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Nutritional, Ant nutritional and Mineral Study of Seeds Used as Soup Thickener

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Abstract: *The Proximate, phytochemical, minerals, and vitamins compositions of some commonly used soup thickeners in were investigated. The soup thickeners included* Defarium microcarpum *(Ofor), Brachystegia eurycoma (Achi), and* Irvingia gabonensis *(Bush mango) was seen to contain various nutritional and anti-nutritional properties such as carbohydrate 43.32% to 59.64%, Ash 2.55- 4.77%, crude fiber 4.05% to 3.00%, Protein, 15.25-16.71%, Fat, 6.10-17.15, Fiber, 4.05- 3.00. The phytochemical included Tannins 67.24-82.1 mg/100g, Alkaloids, 48.71-66.05, Oxalate, 0.67-1.44. The mineral content were calcium 44.28 mg/100g to 65.26 mg/100g, iron 3.02 mg/100g to 4.61 mg/100g, Magnesium 55.34 mg/100g to 72.09 mg/100g, and Sodium 20.60 mg/100g to 28.88 mg/100g. The seed were also found to be rich in vitamins such as Thaimine, 0.44-2.65, Riboflavin, 0.10-0.15, Niacin, 0.22-0.39. The present study shows that most of these seeds used as soup thickeners contains some nutritional and medicinal importance which can serve as supplement or substituted for other source of nutrient for man.*

Keywords: *soup thickeners, Vitamin, Minerals, phytochemical, proximate.*

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I. Introduction

Every food substance consumed by humans has either a therapeutic, nutritional or toxic effect on the body. Plants and their products have been in used for as old as the history of man for there therapeutic purposes. In the past decades, pharmacologists and organic chemists have synthesized a large number of interesting chemical substances from plants, which have been of great help in the practice of pharmacology and traditional medicine.

In eastern Nigeria, most of the foods consumed as soup are prepared with different plant parts (such as the leaves, seeds, and fruits) which serve for different purposes as spices, condiments, thickeners etc. According to Ikechuku and Emmanuel, (2010) Thickening agents, or thickeners, are substances which, when added to an aqueous mixture, increase its viscosity. They provide body, increase stability and improve suspension of added ingredients (the strength of the food materials).

The food use of these thickeners calls for more research to provide data on the nature of their chemical compositions and properties of their constituents so as to ascertain their actual nutritional values, health and other medicinal importance. Examples of these soup thickeners include *Defarium microcarpum* (Ofor), *Brachystegia nigerca* (Achi), and *Irvingia gabonensis* (Bush mango). These plant seeds have being reported for their nutritional and medicinal importance.

II. Materials and Methods

SAMPLE COOLECTION

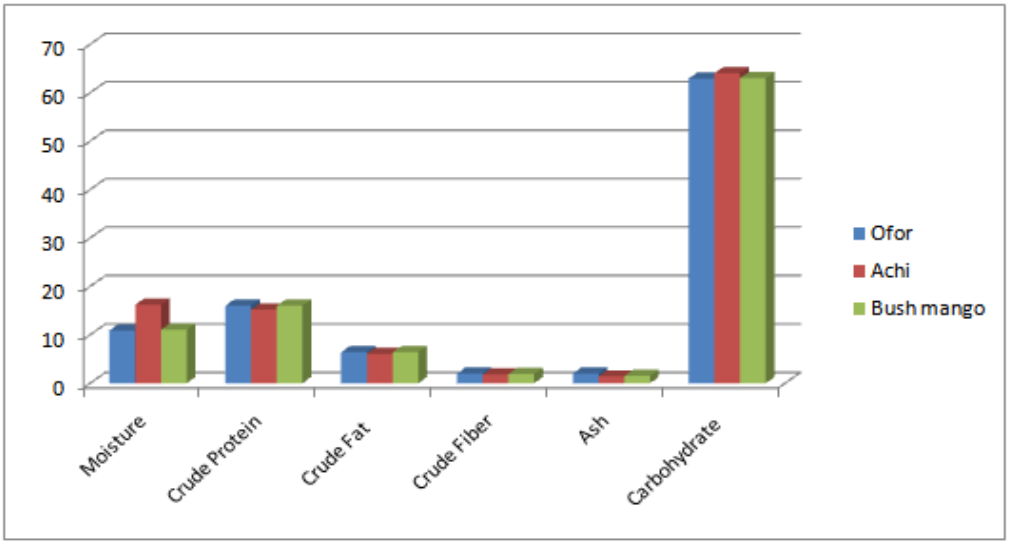
Fresh samples of the plant seeds were collected from Sagbama market in Bayesa state Nigeria. The samples were transported to department of chemistry/ biochemistry, Isaac Jasper Boro Colledge of Education Sagbama. The samples were dried in an oven at 60^{O}C for 48 hours and then milled with an electric blender before used for the analysis.

