale processors.	22.4	34.7	12.2	19.4	11.2
Food safety practices are expensive; therefore, one can do without it.	29.6	31.6	7.1	22.4	9.2
I am willing to change my food handling behaviors when I know they are incorrect	30.6	30.6	31.6	6.1	1.0
I am willing to obtain more food safety knowledge on locust beans processing	38.8	53.1	8.2	0.0	0.0
Sterilizing locust bean processing materials are strenuous.	38.8	21.4	19.4	17.3	3.1

Source: Field survey, 2017

Table 2b shows that above average (55.1%) of the respondents had unfavourable attitude towards food safety practices related to locust beans processing while 44.9% of the respondents had favourable attitude towards these practices. This could mean because of most the locust beans farmers were still producing using traditional methods and this could have influenced their attitude to practice food safety practices in the study area.

Table 2b: Categorisation of respondents based on their attitude towards food safety practices

Category	Frequency	Percentage	Mean	Standard deviation	Minimum	Maximum
Unfavourable	54	55.1	58.42	6.99	43.00	75.00
Favourable	44	44.9				

Source: Field survey, 2017

Knowledge of Locust Beans Processors on food safety practices

Result of knowledge in Table 3a shows that on evaluation of raw material, most of the respondents have more knowledge that legume seeds meant for condiment production should be stored in a dry environment (90.8%) while they least have knowledge that legume seeds meant for condiment production should not be free of stones (44.9%), This is in line with the HACCP standard in Oguntoyinbo and Oni (2004) that legume seeds meant for condiment production should be stored in a dry and pest-free environment, they should not be moldy and should be free of stone Also, on water and its resources, most of the respondents have more knowledge that clean water should be used for soaking and washing locust beans during processing (79.6) while they least have knowledge that any water can be used for cooking locust beans during processing since it will undergo boiling (39.8%). In addition, on environment, most of the respondents had more knowledge that environmental hygiene should be strictly observed during processing of locust beans (71.4%) but least have knowledge that processing locust beans near sewage drainages and waste disposal channels have no effect on locust beans processing hygiene (33.7%). This is in agreement with studies carried out by Ouoba, Diawara, Amoa-Awua, Traore, and Moller (2003) that cross contamination occurs to locust beans from domestic animals or pests in the processing environment. Moreso, on fermentation vessel, most of the respondents were more knowledgeable that plastic bowls are cheap and can be thoroughly cleaned with soap after every fermentation process (37.8%) but least have knowledge that plastic bowls can be used as fermentation vessel instead of calabash (17.3%). This is in contrast with the HACCP standard in Oguntoyinbo and Oni (2004) that Plastic bowls can be used as fermentation vessel instead of calabash; they are cheap and can be

thoroughly cleaned with soap after every fermentation process. Furthermore, on personal hygiene most of the respondents have more knowledge that sneezing or coughing over unprotected products should be avoided during locust bean processing (81.6%) while they least have knowledge that engaging in hygienic practices is time consuming (33.7%). Also, on handling during packaging of final product, most of the respondents have more knowledge that leftover locust beans can be tasted to check if they are still safe (69.4%) while they least have knowledge that improperly processed locust beans can be hazardous to health (40.8%).

Table 3a: Distribution of respondents on knowledge on food safety practices of locust beans processing

Statements	Correct		Incorrect	
	Freq.	**%**	**Freq.**	**%**
Evaluation of raw materials				
Legume seeds meant for condiment production should be stored in a dry environment.	89	90.8	9	9.2
Legume seeds meant for condiment production should not be free of stones.	44	44.9	54	55.1
Water and its sources				
Any water can be used for cooking locust beans during processing since it will undergo boiling.	39	39.8	59	60.2
Clean water should be used for soaking and washing locust beans during processing.	78	79.6	20	20.4
Environment				
Processing locust beans near sewage drainages and waste disposal channels have no effect on locust beans processing hygiene.	33	33.7	65	66.3
Environmental hygiene should be strictly observed during processing of locust beans	70	71.4	28	28.6
Fermentation vessel				
Plastic bowls can be used as fermentation vessel instead of calabash.	17	17.3	81	82.7
Plastic bowls are cheap and can be thoroughly cleaned with soap after every fermentation process.	37	37.8	61	62.2
Personal hygiene				
Sneezing or coughing over unprotected products should be avoided during locust bean processing	80	81.6	18	18.4
Engaging in hygienic practices is time consuming.	33	33.7	65	66.3
Handling during packaging of final product				
Leftover locust beans can be tasted to check if they are still safe.	68	69.4	30	30.6
Improperly processed locust beans can be hazardous to health	40	40.8	58	59.2

Source: Field survey, 2017

Table 3b shows that more (53.1%) of the respondents had low level of knowledge on food safety practices related to locust beans processing. This implies that generally, the respondents in the study area have low knowledge of locust beans processing related safety practices. This could be because most of the locust beans farmers are used to their old way of processing the beans and adequate attention are not giving to the production of locust beans most especially using a more hygienic, safety and modern methods of processing.

Table 3b: Categorisation of respondents by their knowledge level of food safety practices of locust beans processing

Level	**Frequency**	**Percentage**	**Mean**	**Standard deviation**	**Minimum**	**Maximum**
Low	52	53.1	5.74	1.71	3.00	9.00
High	46	46.9				

Source: Field survey, 2017

CONCLUSION

The study concluded that most of the respondents who were still young but married, practicing Islamic religion, had some form of education, involved in small scale processing though were experienced processors, earning a moderate income and engaged more in the use of traditional equipment in processing had low level of knowledge on food safety practices related to locust beans processing. Likewise, most of the respondents had unfavourable attitude towards food safety practices related to locust beans processing in the study area.

RECOMMENDATIONS

The following recommendations were therefore generated during this study:

1. Awareness in form of publicity should be done by research institutes, NGOs and other relevant stakeholders in the enterprise to boost processors' level of awareness.
2. Education about environmental sanitation, thorough washing of hands and utensils with soap or detergent before and after use will contribute significantly to product safety.
3. Given how essential water is in processing African locust bean, boreholes should be provided by government near processing sheds.
4. The processing techniques should be modernized for efficient production and improved shelf life by research institutions and government.
5. The processors should be trained by extension service providers through series of workshops and seminars on improved processing techniques.

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