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Nutritional Potential of the Nut of Tropical Almond (*Terminalia Catappia* L.)

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Abstract: Nuts play an important role in the diet of many people in the world. They serve to supplement the nutrients provided by cereals, legumes and vegetables. The goal of this study was to investigate the nutritional potential of the nut of Tropical Almond (*Terminalia catappia* L.). To this end the mineral composition, proximate composition, vitamin A and C content, nitrite and total acidity levels of the nut were analyzed. The results showed the presence of significant amount of phosphorus (22000 µg/g dry weight), large amounts of carbohydrates (78.14% dry weight) and crude fat (16.35% dry weight) in the nut. Magnesium, Calcium, Iron, Zinc, Sodium and Manganese were also detected at significant levels. Vitamins A and C were also present at levels, which can supplement other dietary sources. Nitrite and total acidity were low, thus making the nut safe for consumption. The result of the study shows that Tropical Almond nut can contribute useful amounts of essential nutrients to the diet of man.

Key words: Nut, tropical almond nut, animal food

Introduction

Nuts have been the food of man from the earliest times and still are the mini-articles of diet in many parts of the world (Shakuntala and Shadadsharaswamy, 1987). Their significance in the nutrition of man is based on several reasons. First, nuts are very nutritious and contain a significant amount of high quality proteins and vital minerals (Eley, 1976). The superior quality of nut proteins makes them good substitutes for animal food. Second, nuts are good sources of edible oils and fats. Weight for weight, oils and fats furnish 2.25 times more energy than proteins and carbohydrates.

Terminalia catappa L. commonly called Tropical Almond, is a large deciduous stately tree that thrives mainly as an ornamental tree in many tropical cities in the world. It has a large nutty fruits that taste very much like commercially grown almonds. A fibrous shell surrounds the nut. The nut is edible but unlike the commercial almond, can be eaten raw.

In Taiwan, the nut of tropical almond is considered to have aphrodisiac and antibacterial properties. The nut is highly cherished by many people in the rural areas of Southern Nigeria. It also forms part of the local feedstock for tropical aquarium fishes in Nigeria. The nut is also consumed in India, Malaysia and many other parts of South East Asia.

Information abound on the nutritional content of common nut such as groundnut, cashew nut, walnut etc., however, the nutritional content of tropical almond nut has not been reported (Ihekoronye and Ngoddy, 1985; NIN, 1984). The usefulness of the nut of *Terminalia catappia*, L. as a source of dietary protein, fats, carbohydrate, micro and macro minerals will be studied in this work with a view to providing nutritionist useful information about its nutrient potentials. International development agencies working in the field of nutrition can also benefit from this information. This information will also assist food technologist on the possible industrial application of the nut.

Materials and Methods

Preparation of samples for analysis: The nuts used for the work were collected in the field in Benin City. Benin City is the capital of Edo State in Nigeria and is located in the South-South geopolitical zone of Nigeria.

The nuts were shelled manually and screened to remove bad seeds. Prior to analysis they were sun-dried on location, sealed in plastic bags and transported to the laboratory. The nuts were ground to a fine powder (mesh size not determined) in a stainless steel mill (Model 203, Black and 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: The mineral analysis was performed using the methods described by Glew and coworkers (Glew *et al*., 1997): Three replicate aliquots (50-500 mg) of the dried ground nut specimens were weighed and then wet-ashed by refluxing overnight at 150°C with 15 ml of concentrated HNO_3 and 2.0 ml of 70% $HClO_4$. The samples were taken to dryness at 120°C and the residues dissolved in 10 ml of 4.0% HNO_3-1% $HClO_4$ solution. The mineral content of the nut sample solution was determined by Inductively Coupled Argon Plasma Atomic Emission Spectroscopy (ICP-AES Jarrel-Ashas). The sample was quantified against standard solutions of know concentration that were analyzed concurrently.

Proximate analysis: The moisture content, total ash and

crude fibre were determined as described by AOAC (1990). Crude fat was extracted by the Soxhlet method with petroleum ether (60-80°C) for 8 hours. The total nitrogen was analyzed for using the microkjedahl method and converted to crude protein by multiplying by 6.25 while the carbohydrate was determine by difference (Pearson, 1976). Determinations were done in triplicates.

Other analysis: The total acidity was carried out by titration (Amoo and Lajide, 1999) while nitrite was analyzed for by the method described by Kamm and Coworker (Kamm *et al.*, 1980). The experimental methods described by Josyln (1970) were used to measure the vitamin A and vitamin C contents of the sample. All analysis was done in triplicates.