PROXIMATE ANALYSIS: The seed samples were analyzed for their proximate compositions using the Official methods as described by AOAC, (1980).

DETERMINATION OF PHYTOCHEMISTRY: Alkaloids were determined by the method as described by Higuchi and Hassan (1973). Tannins were determined by the method of Price *et al*., (1978); Bainbridge *et al*. (1996), Saponins, flavonoids, glycosides and steroidal aglycon were variously determined by the method of Harbone (1973)

DETERMINATION OF MINERAL CONTENT: Calcium, sodium, potassium, magnesium and iron were determined according to the method of Shahidi *et al*. (1999). The sound seed samples were sieved with a 2mm rubber sieve and 2g each of samples were weighed and subjected to dry ashing in a well-cleaned porcelain crucible at 550^{o}C, in a muffle furnace. The resultant ash was dissolved in 5ml of HNO_3/HCL/H_2O (1:2:3) and heated gently on a hot plate until brown fumes disappeared. To the remaining materials in each crucible, 5ml of deionized water was added and heated until a colourless solution was obtained. The mineral solution in each crucible was transferred into 100ml volumetric flask by filtration through a Whatman No 42 filter paper and the volume made to the mark with deionized water. This solution was used for elemental analysis by atomic absorption spectrophotometer. A 10cm long cell was used and concentration of each element in the sample was calculated on percentage of dry matter**.**

III. Result



Figue 1: Proximate analysis of soup thickeners in %w/w

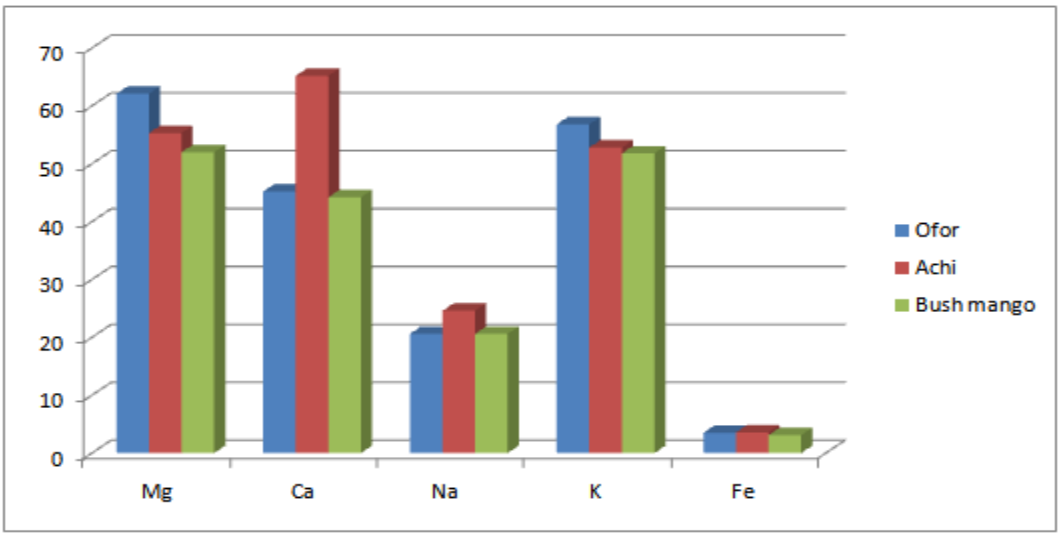


Figure 2: Mineral composition of soup thickeners (mg/100g)

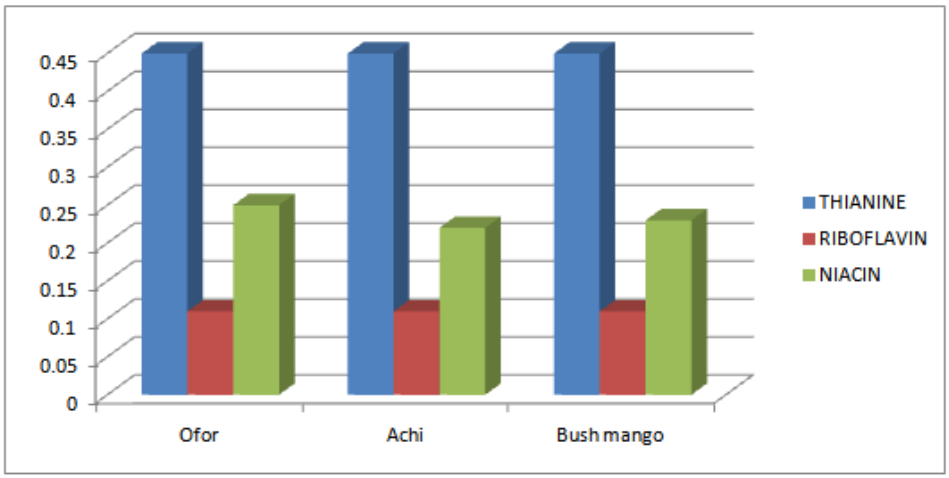


Figure 3: Vitamins composition of soup thickeners (Mg/100g)

