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Nutritional Composition Of Fluted Pumpkin (*Telfairia Occidentalis,* Hook F.) Seed

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ABSTRACT

Seeds play an important role in the diet of man. They serve to supplement the nutrients provided by cereals and tubers, however, there is lack of comprehensive compositional data regarding the mineral and proximate composition of seeds in Nigeria. In these studies, the mineral contents, proximate composition, vitamin A and C contents, total acidity and nitrite levels of the seed of fluted pumpkin (*Telfairia occidentalis*, Hook F.) was analyzed. The seed contains substantial amounts of essential minerals especially phosphorus; 21000μg/g, calcium; 280μg/g magnesium; 700μg/g and iron; 69μg/g (on a dry weight basis). The carbohydrate content was high (53:08%) and significant levels of vitamin A and C were present. The low nitrite levels of 1.33 μg/g and low total acidity (0.06%) makes the seed safe for consumption.

KEYWORDS

Nigeria;
Mineral composition;
Fluted pumpkin;
Proximate composition;
Benin City;
Nutrients.

INTRODUCTION

Seeds form an important part of the diet of human beings and are usually regarded as good food[1]. The significance of seeds especially in the nutrition of the Nigerian population is increasing for several reasons. First, seeds have nutritive and calorific values, which make them necessary in diets. They are good sources of edible oils and fats. The amount of energy provided by 1 g of fat/oil when fully digested is more than twice as many joules as do carbohydrates and protein[2]. Second, since 1980, Nigeria experienced declines in yields for cereals, tubers and root crops[3]. This problem has been compounded by poor economic growth, degradation of rural environment especially in crude oil rich communities and insincere government. As a result, seed could be described as a good source of "famine food". Seeds are also potential raw materials for local industries.

The seed of fluted pumpkin (*Telfairia occidentalis*)

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is widely consumed in Nigeria, especially in the south-eastern part of Nigeria where it is used as a condiment in soup. The fermented seeds of fluted pumpkin is used in the production of "Ogiri ugu", a locally made custard. The seeds of fluted pumpkin could also be used in cookie formulations and marmalade manufacturing[4,5]. The seed is also a good source of edible oil[6].

The microbiology of "Ogiri ugu", and crude protein and crude fat content of the seed flour has been reported[7,8]. However, a more detailed study of the proximate and mineral compositions and vitamin A and C contents of the seed has not be reported. In these studies the nutritional composition of the seed is investigated in order to provide useful information for the consumers of the seed on the nutritional value of the seed.

MATERIALS AND METHODS

Preparation of sample for analysis

All the fluted pumpkin seed (*Telfairia occidentalis*) used for the work were obtained for Uselu market in Benin City, Nigeria. The seeds were shelled manually and screened to remove bad seeds. Prior to analysis, they were dried in an air oven at 60°C for 24 hours. The seeds were ground to a fine powder (mesh size not determined) in a stainless steel mill (Model 203, Black & Decker, Shelton, CT) and dried in a desiccator under vacuum at room temperature until a constant weight was obtained. All results are expressed on a dry weight basis.

Mineral analysis

A 50–500 mg portion of the powdered seed was wet-ashed using 15 ml of concentrated HNO_3 and 2.0 ml of 70% $HClO_4$ and then refluxed for 18 hours at 150°C. The samples were then dried at 120°C and redissolved in 10 ml of 4.0% (v/v) HNO_3: 1.0% (v/v) $HClO_4$ solution. Mineral analysis was performed by inductively coupled argon plasma atomic emission spectroscopy (ICP-AES) as described by Glew and coworker[9] and compared to standard solutions run at the time of analysis. The determinations were done in triplicates.

Proximate analysis

The proximate analyses for moisture, total ash and crude fibre were carried out using the methods described in AOAC[10]. Crude fat was extracted by the Soxhlet method with petroleum ether (60 – 80°C) for 8 hours. The nitrogen was determined by the microkjeldah method described by Pearson [11] and the nitrogen content was converted to protein by multiplying 6.25. Carbohydrate was determined by difference. The determinations were done in triplicates.

