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Physicochemical and nutrient evaluation of African bush mango (*Irvingia gabonensis*) seeds and pulp

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Abstract. Physicochemical and nutrient evaluations of African bush mango seeds and pulp were conducted. The seeds contained 3.36%, 7.70%, 65.46%, 2.26%, 10.23% and 10.93% of moisture, crude protein, crude fat, mineral ash, crude fiber and carbohydrate, respectively. The pulp contained 80.0%, 1.09% , 1.06%, 0.8%, 0.4% 10.7% of moisture, crude protein, crude fat, mineral ash, crude fiber and carbohydrate, respectively. The physicochemical analysis of the pulp showed that it contained 0.112 cm^3 titratable acidity, 0.21% water soluble ash, 459.7 mg/100 ml reducing sugars, 49.1% non-reducing sugars, 10.0 (Brix°) soluble solids, 1.3355 refractive index, 10.0% total solids, 1.2×10^3 NSM^{-2} viscosity and 1.012 specific gravity. Ascorbic acid and calcium contents were 66.7 mg/100 ml and 262.5 mg/100 g, respectively. The pulp was slightly acidic (pH 5.8) which indicates that it may not be easily spoiled by micro-organisms.

Key words: African bush mango, Nutrient, Physicochemical, Pulp, Total solids

Introduction

The African bush mango comes in two varieties, *Irvingia gabonensis* and *Irvingia excelse*. *Irvingia gabonensis* is locally called egili (Igala) and Oghi (Etsako) but has other local names in Nigeria. Both varieties are found in the tropical rainforest and some parts of the Savannah zone in Nigeria [1]. The *I. gabonensis* variety has an edible sugary pulp which is eaten raw when ripe [2]. The pulp of the second variety (*I. excelse*) is not edible because it is highly fibrous. The fruits are available from May to September every year with the peak harvest in June/July. *I. gabonensis* has been domesticated, though a large amount still grows wild. Both varieties of the African bush mango contain seeds which are used for making a popular soup, Ogbono. The pulp is usually discarded because of lack of alternative uses.

Previous studies of the seeds indicate that they contain 8.7–10.5% crude protein and 54.0–72.0% fat [3, 4]. Other studies have been done on the functional properties of the seed [5]. The only study done so far on the pulp was

that of Akubor [6] exploring the possibility of using it for wine production. However, there is a need to do more studies on the physicochemical properties of the *I. gabonensis* pulp. The results of such studies will help to determine the suitability of the pulp for the production of juices, wines and jams [3]. This study was, therefore, carried out to provide the necessary basic information that will enable alternative uses of the pulp. This is particularly important when it is known that an insignificant quantity of the pulp is consumed as snacks or as dessert while the rest is wasted.

Materials and methods

Preparation of samples for analyses

Ripe, healthy African bush mango (*Irvingia gabonensis*) were obtained from a peasant farmer in Okenya. Idah. They were sorted, washed and peeled manually using a sterile kitchen knife. About 100 g of the pulp were mashed using a laboratory pestle and mortar. The mashed pulp was kept in a 500 ml clean beaker covered with a watch glass in the refrigerator (4 °C) pending analyses.

The seeds were obtained by splitting the nuts open with a locally made hammer, designed for that purpose. The kernels were dried in the sun for seven consecutive days. The dried seeds were milled (Premier Mill, A1) to pass through a 0.5 mm sieve. The ground seeds were packed in sealed cellophane bags and kept at ambient temperature (30 °C) on the laboratory shelf.

Nutrient and physicochemical analyses

Samples of the pulp and seeds were analyzed to determine crude protein (6.25 × N, microKjedahl), ether extract (crude fat) and ash contents, using AOAC [7] standard methods. Moisture content (constant weight), crude fiber and calcium (EDTA titration) were determined as described by Pearson [8]; carbohydrate was determined by difference.

Titratable acidity was determined by titrating dilute samples of the pulp with 0.1 N NaOH to the phenolphthalein end point [7], while ascorbic acid content was determined by the indophenol titration method [9]. Water soluble ash (as $K_2 CO_3$), reducing sugars (as invert sugar) and non-reducing sugar (as sucrose) were estimated by standard methods described by Pearson [8].

Refractive index was determined using an Abbe refractometer (Model RG 701, Officine Galileo Italy); specific gravity was estimated using a 2.5 ml specific gravity bottle at 20 °C as described by Pomeranz & Meloan [10].