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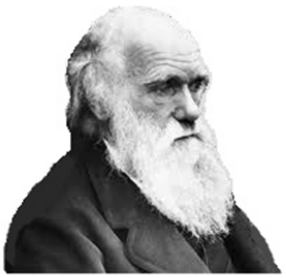

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Comparative proximate analysis for processes *Parkia biglobosa*

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ABSTRACT

Herein, a proximate analysis of processed *Parkia biglobosa* (PB) was undertaken. The properties determined for the sample were Moisture content, Ash, Crude fibre, Protein, Fat, and Carbohydrate. Triplicate analysis were carried out for each parameter. The result of the study shows that processed PB seed contains appreciable quantities of nutrients required for the body, allied with low levels of inorganic impurities.

***Keyword*:** *Parkia biglobosa*, proximate analysis, ash content, fiber content, NAFDAC

1. INTRODUCTION

Parkia biglobosa (PB), also called African locust bean tree, lyere in Igbo, Iyeke in Igede language in Nigeria, is a leguminous crop peculiar to the tropics. It is a perennial tree which belongs to sub-family of mimosodee and family leguminosae (now fabaceae). PB is a tree that is not normally cultivated but found in population of two or more in the savannah regions of West Africa. PB is found throughout the savannah lands of North central Nigeria covering Benue, Kaduna, Kwara, Kogi, Nassarawa, and Plateau States.

The tree grows to the range of 7 to 20 metres high and bears pods that occur in large bunches and vary from 120 to 300 mm in length. A matured PB of 20 to 30 years can bear about a tone and above of harvested fruits, the tree can start to bear fruits from five to seven years after planting.

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Soaking reduces anti-nutritional factors such as trypsin inhibitors of legumes, water soluble minerals, vitamins, amino acids, proteins and sugars are solubilised when seeds are soaked in water. In another work, it was reported that sun drying temperature less than 54 °C causes little or no change in physic-chemical and nutritional quality of starch and protein while high temperature drying in mechanical devices changes these qualities by changing the nature of the basic constituents of seeds.

It is a raw material for the production of flavour called “okpehe” in Igede language and “dawadawa” in Hausa. A flavour that competes favourably with Maggi cube among the locals in West Africa. Dawadawa or local magi is eaten regularly in soups and stews. It is tasty and protein-rich seasoning which is used like stock cubes or cheese in European and North American cooking.

From the proximate analysis and PH after investigating the chemical and biochemical changes during fermentation in African locust beans, it was observed that there was increase in moisture content of fermented African locust beans and concluded that fermentation seemed to have about 30% decreased in the ash content of African locust bean seed. It was concluded that boiling, soaking in water and dehulling of African locust beans led to a loss of 41% ash, a decrease in crude fibre content of the African locust beans seed during the last 24hours of fermentation was also observed, this was said to be probably due to the production of extracellular enzymes. They also noticed that the viscosity of the boiling water at the end of the boiling process was more than it was at the beginning of the process which is an indication of the presence of mucilaginious materials in water, which would explain in part the reduction of the crude fibre content of African locust beans seed on boiling [1-25].

The pulp contained 85.5g/100g carbohydrate, 70.4g/100g reducing sugars, 13.0g/100g fats, 1.0g/100g proteins, 3.5g/100g ash, and 1.0g/100g for other constituents. It was also reported that the pulp contained a moisture content of 8.41%, protein 6.56%, fat 1.80%, crude fibre 11.75%, ash 4.18%, carbohydrate 67.30%, sugar content was found to be 9.00.

2. MATERIALS AND METHODS

All the reagents used in this experiment are analytical grade reagents obtained from Emole chemicals in Makurdi Nigeria. These reagents include petroleum ether, sodium hydroxide, sulphuric acid, ammonium sulphate, copper sulphate, boric acid and anhydrous sodium sulphate. Distilled water was used throughout the experiment. Routine laboratory apparatus were used.

2. 1. Sample Collection and Preparation

Parkia biglobosa seeds used for this work were bought from Aliade market in Gwer-East, Benue State. The seeds were boiled for 12 hours, dehulled to separate the cotyledons from the hulls. The loosened hulls were removed by floatation.

The dehulled cotyledons were boiled in excess water for 2 hours drained through a raffia basket while still hot. It was then covered with leaves and allowed to ferment for 72 hours. The resulting product was dried and ground manually into powder and kept in an air container for use as sample.

2. 2. Proximate Analysis

Proximate composition (moisture, ash, fat, protein, crude fibre and carbohydrate of the fermented PB was determined using the method of Association of Official Analytical Chemists.

2. 3. Determination of moisture content

A crucible was thoroughly washed and dried in the oven at 100 °C for 30 minutes and allowed to cool inside desiccator. After cooling, it was weighed and the weight recorded as (W_1). 1 gram of the sample were poured into crucible and weighed, the weight recorded as (W_2). Then, the sample plus the crucible were placed in an oven at 100 °C for 2 hours, cooled in a desiccator and weighed for 30 minutes. The process was repeated until a constant weight was obtained as (W_3). The values obtained were used to calculate the percentage of moisture content.

2. 4. Determination of crude fibre

1 g of the sample was hydrolyzed in a beaker with petroleum ether after which it was refluxed for 30 minutes with 200 ml of a solution containing 1.25% H_2SO_4 per 100 ml of solution. The solution was filtered through filter paper. After filtration, the sample was washed in the boiled water until the sample was no longer acidic. The residue was transferred through filter crucible and dried at 100 °C for 2hours. The percentage crude fibre was thus calculated from the weight after drying and the weight of the sample.

