

Evaluation of the Nutritive Importance of Fresh and Dry *Cyperus esculentus* (Tiger nut) Available in Ogbomosho, Oyo State, Nigeria

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Abstract

Fresh and dried *Cyperus esculentus* nuts were obtained from a local market (Sabo market) in Ogbomosho, Oyo State, Nigeria. These nuts are chew, serve as snacks and used as sources of food and medicine in Nigeria. In this study; proximate, mineral content (using AAS), vitamins and sugar compositions were determined using standard methods [1]. The results of the proximate composition revealed that the dry nuts contained higher amount of the nutrients present (fat 35.43 %, protein 9.70 % and ash 4.25 %) than the fresh nuts (32.13 %, 7.15 % and 3.97 %). The result of the mineral content shows that, calcium, iron and manganese were higher in the dry nut than the fresh nut. Sugar composition result shows that sucrose and glucose were the prominent sugar present and were higher in the dried nut than in the fresh nut. The result of the vitamin compositions revealed that vitamin A was equally present in both fresh and dried nut, while fresh nut contained higher amount of vitamin B₁ (2.25 mg/100g) and B₃ (3.47 mg/100g) other vitamins were in traces in both nuts. The result of this study showed that both fresh and dried nuts of *C. esculentus* are of high nutritional value based on their proximate, mineral, vitamin and sugar contents.

Keywords: Proximate, mineral, vitamin, sugar, nuts

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Introduction

Cyperus esculentus (Tiger nut) is a noxious weed which belongs to the family of *Cyperaceae*. It produces rhizomes from the base and tubers that are spherical [2], and is known by various names like Chufa (Spanish), Earth Almond, Rush nut, Water grass, Zulu nut, Nut grass and edible rush [3][4]. The nut of this plant is known by various local languages in Nigeria as 'Aya' (Hausa), 'Imumu' or Ofio (Yoruba) and Aki Hausa (Ibo) [5].

The nuts can be eaten raw, roasted, dried, baked or made into a refreshing beverage called 'kunnu' in Hausa language [6].

It has been reported that tiger nut helps in preventing heart attacks and cancer especially of the colon due to high content of soluble glucose [7]. In Egypt, It is used as sources of food, medicine and perfume [8].

Tiger nut milk is very nutritive and energetic drink, both for young and old. It is tremendously high in starch, glucose and protein. Also rich in mineral and has never been found to produce allergy [9]. It is also found to be useful as a flavoring agent for ice cream and biscuits [10].

This nut contains a good quantity of vitamin B₁, which assist in balancing the central nervous system and helps to encourage the body to adapt to stress. It is also used in the treatment of flatulence, indigestion, diarrhea, dysentery and excessive thirst [11].

The nut has been reported to be carminative, diuretic, stimulant, aphrodisiac, emmanogogue and tonic [12]. When the nut is well roasted they are used as a substitute for coffee in Sierra Leone, it is made into a kind of Chocolate, therefore, it is widely regarded as having an aphrodisiac and medicinal effect [13].

It has also been reported to contained high dietary fibre content, which could be effective in the treatment and prevention of many diseases such as colon cancers, coronary heart diseases, obesity, diabetes and gastro intestinal disorders [14]. Oladele *et al* [15] reported that the nuts are excellent sources of some useful minerals such as iron and calcium which are essential for body growth and development. This research work intends to establish the nutritive values present in both the fresh and dried *C. esculentus* nut such as; nutrients, mineral, vitamins and sugar, in the Ogbomosho type of the nuts.

Materials and Methods

Sample collection and preparation

Cyperus esculentus (Tiger nuts) were purchased from Sabo market (the centre of distribution of the nut to other parts of Ogbomosho land markets) in Ogbomosho, Oyo State, Nigeria (Plate 1,2). The nuts were thoroughly picked to remove the bad, stones and particles. Three hundred gramme (300g) of the fresh and dried nuts were weighed respectively and air dried for 30 days thereafter ground to powdery form using laboratory electric Mill. The powdered samples were air dried by spreading on a white cardboard in the laboratory for seven (7) days then transferred into a dessicator separately in order to be certified that all water molecules had dried off, thereafter,

the samples were transferred into air tight sample bottles and kept for other analysis.

Proximate Analysis

Twenty gramme (20 g) of each sample was weighed and used for the determination of moisture content while other parameters like; ash content, crude fibre, crude protein, crude fat were determined using the air dried powdered samples and the carbohydrate content was estimated by difference, subtracting the sum of moisture, protein, fat, crude fibre and ash percentages from one hundred [1].

Mineral Analysis

The AOAC, method [1] was used for the determination of minerals in the test samples. Calcium and magnesium were determined by flame photometric method while iron, zinc, manganese and copper were determined by atomic absorption spectrophotometric method.

Vitamin Analysis

The composition of the water soluble vitamins like thiamine (B₁), riboflavine (B₂), niacin (B₃) and panthohermic acid (B₅) were determined by the method of [16]. Vitamin A was determined using method of [1].

