



**OYO STATE COLLEGE OF AGRICULTURE AND
TECHNOLOGY, IGBOORA (OYSCATECH)**



in Collaboration with

OYSCATECH GLOBAL CONSULT

PRESENTS

2ND BIENNIAL CONFERENCE

TAGGED:

OYSCATECH 2021

E-Proceeding

Theme:

**A SYNERGY BETWEEN AGRICULTURAL PRODUCTION,
TECHNOLOGICAL INNOVATION & MANAGEMENT EFFICIENCY:
A PANACEA TO ECONOMIC STABILITY
DURING PANDEMIC**

Date: Mon. 12th - Thur. 15th July, 2021

Venue: 800-Seater, Lecture Hall, OYSCATECH, Igboora

Editors:

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QUALITY EVALUATION OF FERMENTED LOCUST BEAN POWDER

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Absrtact

This study was conducted to determine the proximate, macro- and micro-nutrients compositions in fermented locust bean powder. The locust bean seed were soaked for 15minutes cooked, for 8 hours, dehulled and re-cooked for another 1 hour and fermented for 12hours before sun-drying and grinding. The grinded fermented locust beans were subjected to analyses. The result showed that the proximate composition of the fermented locust bean powder was found to be 44.47% crude protein, 4.78% crude fibre, 2.57% ash, 10.73% carbohydrate, 27.35% fat, 9.08% total soluble sugar, 5.98% reducing sugar. While the micro-nutrient composition of the locust bean powder were Iron (5.72 mg/100g), Zinc (6.35mg/100g), Manganese (1.70mg/100g), Vitamin A (2.22mg/100g) and Vitamin C (16.87mg/100g). Macro-nutrients compositions of the locust bean powder were Sodium (482.80mg/100g), potassium (523.25mg/100g), Calcium (1635.30mg/100g) and Phosphorus (85.80mg/100g).

Key words; Locust bean powder, Sun-drying, Fermentation, Proximate composition, Micro-nutrients, Macro-nutrients.

Introduction

Locust bean seed (*Parkia biglobosa*) is a grain legume found in savanna area of Africa. It is fermented and added to soup and stew as condiment to enhance flavor and nutritional value. The fermented locust bean seed is commonly consumed in Ghana, Nigeria, Sierr'leone and Togo (Odunfa, 1985). In Nigeria it is called 'Iru' in Yoruba, 'dawadawa' in Hausa and 'Ogiri ingala' in Igbo. It is also referred to as 'Kinda' in Sierr'leone and 'Kpalueu' in Ghana. Fermented food species (Iru) have remain popular among Africans especially now that the industrial processed food seasoning such as curry and thyme are costly and beyond the reach of many people (Ogbonnaya *et al.*, 2010).

Locust bean (Iru) is a long pod containing small beans and sweetish edible pulp; used as animal feed and source of a chocolate substitute. Among the plant species legumes are considered as the major source of dietary protein, consumed world-wide especially in the developing and underdeveloped countries where consumption of animal protein is limited as a result of economic, social and cultural factors (Esenwah and Ikenebomeh, 2008). Seeds of legumes may account for 18% of dietary protein. For some groups, they are eaten as meal in fermented form as condiment (Iru) to enhance the flavor of food (Achi, 2005).

The processed locust bean known as 'Iru' is a popular food condiment common in West African countries. It adds flavor and taste to soup, sauce and stew. It also serves as a source of protein supplements in the diet of a poor family especially in rural areas (Daiwara *et al.*, 2000). It is unfortunate that locust bean is fast losing its popularity to some other flavoring agents whose nutritive value cannot be compared with that of 'dawadawa/Iru'. The federal office of statistics in 2003 reported that about 200million is spent annually on imported food flavor in Nigeria with a projection of 15% annual future increase despite the fact that, traditionally processed flavoring products have lower caloric value and higher dietary protein content than imported food flavor. This situation may be as a result of short life of the product, the product odour and the poor product quality due to the poor manufacturing practice. Locust bean processing and marketing 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 problem associated with production processes, there is no standard measurement or grading of the condiment for sale so as to know whether the condiment are probably utilized for profit maximization. It is therefore necessary to evaluate the quality of fermented locust bean powder to ascertain if the nutrients will still be intact after drying.

Soups and stews prepared with locust beans are preferred in some region in Africa because it produced better taste and aroma. They are also important protein supplement (Ogunbunmi and Bashir, 1980).

Materials and Methods

Materials: The materials used are locust bean seed (3.4 kg), bowls, water (100L), Sieve, Pot, Calabash, River sand (10kg), Salt (20 g), wood, 6Jute sacks. African locust bean seed and other materials used for the study were purchased from a local market, Towobowo, in Igbo-ora, Oyo State.