2. 5. Determination of ash content

1 g of the sample was weighed into a previously ignited and weighed crucible. The crucible and content were ignited in a preheated muffle furnace at 650 °C for 2 hours. The crucible was cooled in a desiccator to a constant weight, weighed and percentage ash content was calculated.

2. 6. Crude fat determination

This was done by soxhlet extraction method. 250 ml clean flask was dried in an oven at 105-110 °C for about 30 minutes. 1g of the dried sample was weighed accurately into labelled thimble then corresponding labelled cooled boiling flask was weighed. The boiling flask was filled about 100 ml of petroleum ether. (Boiling point 40-60 °C). Extraction thimble was plugged lightly with cotton wool while the soxhlet extractor apparatus was assembled and reflux for about 3 hours. The thimble was removed with care and petroleum ether collected on the top container of the set up and drained into flask for re-use. When the flask was free of petroleum ether, it was removed and dried at 105-110 °C for 1 hour. The flask was transferred from the oven into a desiccator and allowed to cool, and then weigh. The weight obtained were used to calculate the percentage fat.

2. 7. Determination of protein

This was done by Kjeldah method which remains the most popular method of protein determination.

(a) Protein digestion: 1g of sample was weighed into a Kjeldah flask. 5g of anhydrous sodium sulphate was added. This was followed up with the addition of 1g of copper sulphate and 1 tablet of Kjeldah catalyst. Into the mixture, 25 ml of concentrated sulphuric acid and 5 glass beads were introduced. In the fume cupboard, heating was done gently at first and then increased in heat with occasional shaking till solution assumes a green colour. The black particle showing at the tip and neck of the flask was cooled and washed with the distilled water. Reheating was done gently at first until the green colour disappeared and then allowed to cool. After the cooling, the digest was transferred with several washings into a 250 ml volumetric flask and filled to the mark with distilled water. Distillation was done using distillation apparatus.

(b) Protein distillation: The distillation apparatus was steamed for about 15minutes before usage. Under the condenser, 100 ml conical flask containing 5 ml of boric acid indicator was placed such that the condenser tip was under the liquid. 5 ml of the digest was pipette into the body of apparatus through a small funnel aperture; the digest was washed down with distilled water followed by 5 ml of 60% NaOH solution. The mixture was steamed thoroughly for about 5-7 minutes to collect enough ammonium sulphate. Then receiving flask and the condensed water were removed. Titration of the solution was made in the receiving flask using (0.1 M) sulphuric acid and calculation of the nitrogen content was done.

2. 8. Determination of carbohydrate

The total carbohydrate content of the sample was obtained from the relation; percentage carbohydrate = 100% - (moisture + ash + fat + crude fibre + protein) %

3. RESULT AND DISCUSSION

From the results, the processed *Parkia biglobosa* seed contained $4.47\pm1\times10^{-5}$ % moisture which indicates the shelf life of the product. It also shows that processed PB seeds is somewhat a dry packed soup condiment. Also, processed PB contained $2.89\pm3\times10^{-7}$ % ash. Comparing this with the ash content of star maggi seasoning cube which is 26% ash contents indicated that processed PB has a low ash content as compared to star maggi seasoning cube approved by NAFDAC and consequently a low level of inorganic impurities.

As shown in Table 1, the result obtained from processed PB seed contained $16.68\pm1\times10^{-5}$ % of fat content while star maggi seasoning cube which is approved by NAFDAC contained 4.7% fat. This showed that processed PB has a high fat/oil content as compared to maggi seasoning cube which is an indicator of appropriate dietary source for fat in energy metabolism.

The result also showed that processed PB seed have protein content value of $35.69\pm3\times10^{-7}$ %. Comparing the result with 6.3% obtained from the star maggi seasoning cube it would be concluded that processed African locust beans has a high crude protein which is a good source of amino acid requirement necessary for growth, maintenance and repair.

The percentage crude fibre content obtained from the processed PB seed is $3.13\pm2.2\times10^{-7}$ % which is higher than the 1.70% contained in maggi seasoning cube,

indicative of high energy content of the processed PB. The crude fibre plays a role in the prevention of number of communicable diseases by reducing the level of cholesterol.

The result obtained from the proximate analysis of processed PB seed powder showed that carbohydrate content was $37.14 \pm 2.1 \times 10^{-5}$ % compared to 26% obtained from star maggi seasoning cube approved by NAFDAC. With this result, processed PB seed has a high presence of carbohydrate in the sample and consequently a good source of immediate energy for normal cell functioning.

Table 1. Comparison between the proximate values of the content of PB and NAFDAC approved maggi seasoning cube

Parameters	PB (%)	Maggi seasoning cube (%)
Moisture	$4.47 \pm 1x10^{-5}$	
Ash content	$2.89 \pm 3x10^{-7}$	26
Fat content	$16.68 \pm 1x10^{-5}$	4.7
Protein value	$35.69 \pm 3x10^{-7}$	6.3
Fiber content	$3.13 \pm 2.2x10^{-7}$	1.7
Carbohydrate content	$37.14 \pm 2.1x10^{-5}$	26

4. CONCLUSION

This study has shown that processed PB seed contains appreciable nutrients required for the body as shown in Table 1. The result of the analysis shows that processed PB seeds are rich in carbohydrate indicating a good source of immediate energy for normal cell functioning, a high percentage of protein which is a good source of amino acid, and good amount of fat/oil which is a dietary source for fat in energy metabolism, a low moisture content which is implies that processed PB seed is somewhat a dry packed soup condiment, a low percentage of ash content which is indicative of low level of inorganic impurities. The result also show a low percentage of crude fibre content in the sample and consequently high energy. Based on the results obtained, it would be concluded that PB seed contains food nutrients that are required for the body and it should be used as soup condiment and over dependence on imported food flavours should be minimised.

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