Other analysis

The total acidity was carried out by titration while nitrite was analyzed for by the method described by Kamm and Coworkers[12]. The experimental methods described by Josyln[13] were used to measure the vitamin A contents of the sample. Analysis of the sample for vitamin C was carried out by the methods described by Marynard[14]. All the determinations were done in triplicates and results expressed as averages on dry weight basis.

RESULTS AND DISCUSSION

The goal of these studies was to assess the nutrient value of fluted pumpkin (*Telfairia occidentalis*, Hook F.) seed in order to provide useful information to the consumers of the seed. TABLE 1 shows the mineral composition of the seed. Minerals are important in the diet because they serve as cofactors for many physiologic and metabolic functions. The seed analyzed contained levels of important minerals which when consumed in adequate amounts could satisfy about one-third of the daily requirement of

TABLE 1: Mineral composition of fluted pumpkin seed

Mineral	Amount, µg/g (mean)
Na	10.80
Ca	280
Mg	700
P	21000
Zn	N.D
Se	< 0.005
Fe	69
Mn	1.50

this minerals. Calcium, a vital mineral for bone growth and muscle and neurological function, was present in the seed. The daily requirement of calcium is 1200 mg until the age of 24 years, so an adequate consumption of Telfairia occidentalis (approximately 1kg) per day would satisfy about one-fourth of this requirement[15]. Phosphorus is another important mineral for which deficiency could result in rickets[16]. The seed contains substantial amounts of phosphorus, which could supply more than half of the daily requirement of this mineral, if the seed is served in modest quantity.

Selenium is a trace mineral that plays many roles, the most important of which is as an antioxidant[16], however this mineral was not present at a significant amount. Iron, which is required for hemoglobin formation, was detected in substantial amount (69 μg/g). Fluted pumpkin seeds contains an adequate amounts of iron and a 250g serving would satisfy the RDA of iron for an adult female, who requires one-third more iron than her male counterpart.

Though, zinc was not detected, magnesium another vital mineral was present at levels at which 500 g serving per day would supply more than the body daily requirement. Sodium, a principal cation in the extra-cellular medium was also detected in significant amounts.

The proximate composition is given in TABLE 2 while the vitamin A and C are show in TABLE 3.

TABLE 2: Proximate composition of fluted pumpkin seed

Components	Amount, (Percentage) (Mean)
Moisture	10.93
Crude fat	33.38
Crude protein	0.47
Ash	0.016
Carbohydrate	53.08
Crude fibre	2.12

TABLE 3: Total acidity nitrite and vitamin A and C content of fluted pumpkin seed

Components	Amount
Vitamin A (μg/g)	0.89
Vitamin C (μg/g)	0.07
Nitrite (μg/g)	1.33
Total acidity (%)	0.06

TABLE 3 also shows the nitrite content of the seed. Nitrite at acid pH reacts with secondary amine group of amino acids, peptides and proteins, giving rise to nitroso-compounds or nitrosamines[2]. These nitrosamines are not all carcinogenic, though they may give rise to compounds, which are. Nitrites in infant food also give rise to methemoglobinemia. The nitrite level of the seed is far below the recommended limit of nitrite intake of 18 mg/l[17]. The crude protein and crude fat contents at 0.47% and 33.38% did not agree with values reported by Aziegbu[8]. The difference may be due to the fact that the latter used germinated seeds.

The crude fat content also indicates that the seed is a potential source of edible oils. The carbohydrate content is high (53.08%) compared with value reported for other locally consumed seeds such as African oil beans[18]. The vitamin A and C content are adequate to supplement other dietary sources. Vitamin A is a good treatment for people suffering from eye problem while deficiency of vitamin C leads to scurvy and gingivitis. The levels of acidity are low (0.06%) and this indicates that the seed is safe for consumption.

The nutritional analysis of the seed of fluted pumpkin (Telfairia occidentalis, Hook F.) by chemical means informs one only of the potential value of the seeds. The next step is to assess bioavailability of the essential nutrients in the seed. Such studies should focus on the digestibility of the proteins and fats and on the possible present of antinutrients, such as metal chelators (e.g. phytates, oxalates) and protease inhibitors.

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