Methods: Locust bean seeds (3.4kg) was purchased from the market and soaked in 100L of water for 15minutes. The water was drained and reasonable quantity of sand was added and pounded with pestle in the mortal. It was washed with sieve in three different bowl of water to remove sand and stones and also peel off the outer shell of the locust bean seeds. After this process, fire was set. The locust bean seeds were boiled for eight hours (8hrs) on firewood. The seed was left to cool and was later poured into the mortal and pounded with pestle until the shell was completely removed. The seeds were washed and rinsed again in three different bowls with a sieve to ensure that there was no stone, particles and or sand in it. It was boiled again for one hour (1hr) with addition of salt, after 1 hour, it was removed from the fire and without wasting time, it was spread in two calabash and covered with a lot of cloth and placed in a corner on a plank for 12 hours for fermentation process to take place. It was opened after 12 hours and was spread on two trays in order to sun-dry.

The drying process took up to three weeks before it was grinded and sealed.

Physico-chemical Analysis: analysis determined were proximate (Carbohydrate, crude protein, moisture content, crude fiber, ash, fat, total soluble sugar and reducing sugar), macro-nutrients (sodium, potassium, phosphorus and calcium) and micro-nutrients (iron, zinc, manganese, Vitamins A & C) were all determined using standard procedures (AOAC, 1995). The analyses were performed in triplicate and the mean was recorded.

Results and Discussion:

Table 1 showed the proximate composition of the powdered locust bean. The moisture content was 10.25% which is good for storage. A research carried out by Ogbonnaya *et al.*, (2010) shows that the moisture content of raw locust bean seed was 7.01% and fermented locust bean seed was 37.10%. It may be as a result of metabolic activities of micro-organisms during the fermentation period which gave out moisture as one of their end products (Omafunbe *et al.*, 2004).

The crude protein of the fermented locust bean seed was 44.40%. Eka (1979) reported 30.06% protein for raw locust bean seed. It was reported by Oboh (2006) that apparent increase of crude protein was due to microbial proliferation or micro-organisms in form of single cell protein. Therefore, fermentation caused an increase in protein content.

The crude fibre was 4.78%, the crude fibre of raw African locust bean seed reported by Omafunbe *et al.*, (2004) was 11.7%, fermentation decrease the crude fibre of raw locust bean seeds.

The ash present in fermented locust bean seeds was 2.50%, the ash content of locust bean seed reported by Eka (1979) was 5.10%. Fermentation decreased the ash content due to boiling, soaking in water and dehulling of the raw bean seeds.

The carbohydrate value as revealed in table 4.1 was 10.73%, the raw locust bean seed value revealed by Olakunle and Adebola (2012) was 24.40%. The reduction of the carbohydrate might be attributed to the ability of fermenting micro-floral to hydrolyze and metabolize carbohydrate as carbon source in water to synthesize cell biomass (Madigan *et al.*, 2002).

The obtained fat was 27.35%, the crude fat of raw locust bean seed was 17.70% reported by Olakunle and Adebola (2012). The increase in fat of locust bean seed was due to fermentation (Eka, 1979).

The reducing sugar and the total soluble sugar of the fermented locust bean seed was 5.98% and 9.80% respectively.

Table 1: Proximate Analysis of the Fermented Locust Bean Powder

Nutrient %	Composition
Moisture Content	10.25
Crude Protein	44.40
Crude Fibre	4.78
Ash	2.50
Fat	27.35
Carbohydrate	10.73
Total Soluble Sugar	9.08
Reducing Sugar	5.98

Table 2 showed the macro-nutrient composition viz: Sodium (482.80mg/100g), potassium (523.25mg/100g), Calcium (1635.30mg/100g), Phosphorus (850.80mg/100g) while table 3 revealed the composition of micro-nutrient of the fermented locust bean powder (mg/100g) Viz: Iron (5.72mg/100g), Zinc (6.35mg/100g), Manganese (1.70mg/100g), Vitamin A (2.22mg/100g), Vitamin C (16.87mg/100g). Oladunmoye (2007) reported that during processing, some of the mineral are used up by microorganisms as nutrient source during growth. However, fermentation did not affect calcium and iron content of locust bean seed due to the insolubility of this mineral in water and hence could not easily leach.

Table 2: Macro-nutrients Composition of Fermented Locust Bean Powder

Macro-nutrients	Composition
Sodium mg/100g	482.80
Potassium mg/100g	523.25
Calcium mg/100g	1635.30
Phosphorus mg/100g	85.80

Table 3: Micro-nutrients Composition of Fermented Locust Bean Powder

Micro-nutrients	Composition
Iron mg/100g	5.72
Zinc mg/100g	6.35
Manganese mg/100g	1.70
Vitamin A mg/100g	2.22
Vitamin C mg/100g	16.87

Conclusion

The production of “Iru” offers a means of utilizing African Locust Bean seeds as a food condiment, since the locust beans are inedible on their own. Therefore, fermentation of African locust bean seeds to condiments is desirable nutritionally as the process increases the nutrients most especially protein. It was concluded that processing of locust bean seeds to “Iru” resulted in a value added products especially when protein and vitamins are the target nutritional components. Drying of “Iru” should also be encouraged to enhance storage and extend shelf-life.

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