Sugar Analysis

Sugar extraction

Sugar were extracted from the samples using 25 ml of hot 80 % ethanol added to 1 g of each sample in a boiling tube and shaken on a vortex mixer. The materials were allowed to settle for 30 min and then filtered through a Whatman no.41 filter paper into a beaker. The extracts were heated until the ethanol was evaporated. 10 ml water was added to each beaker to dissolve the contents (extracts) and transferred into 100 ml volumetric flask. The beaker's content was washed and added to the volumetric flask and made up with distilled water to 100 ml mark.

Determinations of Sugar composition

Anthrone method was used. 1 ml solution of the sugar extract was pipette into a test tube and 1 ml water as blank was pipette into another test tube, 6 ml of anthrone-sulphuric acid reagent (which was prepared by dissolving 1 g of anthrone in 760 ml of conc. H₂SO₄ plus 240 ml of distilled water) was added and shaken on a shaker vigorously for 2 min and cooled.

Standard sugar (sucrose, maltose, glucose) solutions of range 10-50 µg/ml were treated with anthrone-sulphuric acid reagent as above and the absorbances of the separate solutions of samples and their standards were read on a spectronic 21D spectrophotometer at wavelength of 490 nm [1].

Results and Discussions

The result of proximate composition shows that the fat (35.43%), protein (9.70%) and ash (4.25%) contents in the dry nut were more than that in the fresh nut, while the fresh nut contained more crude fibre than the dry nut (Table 1). The high dietary fibre content could be effective in the treatment and prevention of many diseases such as colon cancers, coronary heart diseases, obesity, diabetes and gastrointestinal disorders [14]. Fibre diets promotes the wave-like contraction that move food through the intestine, high fibre food expand the inside walls of the colon, easing the passage of waste, thus making it an effective anti-constipation, it also lowers cholesterol level in the blood, reduce the risk of various cancers, bowel diseases and improve general health and well being. Presence of high crude fibre improves glucose tolerance and is beneficial in treating maturity on set diabetics [17].

The amount of mineral content, especially, calcium, iron and manganese contained in the dry nut were little higher than the fresh nut (Table 2). Calcium helps in regulation of muscle concentrations, transmit nerve impulses and help in bone formation [18]. Iron is said to be an important element in the diet of pregnant women, nursing mothers, infants, convalescing patients and elderly to prevent anaemia and other related diseases [19].

Therefore, *Cyperus esculentus* nuts are good sources of iron. However, Manganese supports the immune system, regulates blood sugar levels and is involved in the production of energy and cell reproduction. It works with vitamin K to support blood clotting. Working with B-complex vitamins, manganese helps to control the effects of stress and also used in the management of diabetics [20].

The amount of the B vitamins were higher in the fresh tiger nut than in the dried nut, while vitamin A was little higher in the dried tiger nut than the fresh nut, the reason being that vitamin B's are water soluble while vitamin A is fat soluble, therefore the fat in dried nut was higher than the fresh nut (Table 3). Presence of vitamin A indicates the usefulness of this plant in sight management.

Sucrose, maltose and glucose were the prominent sugars present in the nuts, therefore, the dried nut contained more of these sugars than the fresh nut (Table 4).

The high amount of fat, glucose, fibre, protein and carbohydrate in the *C. esculentus* nut make them ideal for healthy living and contribute to its nutritional qualities [21].

Conclusion

This study revealed that fresh and dry nuts contained all the nutrients that constitute balance diet and could serve as good sources of useful minerals which are essential for body growth and development. Therefore, the dry *Cyperus esculentus* nut is more nutritious than the fresh nut.

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Plate 1: Fresh *Cyperus esculentus* (Tiger) nut



Plate 2: Dry *Cyperus esculentus* (Tiger) nut

Table 1: Proximate Compositions of the Fresh and Dry *C. esculentus* (Tiger) nuts

Parameter	Fresh	Dry
Moisture content (%)	3.88	3.65
Crude fibre (%)	6.06	5.52
Ash (%)	4.01	4.38
Protein (%)	7.10	9.50
Fat (%)	31.10	34.50
Carbohydrate (%)	47.85	42.45
Energy value(kcal/g)	499.70	518.30

Table 2: Mineral Compositions of the Fresh and Dry *C. esculentus* (Tiger) nuts

Parameter	Fresh	Dried
Calcium (ppm)	21.96	22.24
Magnesium(ppm)	0.15	0.21
Zinc (ppm)	0.22	0.46
Iron (ppm)	11.00	11.03
Manganese(ppm)	4.69	4.72
Copper(ppm)	0.66	0.68

Table 3: Vitamin Compositions of the Fresh and Dry *C. esculentus* (Tiger) nuts

Vitamin	Fresh	Dry
A (mg/100g)	3.086	3.167
B1(mg/100g)	2.25	1.67
B2(mg/100g)	0.15	0.09
B3(mg/100g)	3.47	2.56
B5(mg/100g)	0.72	0.55

Table 4: Sugar Compositions of the Fresh and Dry *C. esculentus* (Tiger) nuts

Sugar	Fresh	Dry
Sucrose (%)	8.63	9.50
Galactose (%)	0.35	0.69
Maltose (%)	2.19	2.47
Fructose (%)	1.04	1.36
Glucose (%)	4.91	5.81