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Research Article

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Comparative Analysis on the Proximate and Mineral Contents of Local Condiment Produced from Soya Bean and Locust Bean Seeds (Daddawa)

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Abstract The proximate and mineral analyses of Soya bean and Locust bean seeds were carried out according to the standard methods. The proximate were found for Soya bean sample contained protein content of 32.2%, moisture 26%, ash 5%, fat 3.9%, crude fibre 21.3%, carbohydrate 11.6% while that of the Locust bean sample had protein content of 26.3 %, moisture 6%/ ash 2.5%, fat 4%, crude fibre 4.8%, carbohydrate 56.4% respectively and the minerals were found for Soya bean seeds had potassium 21.95mg/L, calcium 19.68mg/L, magnesium -0.10mg/L, lead -0.14mg/L, iron 0.53mg/L while that of Locust bean sample had potassium 0.99mg/L, calcium 20.94mg/L, magnesium -0.05mg/L, lead -0.02mg/L, iron 0.83mg/L respectively. From the findings show that production of local condiment using Soya bean seeds is rich in protein than Locust bean seeds (Daddawa) therefore it is recommended to consume Soya bean than locust bean seeds (Daddawa).

Keywords Soya bean, Locust bean, Proximate, Mineral, Daddawa

Introduction

Food additives are substances that become part of a food product when they are added during the processing or making of that food. They often add nutrients, help process or prepared the food, and make the food more appealing. They are primarily used for flavouring, colouring, garnishing or preserving food [1]. Most of the man made food additives are produced by fermentation process. Fermentation is one of the oldest methods of food processing and preservation known to man [2]. In Africa, the art of fermentation is wide-spread including the processing of seeds, fruits and non alcoholic beverages [3]. Food fermentation is basically aimed at producing important nutrients or eliminating anti-nutrients. This is necessary therefore to improve the prevailing case of malnutrition in Nigeria and other sub-sahara countries [4]. Various type of condiments which are product of fermented seeds that are in use in Africa and some other parts of the world depending on the available raw materials and cultural background include; Oso in south western Nigeria [5] and Soumbala in Burkina Faso [6].

Locust beans cake, a popular food additive in Nigeria is a type of fermented and processed locust beans *(Parkia biglobosa)* or Soya beans (*glycine max)* used as a condiment in cooking. Locust beans cake is known as Iru by Yoruba people and Daddawa in Hausa land. It is used in cooking traditional soups like Egusi soup, Okro soup and Ogbono soup. It has a black appearance and a strong pungent smell [7].

In Bauchi, northern Nigeria, Daddawa is one of the most fully exploited traditional additives, used almost every day; in most food preparations, for its aroma and flavouring enhancing effects. Apart from serving as a food additives that enhances the organoleptic properties of the food. Daddawa may also serve as a source of proteins; especially soya beans based Daddawa which is rich in protein contents [8]. Even though used in small quantity, Daddawa can augment and enrich the diet and can also be recommended to people who suffer from protein energy malnutrition in the absence of protein rich diet, particularly in Africa and some parts of Asia. In general, both locust and soya beans based condiments are organoleptically similar [8]. However, the popularity of soya beans Daddawa is marred by the perception that is prone to faster deterioration than locust beans Daddawa; at the end of the fermentation period. [5]. Indeed, method of fermentation and handling after processing may in general interfere with nutritional properties of the condiments in view of this, this research is geared towards providing some nutritional insight of the two condiments popularly sold in Bauchi metropolis, Bauchi, Nigeria.

Scope

The scope of this research works will cover production of local condiment using Soya bean and Locust bean seeds, determination of proximate composition and mineral content of local condiment (Daddawa).

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Methodology

Sample Collection

The samples of Soya beans and Locust beans were purchased from Yelwan Tudu Market, Bauchi local Government Area of Bauchi State.

Pre-treatment of the Sample

The samples were separately washed with tap water. Sharp stone and other dirt were picked out. The locust bean seeds were cooked for about 24 hours while the soya bean seeds were fried to brownish colour and pill, filter and allowed to cool before cooking for about 8 hours.

Mineral Determination

Mineral contents of the samples were determined by Atomic Absorption Spectrophotometer (AAS) method.

