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Review

Processing of locust bean fruits: Challenges and prospects

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Locust bean fruit is normally processed into food condiment, which is popularly taken in the western part of Africa and it is used as a spice that gives an African meal a pleasant flavor. Processing of Locust beans is faced with various difficulties that affect both the small and the large scale production. This paper reviews the traditional methods of production of fermented locust beans, the problems associated with it and the possible ways of overcoming these problems in order to bring this health friendly seed into the limelight of large scale production. The processing of locust bean fruits to food condiment involves depodding, cleaning, boiling, dehulling, washing, re-cooking and fermentation. Some constraints are identified in the production and consumption of the condiment such as low production due to rudiment equipment, high wood consumption and poor production practices.

Key words: Locust bean, processing, technology

INTRODUCTION

The African locust bean tree, *Parkia biglobosa* are perennial trees legumes which belongs to the sub-family mimosoideae and family leguminosae (now family fabaceae). They grow in the savannah region of West Africa up to the southern edge of the Sahel zone 13° (Campbell-platt, 1980). A matured locust bean tree (20 - 30 years) can bear about a tone and above of harvested fruits. From experience, the tree can start to bear fruits from five to seven years after planting (Musa, 1991). The most important use of African locust bean is found in its seed, which is a grain legume, although it has other food and non - food uses, especially the seeds which serves as a source of useful ingredients for consumption (Campbell-platt, 1980). It has also been reported that the husks and pods are good food for livestock (Douglass et al, 1996; Obiazoba, 1998). The fruit shell traditionally is used to extract a substance that helps to harden the natively made house floors and can be an important source of tannin for leather tanning. The yellow powdery substance (ngolo) which our people use in our native gruel (kunu) that can be taken pure or fed to pigs is known to have useful extractable products (Musa, 1991).

The seeds (karwa-hausa; ngin-ham; Iyere - Yoruba), which traditionally are used as food condiment (dawadawa - Hausa; iru-yoruba; soumbala in Burkina faso, mali, cotdeivoire and guinea) are known to be rich in protein and contain easily digestible calcium. (Conversation with Dr. H. G. Bwala, now Commissioner of Health, Borno State): Dr. Shok indicated that the seed in addition to be rich in protein contains 20% edible oil. (Musa, 1991). So nutritionally, the locust bean is very important particularly in the third world countries where the need for protein supplementation is high for both adult and infants.

The harvesting technique of locust bean is universally the same that is, by the use of a hooked light pole. The farmer climbs up the tree and leans on bigger branches and stretches out the hooked pole to reach every bunch. The processing of locust bean fruits into food condiment undergo series of unit operations and it was observed that these unit operations are still done manually by the processors in Nigeria which has made the processing of locust bean seeds into food condiment to be faced with challenges. Therefore, the objective of this review is to highlight the challenges confronting the processing and the production of locust bean seed and possible way out.

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TECHNOLOGY FOR PROCESSING LOCUST BEAN FRUITS

Processing of locust bean fruits to food condiment, involves different unit operations after harvesting, such unit operations include depodding, removal of the yellowish pulp to produce locust bean seeds. Other processing operations are cleaning, boiling, dehulling, washing, re-cooking, and then fermentation to produce the food condiment which is used as soup seasoning/spices (flavoring agent). The flow chart of the processing line of locust bean pods to food condiment is shown in Figure 1.

ECONOMIC IMPORTANCE IN THE PROCESSING OF LOCUST BEANS

Mechanization of the Locust beans production or processing is of high economic value to the nation in the following areas:

Cost effective: Due to the little attention required by the locust beans tree during growing period, cultivation on large scale will result in large output.

Good source of nutrient: High acceptability by the consumers e.g. Nigerians. Due to its high nutritional value when properly processed, commands good price.

Employment opportunities: It will encourage the establishment of both small and large scale production when mechanized.

CHALLENGES OF THE PROCESSING TECHNOLOGIES OF LOCUST BEAN FRUITS

Several constraints are identified in the production and consumption of the condiment. These include, among others, low production due to the use of rudiment equipment, high wood consumption and poor manufacturing practices. Dehulling and cooking of the locust bean seeds are time consuming, laborious and inefficient. Consequently, the production of this condiment has not increased substantially. Its declining popularity, especially among the growing urban population has led to rapid increase in an import of foreign soup flavors (Beaumont, 2002). The details on the challenges of the processing technologies in locust bean fruits are enumerated here: -