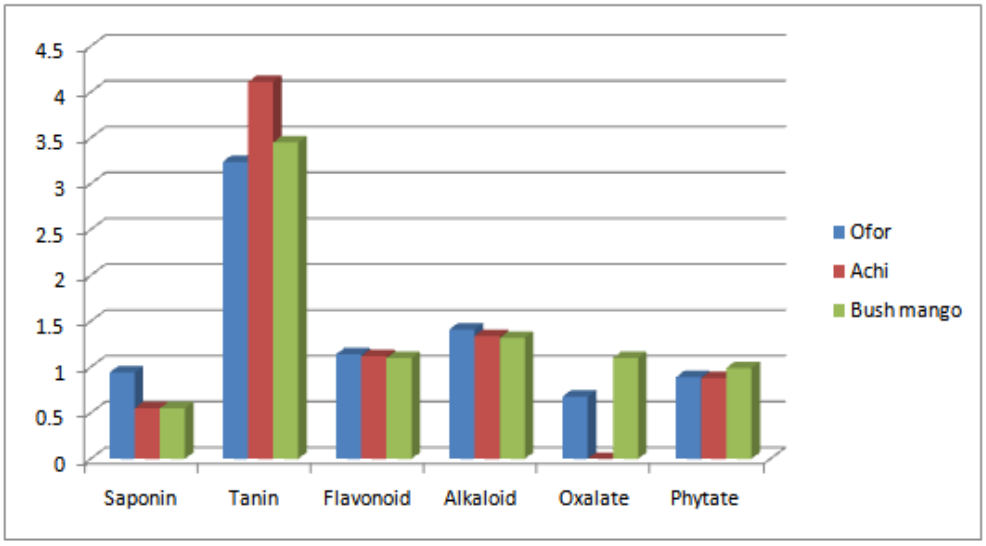


Figure 4: Phytochemical composition of soup thickeners (seeds) mg/100g.

IV. Discussion

Plants have long serve as useful ingredients for our nutritional purposes and in the treatment of diseases in both developing and developed countries. The result for the proximate compositions of the soup thickeners shows that there were significantly differences among the seeds. *Irvigna gabonesis* 16.00% and *Detarium microcarpum* 16.02%. Igwenyi and Akubugwo, (2010) reported higher values. These recorded values give the seeds positive attributes as plant proteins which can be substituted for animal protein to furnish the essential amino acids needed for healthy growth (Igwenyi, 2008).The crude fat content recorded 6.12% in *Brachystegia eurycoma* (Achi), *Irvigna gabonesis* (Ogbono) 6.46% and 6.46% in *Detarium microcarpum* (Ofor). The result is related to that reported by Odenigbo and Obizoba, (2004) who recorded similar values. The percentage crude fiber in the seed samples were; *Brachystegia eurycoma* 7.84%, *Irvigna gabonesis* 5.97% and *Detarium microcarpum* 6.01%. These values are close to the values reported by Barminas *et al*., (2004).

The ash contents were also investigated and it showed that the values were *Brachystegia eurycoma* (achi) 4.77%, *Irvigna gabonesis* 2.47 and *Detarium microcarpum* 3.79%. The ash contents was comparable to that reported by Barminas *et al*., (2004) for *Xylopia ethiopica* also used as a thickener. The percentage moisture contents were *Brachystegia eurycoma* 11.27%, *Irvigna gabonesis* 11.03% and *Detarium microcarpum* 10.96%. The carbohydrate composition of the thickeners was recorded at 56.75% for *Brachystegia eurycoma Irvigna gabonesis* 58.07%, and *Detarium microcarpum* 57.76%, These results are comparable to the work of (Eddy and Udoh, 2005).