Results and Discussion

The results of the mineral composition, proximate composition, vitamin A and C contents, total acidity and nitrite content are shown in Table 1, 2 and 3. Table 1 shows the mineral composition of the nut. Minerals are important in the diet because of their various functions in the body. They serve as cofactors for many physiologic and metabolic functions. Calcium, an important mineral required for bone formation and neurological function, was found to be present at significant levels. Considering that WHO/FAO recommends an intake of 400 – 500 mg per day of calcium for adults and 1200 mg per day until the age of 24 years (WHO/FAO, 1973), a modest serving of approximately 100g of tropical almond per day would satisfy half an adult daily calcium need and one-fourth of the daily requirement for children. This shows that tropical almond can supplement other sources of dietary calcium since it is consumed mainly as snack. Calcium deficiency in children leads to rickets, while in adults it may results in osteomalacia. As rickets is a common problem in the Western Sahel, calcium intake is especially important for children who live in this part of Africa (Scariano *et al.*, 1995).

The body contains 20-28g of magnesium, more than half of which is stored in the bones. The element is an essential part of many enzyme systems and is also important in maintaining the electrical potential of nerve and muscle membranes. Tropical almond nut contains large amounts of magnesium and an adequate serving would satisfy Recommended Daily Allowance (RDA). Since tropical almond nut is consumed mainly as snack, when eaten alone or in conjunction with other sources of dietary magnesium, can contribute a significant amount of magnesium to the body.

Sodium is a macronutrient and constitutes 2 percent of the total mineral content of the body. The mineral is vital in maintaining the body fluid volume, osmotic equilibrium and acid-base balance. Deficiency of sodium occurs during hot weather or as a result of heavy work in hot climate. A significant consumption of tropical almond nut will provide the RDA of sodium as 1.37g is an adequate daily intake (NRC, 1989).

Table 1: Mineral composition of tropical almond nut (*Terminalia catappia*, L.)

Minerals	amount (µg/g Dry Weight)
Na	13.61
Ca	320
Mg	400
P	22000
Zn	0.50
Se	ND
Mn	9.50
Fe	49.00

Table 2: Proximate composition of tropical almond nut (*Terminalia catappia*, L.)

Components	amount (%Age Dry Weight)
Moisture	2.840
Crude fat	16.350
Crude protein	0.650
Ash	0.039
Carbohydrate	78.140
Crude fibre	1.980

Table 3: Total acidity, nitrite and vitamin a and c content of tropical almond nut (*Terminalia catappia*, L.)

Components	Amount
Vitamin A (µg/g)	0.710
Vitamin C (µg/g)	0.030
Nitrite (µg/g)	1.125
Total Acidity (%)	0.090

Table 1 also shows that the nut contains significant amounts of phosphorus, adequate levels of iron and some amounts of zinc and manganese. Selenium, which is a micronutrieut and a component of glutathione peroxidase, was not detected. Reduced glutathione plays many role, one of which is as an antioxidant protecting cells and tissues against harmful reduced oxygen metabolites (Rotruck, 1973). Iron is a constituent of hemoglobin, myoglobin, and a number of enzymes, which catalyse oxidation, and reduction processes in the cell. Anaemia is causes due to diet deficient in iron, protein and the vitamins folate, B-1, B-6 and C, or poor absorption over long periods. The present study on tropical almond nut shows that the nut contains some levels of iron which can supplement other sources of dietary iron.

Phosphorus a macronutrient comprises 22 percent of the total minerals of the body. Dietary deficiency of phosphorus is extremely unlikely as nearly all food content this mineral. The study shows that tropical almond nut is a rich source of dietary phosphorus. The study also shows the present of zinc and manganese.

In human diets, protein quality and quantity are major concerns. The present study investigated only the crude protein content of the nut. WHO/FAO suggests a daily intake of 0.88g of protein per kg body weight for children in the age range of 1-10 years. As many people who inhabit the developing nations rely almost exclusively on plant proteins, an adequate serving of tropical almond nuts should be encouraged in the diets of this people. The present study shows that the nut contains some amount of protein that can supplement other dietary sources.

The results of the proximate analysis also show that the nut is a rich source of carbohydrate. Carbohydrates are easily digested, provides the necessary calories in the diets of most people of the world, promote the utilization of dietary fats and reduce wastage of proteins. The results show that tropical almond nut is an energy food. The water content is relatively low when compared with other common nuts such as cashew nut, almond nut (prunus amygdalus), groundnut etc. (NIN, 1984). This indicates that the nut will have good keeping properties. The nut is also a good source of oil.

Table 3 shows the vitamins A and C, nitrite and total acidity level of the nut. Nitrites in infant food give rise to methemoglobinemia. At acid pH, nitrite also reacts with secondary amine group of amino acids, peptides and proteins giving rise to nitrosamines. Some of these nitrosamines are potent carcinogens (Alais and Linden, 1999). The levels of nitrite detected were below the lethal dose for man (Alais and Linden, 1999).

The vitamin A and C content are adequate to supplement other dietary sources. Vitamin A is a good treatment for people suffering form eye problem while deficiency of vitamin C leads to scurvy and gingivitis. The levels of acidity are low (0.09%) and this suggests that the nut is edible.

The results of this present study inform one only of the potential value of the nut of tropical almond. The next step is to assess the bioavailability of the essential nutrients. 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. Exploration of these issues should provide a more complete picture of the nutritional significance of the tropical almond nut.

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