Ten (10) g of the each sample was weighed and placed in a conical flask, and then 25ml of nitric acid (HNO_3) was added to each sample and warmed in a fume cupboard until fumes were formed. 5ml of 30% hydrogen peroxide (H_2O_2) was added drop-wisely when heated. It was allowed to cool and then filtered separately into a sample bottle to remove residue.

Proximate Composition

The proximate compositions of Soya bean and Locust bean seeds were determined using standard methods of AOAC (2005) [9].

Moisture Determination

The moisture contents of the samples were determined using AOAC (2005) procedure [9]. Washed porcelain dishes were dried in an oven at 100 ºC for about 2 hours, cooked in desiccators and reweighed. Five grams (5g) of each of the samples were weighed into the weighted dishes and placed in the oven at 100 ºC for 24 hours. The dishes containing the samples were cooled in desiccators, weighed and dried repeatedly until a constant weight was obtained. The percentage moisture was calculated using formula below:

$$\text{Moisture content} = \frac{\text{initial weight of dish } + \text{ sample } - \text{ final wt of dish } + \text{ Sample}}{\text{Weight of sample}}$$

$$\text{Percentage moisture} = \frac{\text{Moisture content}}{\text{Weight of sample}} X\ 100$$

Crude Protein Determination

Crude protein was determined by automatic micro-Kjeldahl method [9]. Crude protein was estimated by multiplying nitrogen value with N conversion factor 6.25 (Nx6.25) proteins. The method involves digestion, and titration. About 0.2g of each sample was weighed into a 100ml Kjeldahl digestion flask. Two and a half grams (2.5g) of anhydrous sodium sulphate, 0.5 copper sulphate (catalyst) and 5ml of concentrated sulphuric acid was added. The flask was placed on a heater and heated gently initially, until the solution turns black. After this, heat was increased to obtain a clear solution, cooled, washed and transferred into 25ml volumetric flask and rinsed with distilled water to mark.

Distillation

A combination of boric acid and methyl indicator was poured in a conical flask, placed under a condenser tip under the liquid. Five milliliters (5ml) of the digest plus 10ml of 60% concentrated sodium hydroxide was poured into Markham distillation apparatus. Steam was let down through the distillation apparatus for 5 minutes when ammonia dropped into the indicator and changed the color of the indicator from purple to green which is characteristic of alkaline gas.

Titration

The distillate was titrated with 0.01 normal hydrochloric acid (HCl) until a neutral point was reached (light purple or pink).

Titre value (T) = final burette reading minus initial burette reading.

$$\% \text{ crude protein} = \frac{14.01\text{x}0.01\text{x}6.25\text{x}\text{T}}{200\text{mg}} \; X \; 100$$

Where,

14.01 = atomic wt of nitrogen

0.01 = molarity of acid

100 = percentage

6.25= protein conversion factor

T = Titre value

Fat Determination (Soxhlet Method)

The fat contents of the samples were determined using the Soxhlet extraction method AOAC (2005) [9].

The extraction flask was washed, dried, cooled and weighed prior to adding 5g of each sample. The samples were weighed into filter paper and introduced into thimble. N-Hexane was added to the flask for extraction in the Soxhlet apparatus. After this, the extract was dried in an oven for 15 minutes at 1000C to remove any remaining solvent, cooled in the desiccators and reweighed.

Calculation

$$\% \;\; \text{fat} = \frac{\text{weight of extract cup} \; - \; \text{weight of cup}}{\text{Original weight of sample}} \; X \; 100$$

Ash Determination

The ash contents of the samples were determined using the method of AOAC (2005) [9]. Five grams (5g) of each sample was weighed into reweighed crucibles and put into muffle furnace at 600°c for three hours until light gray ash is obtained. The crucibles was removed from the furnace, put in desiccators to cool and reweighed to obtain the weight of ash. The percentage ash was calculated using the formula below:

$$\% \;\; \text{ash} = \frac{(\text{weight of crucible} \; + \; \text{ash}) \quad - \quad (\text{weight of crucible})}{\text{Weight of sample}} \; X \; 100$$