Who recorded 60.17% in *Brachystegia eurycoma* (Achi) and 51.03% in *Detarium microcarpum* (Ukpo). The concentrations of saponins were in the range of 0.99 mg/100g in *Detarium microcapum* , 0.55 mg/100g in *Brachystegia eurycoma*, and 0.55 in *Irvigna gabonesis*

Tannins have traditionally been considered antinutritional but it is now known that their beneficial or antinutritional properties depend upon their chemical structure and dosage (Muller-Harvey and McAllan, 1992). The concentrations of tannins were relatively high. *Detarium microcarpum* contained 78.24mg/100g tannins, *Brachystegia eurycoma* 68.01mg/100g, and *Irvigna gabonesis* 67.24 mg/100g These values were higher than 0.38 – 0.77mg/100g reported for Glycine max and *Vigna unguiculata* (Okwu and Orji, 2007). The concentration of alkaloids was 66.05mg/100g for *Brachystegia eurycoma*, *Detarium microcarpum* 57.55mg/100g, and *Irvigna gabonesis* 48.71 mg/100g Alkaloids are famous analgesics and have been utilized in a variety of ways in the treatment of diseases and during surgery due to their medicinal and pharmacological potency (Mothes, 1996).

The concentrations of Oxalate were found in the range of 0.68 mg/100g in *Detarium microcapum*, 0.67 mg/100g in *Brachystegia eurycoma*, and 1.10 mg/100g in *Irvigna gabonesis*. Flavonoids are antioxidants that play major roles in the protection of cells from lethal effects of free radicals and their derivatives Nyerhowo *et al*., (2015). A diet rich in antioxidant compounds (like phenols and flavonoids) therefore helps to strengthen the antioxidant-based defense system in the human body Nyerhowo *et al*., (2015). Flavonoid values recorded *Detarium microcarpum* (1.14 mg/100g), *Brachystegia nigerica* (1.12 mg/100g), and *Irvigna gabonesis* (1.00),

The mineral content of the soup thickeners are shown in table 3. The potassium contents was found in the range of 51.82mg/100g to 56.82 mg/100g *Irvigna gabonesis* (51.82 mg/100g the lowest, 56.82 mg/100g in *Detarium microcapum* ,52.82 mg/100g in *Brachystegia eurycoma*. Potassium is a systemic electrolyte and is essential for co-regulating ATP with sodium. Potassium is a major intracellular cation that maintains intracellular osmotic pressure (Vasudevan and Sreekumari 2007). According to Linder, (1991) Sodium is an electrolyte present in extracellular fluid and is essential for coregulating ATP with postassium. The Sodium contents was found in the range of 20.60 mg/100g to 28.88 mg/100g. *Irvigna gabonesis* 20.65 mg/100g, *Detarium microcapum 20.62* mg/100g, and 24.64 mg/100g in *Brachystegia eurycoma*. The calcium contents was found in the range of 44.28 mg/100g to 65.26 mg/100g with *Brachystegia eurycoma*, 65.26 mg/100g the highest *Irvigna gabonesis* 44.28 mg/100g the lowest, *Detarium microcapum* 45.23 mg/100g. Calcium is a very important mineral. It is a structural component of bones and teeth.

Iron is a component of many proteins and enzymes, notably hemoglobin and cytochrome P450. Deficiency of iron could to iron deficiency anaemia which is more common in menstruating females and pregnant women (Dvlin, 200). The iron contents was found in the range of 3.12 mg/100g to 3.52 mg/100g with *Brachystegia eurycoma*, 3.52 mg/100g) *Irvigna gabonesis* 3.12 mg/100g and *Detarium microcapum* 3.52 mg/100g. Magnesium contents was found in the range of 52.02 mg/100g to 62.14 mg/100g *Irvigna gabonesis* 52.02 mg/100g, *Detarium microcapum* 62.14 mg/100g, 55.34mg/100g in *Brachystegia eurycoma*, The levels of thiamine concentration were within the range of 0.45 mg/100g to 2.64 mg/100g *Detarium microcarpum*, *Brachystegia eurycoma Irvigna gabonesis* were, 2.64 mg/100g, 0.48 mg/100g, and 0.45 mg/100g respectively.

The content of Niacin were *Detarium microcarpum* (0.25 mg/100g), *Brachystegia eurycoma* (0.22 mg/100g), *Irvigna gabonesis* (0.23 mg/100g),.Vitamins are organic compounds, which are found in natural food and are essential for the normal growth and nutrition of human body (Chopra and Panser, 2010).

V. Conclusion

Despite the various levels of these plants secondary metabolites, the seeds used as soup thickeners are not associated with any disease state or condition in the area as such diseases associated with malnutrition and malabsorption. This could be attributed to the presence of antioxidants. However, methods of food preparation such as fermentation, cooking, and malting changes the general properties of the seed and also increases the nutritive quality of plant foods and such processing methods are widely used in societies where cereals and legumes form a major part of the diet.

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