1. Depodding of the locust bean fruits are mostly done by hand by the processors, though it has been concluded that threshing machine used for cowpea could be used for removing the locust bean seeds coated with yellowish pulp from the pod.
2. The seeds of the locust bean are embedded in a yellowish pulpy material and seeds needed to be separated from this yellowish pulpy material before it can be further processed into fermented locust bean (food condiment). The separations are either done by drying the pulp, in which the seed are imbedded, then pounding and separation of the seeds from yellowish pulp, or done by washing it in water to remove the yellowish pulp from the seeds. This unit operation has not been looked into for mechanizing.
3. Cleaning of the locust bean seeds which have to do with removal of any foreign materials prior to further processing is still done manually by use of wind to winnow it or washing in water.
4. Cooking of locust bean seeds; the bean is encased in a hard, tough and relatively thick coat that has semi-permeable characteristics. Easy movement of water through the coat is restricted. The adhesive strength that binds the coat to the seed is relatively high (Aniyi, 2004). Hence cooking is necessary to soften the firmly attached seed coat for easy dehulling. Cooking is done in a locally made aluminum cast-iron pot using fire wood as source of heat. This unit operation takes 24 h, which can be estimated to 50% of time used in processing of locust bean fruits to food condiment.
5. Dehulling occurs when firmly attached seeds coats which has been softened during cooking is removed for fermentation process. This unit operation is traditionally carried out either by action of abrasion of the cooked locust bean seeds and sea sand using hand or feet, or using of mortar and pestle to dehull.

Most processors, who produce fermented locust bean in large-scale are still using these traditional methods of dehulling, although locust bean dehulling machine has been developed by (Audu et al., 2004) to easy the dehulling process. However, it is yet to be adop-ted by the processors.

6. Separation of locust bean cotyledon from its coat proceeds dehulling operation. This operation involves the use of local sieve in flowing water or inside a bowl of water to remove the hull from the locust bean cotyledon. These methods are still commonly used by the processors then wash the dehulled locust bean further operation.
7. Re-cooking of the dehulled seeds. The essence of re-cooking the dehulled seeds is to hasten fermentation process, using locally made aluminum cast iron pot and fire wood as source of heat.
8. The production of fermented locust bean has remained a traditional family art practiced in homes with rudimentary utensils, such as calabash, clothes or leaves for covering to produce a strong-smelling food condiment/flavoring agent, this method is seen to be unhygienic and needs attention.

Most of the challenges faced by the locust bean processor indicated above need urgent attention so as to improve on the quality and quantity of locust bean condiment produced. However, in order to increase supply, it is necessary to use modernized production techniques to optimize processing conditions.