Crude Fibre

The crude fibre content of the samples was determination using the procedure of AOAC (2005) [9]. Five grams (5g) of each sample was put in a 250m1 beaker, boiled for 30minutes with l00ml of 0.12M l-H_2SO_4 and filtered through a funnel. The filtrate was washed with boiling water until the washing water was no longer acidic. The solution was boiled for another 30 minutes with l00mI of 0.02M sodium hydroxide solution, filtered with hot water and methylated spirit three times. The residue was transferred into a crucible and dried in an air oven for l hour. The crucible with its content was cooled in a desiccator and weighed (W2). This was taken to furnace for ashing at 600°C for one hour. The ashed sample was removed from the furnace after the temperature has cooled and put into desiccator and later weighed (W2). The crude fibre content was obtained between the weight before and after the temperature had cooled and put into the desiccator and later weighed (W3). The crude fibre content was obtained between the weight before and after incineration. The percentage crude fibre was calculated thus

$$\%\ \text{crude fibre} = \frac{\text{W2} - \text{W3}}{\text{Weight of sample}}\ X\ 100$$

Carbohydrate Determination

Total carbohydrate contents of the samples were determined by difference (subtracting crude protein, moisture, fat, fibre and ash content from 100%). The total carbohydrate of each sample was by difference.

Carbohydrate = 100 – (% protein + % fat + % ash + % crude fibre + % moisture).

Result

The results of this research work are presented in the tables below

Table 1: Proximate Composition of Soya bean and Locust bean seeds.

Nutrient %	Soya bean seed	Locust beans seed
Moisture	26	6
Crude protein	32.2	26.3
Fat	3.9	4
Ash	5	2.5
Crude fibre	21.3	4.8
Carbohydrate	11.6	56.4

Table 2: Mineral contents of Soya bean and Locust bean seeds

Nutrient %	Soya bean seed	Locust beans seed
Potassium	21.95±0.28	0.99±0.01
Calcium	19.68±0.85	20.94±0.87
Magnesium	-0.10±0.04	-0.05±0.06
Lead	-0.14±0.09	-0.02±0.02
Iron	0.53±0.44	0.83±0.08

Discussion

The proximate composition of Soya beans seeds (*Glycine max)* are 26% moisture, 32.2% protein, 3.9% fat, 5% ash, 21.3% crude fibre, 11.6% carbohydrate and Locust beans seeds (*Parkia biglobosa*) are 6% moisture, 26.3% crude protein, 4% fat, 2.5% ash, 4.8% crude fibre and 56.4% carbohydrate respectively. The mineral contents of *Glycine max* and *Parkia biglobosa* seeds are *Glycine max* contained 21.95mg/L Potassium, 19.68mg/L Calcium, -0.10mg/L Magnesium, -0.14mg/L Lead and 0.53mg/L Iron. *Parkia biglobosa* had 0.99mg/L Potassium, 20.94mg/L Calcium, -0.05mg/L Magnesium, -0.02mg/L Lead and 0.83mg/L Iron.

From the findings, for the proximate; Soya beans seeds has higher value of moisture content 26%, crude protein 32.2%, ash 5%, crude fibre 21.3% than the Locust beans seeds of moisture content 6%, crude protein 26.3%, ash

2.5%, crude fibre 4.8% while Locust beans seeds has higher value of fat 4%, carbohydrate 56.4% than Soya beans seeds of fat 3.9%, carbohydrate 11.6% respectively and for the mineral contents; Soya beans seeds has higher value of potassium 21.95mg/L than Locust beans seeds of potassium 0.99mg/L while Locust beans seeds has higher value of calcium 20.94mg/L, magnesium -0.05mg/L, lead -0.02mg/L, iron 0.83mg/L than Soya beans seeds of calcium 19.68mg/L, magnesium -0.10mg/L, lead -0.14mg/L, iron 0.53mg/L respectively.

Conclusion

From the findings show that production of local condiments using *Glycine max* seeds is rich in minerals such as potassium and nutrients such as moisture, crude protein, ash, crude fibre and *Parkia biglobosa* seeds are rich in minerals such as calcium, magnesium, lead, iron and nutrients such as fat and carbohydrate respectively.

Recommendation

From the findings; since Soya bean seeds have high protein content than Locust bean seeds therefore Soya bean seeds (Daddawa) can be recommended for consumption than the Locust bean seeds.
Further studies should be done on these local condiments.

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