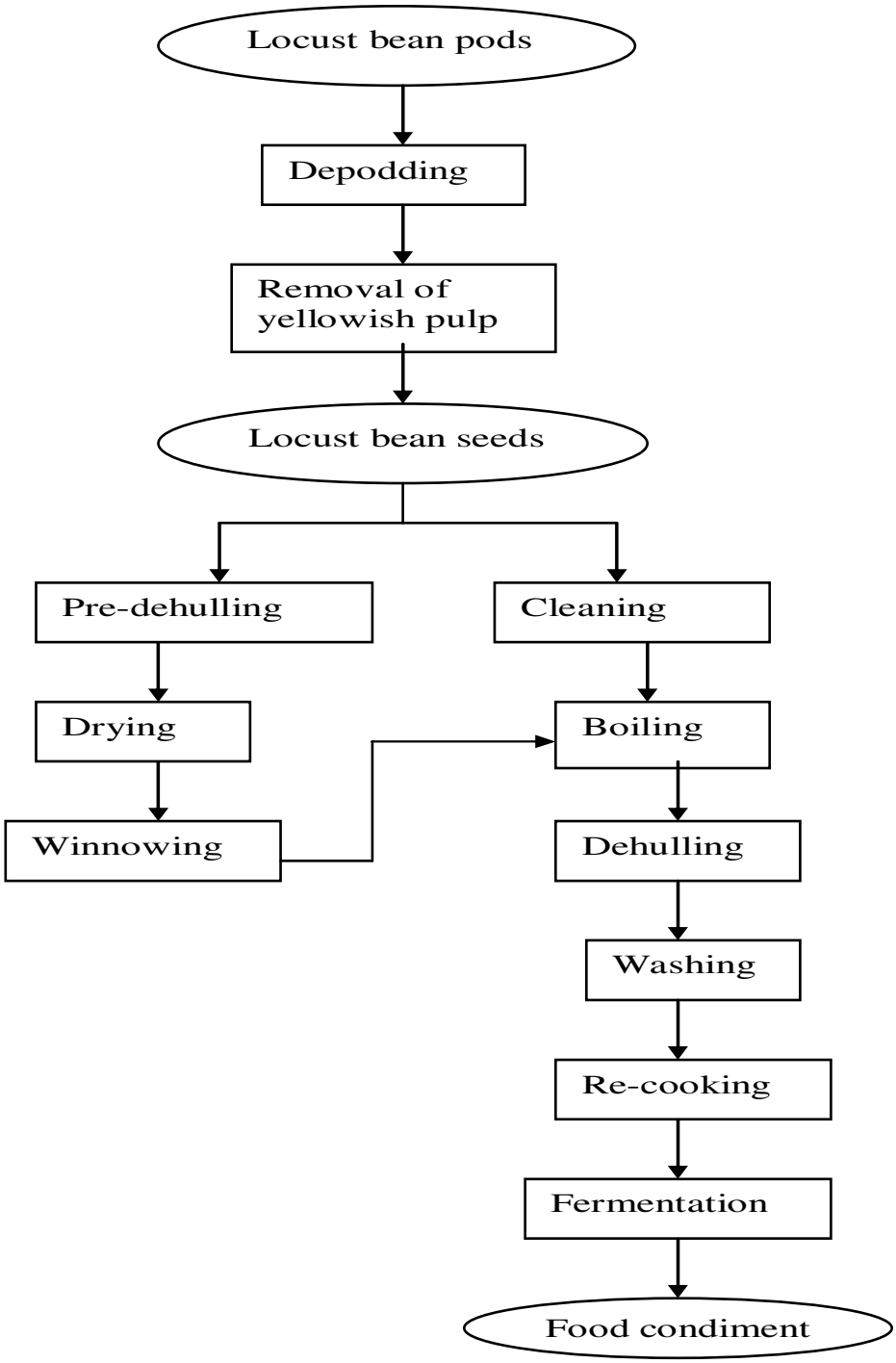

Figure 1. Flow chart for traditional processing of locust bean fruits to food condiment.

PROSPECT IN PROCESSING TECHNOLOGIES FOR LOCUST BEAN FRUITS

The recent research works carried out on the locust bean as a food condiment show the nutritional quality of the condiment and its importance in African diet, though it is popularly use as spice in the African meals. However, it was observed that much research work has not been done on locust bean especially on the appropriate technologies for processing the locust bean fruit into food condiment. This has made the processing of locust bean fruit to be very tedious and time consuming, which renders the processing of locust bean fruits into food condiment to small scale and homemade production, however, the processing of locust bean fruits have a high prospect of being mechanized.

The mechanization of production of fermented locust bean (food condiment) can then be achieved by researching into the production of hybrid locust bean seed by the Agronomist and the Botanist in order to reduce the years of maturity of the tree. The traditional method of harvesting should give way to mechanization by designing and constructing a long handle shear like-harvester. There is also a need for design and construction of washing machine in order to separate the yellowish pulp from the seed. From the preliminary investigation carried out in National Centre for Agricultural Mechanization, it was discovered that the time of cooking locust bean seeds reduced drastically from the initial 24 h when cooked traditionally to 40 min using pressure cooking. Therefore there is need for the design and construction of a coal powered pressure pot. After cooking, the seed is softened enough to be washed with water to separate the seed coat from the cotyledon instead of dehulling using dehulling machine before fermentation. To aid fermentation, appropriate air tight container could be used in place of rudimentary materials. The invention of processing technologies for the above mentioned unit operations will go a long way to reduce the drudgery involved and time consumed in the processing of locust bean fruit into locust bean condiment. Hence, making the food condiment to be in large-scale production.

CONCLUSION

The food condiment (fermented locust bean) is discovered from the researches carried out on it to be very nutritious, because of its high protein content in it (Alabi et al., 2005). The processing of locust bean fruit into food condiment passes through different unit operations that are still carried out manually with rudiment equipment and an unhygienic environment. This has made the production of the condiment to be in small-scale production. In order to increase the supply to the growing population, it is necessary to modernize production techniques and optimize processing conditions. A better post fermentation technique is also necessary to protect and prolong shelf-life and to render the fermented bean in a more presentable form. An invention of these processing technologies for production of fermented locust bean (food condiment) will make its production to be in a large-scale.

REFERENCES

Alabi DA, Akinsulire OR, Sanyanolu MA (2005): Qualitative determination of chemical and nutritional composition of parkia biglobosa(jacq.) Benth. August. Afr. J. Biotechnol., 4(8): 812-815.

Aniyi SO (2004). Performance Evaluation of a Manually operation Decoating Machine for Cooked Locust Bean Seed. J. Agric. Eng. Technol. 12: 26-32.

Audu I, Oloso AO, Umar B (2004). Development of Concentric Cylinder Locust Bean Dehuller. Agricultural Engineering International: Manuscript PM 04 003. CIGR J. Sci. Res. Dev., Vol. 6.

Beaumomt M (2002). Flavoring composition prepared by fermentation with bacillus spp. Int. J. Food Microbiol., 75: 189-196.

Campbell-platt G (1980) African locust bean (Parkia species) and its West African fermented food product, dawadawa. Ecol. Food Nutr., 9: 123-132.

Douglas SJ (1996): Tree Crops for Food Storage and Cash Parts I and II World Corps, 24: 15-19, 86-132.

Musa HL (1991). Ginger and Locust Bean Tree: History, Growth, Use and Potentials. Paper presented at Tuk Ham Symposium, Kurmin Musa, March 29.

Obizoba IC (1998). Fermentation of African Locust Bean. Text on Nutritional Quality of Plant Fruits.