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Comparative study and nutritional assesment of dehulled and whole hunteria umbellata seed

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ABSTRACT

The nutritional compositions of *Hunteria umbellata* were examined in this study. Proximate, mineral and inorganic elements of dehulled *Hunteria umbellata* seed (DHUS) and whole *Hunteria umbellata* seed (WHUS) were analyzed. The proximate composition (%) of the DHUS and WHUS seed are as follows; crude protein (13.65) and (9.0), crude fibre (26.79) and (2.74), crude fat (2.87) and (14.97), ash (3.89) and (3.45), moisture (9.57) and (10.95) and carbohydrate (43.23) and (58.88). *Hunteria umbellata* are good source of macro and micro nutrient (mg/100g) with Potassium (1130) and 1150, Magnesium(180) and (189), Calcium (76) and (78), Sodium (87.5) and (90), Iron (60) and (63), Manganese (5) and (7) also present in appreciable quantities. The result of inorganic element (mg/100g) also revealed in *Hunteria umbellata*; Nitrogen (7.14) and (2.11), Carbon (52.1) and (68.4), Hydrogen (4.22) and (6.11), Sulphur (2.33) and (2.26) and Oxygen (34.3) and (21.1) respectively. Nitrogen content was determined by micro-Kjeldahl method. Total carbohydrate was calculated by the difference method while mineral analysis was carried out after acid digestion using spectrophotometer and flame photometry. The high value obtained for potassium, carbohydrate, and carbon reveal that *Hunteria umbellata* seed has potential of serving as supplement for food, source of synthetic and antimicrobial drugs, and traditional herbal medicine.

Introduction

Plants are very effective in the treatment of diseases and serve as food. Some seeds offer multiple advantages of providing plant proteins with reduced cost of production, less difficulty of processing and can still be used as a medicinal plant. Hence, all research effort geared towards effective utilization of these inexpensive plants for nutritional, functional properties and applications cannot be over-emphasized. At present development on industrial scale is not being accorded the attention it deserves [1]. This has been attributed to the dearth of information available on their varied processing techniques as linked to their nutritional properties for different end usage and applications. One major impediment militating against their direct usage in food applications for human consumption is the hulls or outer coating [2]. Additionally, the oil content of many of these legumes hinder their applications in food products that could be stored over time, being predisposed to rancidity effect. *Hunteria umbellata* falls into this category of less recognized and under-exploited seed despite its promising economic value. *Hunteria umbellata* (Family: *Apocynaceae*) is a West Africa glabrous tree which is known as Demonuain (French) and Abeere (Yoruba, South West Nigeria). In African traditional medicine, water decoction made from the dry seeds of *Hunteria umbellata* is highly valued in the local treatment of pain, swellings, infections, gastric ulcer, diabetes mellitus, obesity and management of labour at term [3, 4]. This work reports a comprehensive study on the nutritional and inorganic element composition of the dehulled and whole seed of *Hunteria umbellata.*

Material And Method

Fresh and matured *Hunteria umbellata* seeds were bought at Oja Oba, Isale Osun Osogbo, Osun State, Nigeria. The seeds were washed properly with distilled water to remove any impurities. The seed were dried for 21days until constant weights was obtained and were divided into two parts; A and B. Sample A was grinded without further treatment while the outer layer of sample B was removed before grinding with a mechanical machine. The two samples were kept in separate air tight container for further analysis. Sample A is regarded as whole *Hunteria umbellata* seed (WHUS) while sample B is known to be dehulled *Hunteria umbellata* seed (DHUS). The proximate analyses of the two samples were determined using the method reported by AOAC, [6]. Test for the presence of minerals was carried out after acid digestion. The supernatant was decanted and the liquid was analyzed for the levels of Ca, K, Mg, Mn, Na, and Fe using standard procedures. Sodium and Potassium were determined using a flame photometer. Nitrogen was determined by Kjeldahl method [7] and converted to protein by multiplying by a factor of 6.25.

Moisture content of DHUS (9.57%) and WHUS (10.95%) are very close to (11.2%) reported for baobab pulp seed [8] and (9.2%) obtained for calabash whole seed [9]. The moisture content indicates that the seed can be stored for a longer time without spoilage. The ash content of DHUS (3.89%) and WHUS (3.45%) are very close to (3.36%) value obtained for *Prunus persica* seed [10], 3.70% obtained for calabash seed by [11] and similar to 4.0% reported for calabash whole seed [9].

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Table 1. Proximate Composition of DHUS and WHUS.

Parameter	DHUS Values (%)	WHUS Values (%)
Moisture	9.57	10.95
Ash	3.89	3.45
Fat	2.87	14.97
Protein	13.65	9.01
Fibre	26.79	2.74
Carbohydrate	43.23	58.88

The ash content shows the presence of inorganic elements in *Hunteria umbellata* seed. Good amount of fibre is an indication that DHUS can serve as a good source of fibre which might aid digestion, help reduce serum cholesterol level, risk of coronary heart diseases and hypertension [12]. The crude fibre was found to be 26.79% in the dehulled seed and higher to 23.90% value reported for dehulled seed of calabash [9] and higher than 12.68% and 15.6% reported for *Canna bidentata* and baobab seed respectively. High level of crude fibre in DHUS also shows that the seed will be very useful in maintenance of internal digestion for a normal peristaltic of the internal tract [13]. WHUS 2.74% is very close to 1.86% obtained for *Prunus persica* but lower than 15.6% reported for baobab pulp seed and 3.47% reported for calabash whole seed. Furthermore, dietary fibre decreases the absorption of cholesterol from the gut in addition to delaying the digestion and conversion of starch to simple sugars, which is an important factor in the management of diabetes. Dietary fibre also functions in the protection against cardiovascular disease, colorectal cancer and obesity [14]. Since ash content in both samples are greater than 1.5-2.5% reported by Pomeranz and Cliffton [15], who suggested that the seed above 2.5% cannot be used in feeding animal, therefore *Hunteria umbellata* seeds will not be suitable for animal feed. Fat content in WHUS (14.97) is very close to 13.4% recorded for baobab pulp seed. Due to the low presence of fat in *Hunteria umbellata* seed, both DHUS and WHUS can help the body and skin to reduce obesity but DHUS will be more efficient due to the high percentage of fat in the outer cover of *Hunteria umbellata* seed. The value obtained for DHUS crude fat (2.87%) is similar to 2.65% reported for *Solanum. dasyphyllum*, and 3.25% reported for *Canna bidentata* but lower than 8.15% reported for Hydrocotyle aziata [5]. Protein content in DHUS (13.65%) is higher than WHUS 9.01% but both are low compared to 19.05% and 19.70% reported for baobab pulp seed and *Prunus persica*. Protein helps to repair the worn out tissue in the body. The dehulled crude protein content 13.65% is higher than the value reported for *Cola. millenii*, *Megaphrynium. mascosterchyum* and *Rauwolfia. Victoria* which are 12.52%, 10.78%, and 8.65% but lower than 19.67% reported for *Ceasalpinia bonduc* [5]. The carbohydrate value was found to be 58.88% in WHUS but lower in DHUS 43.23%. This implies that the outer cover of *Hunteria umbellata* seed contain notable amount of carbohydrate which is removed when dehulled. The carbohydrate content of DHUS (43.23%) is very close to 44.60% reported for *Adansonia digitata* [16] and very high compared to 9.10% obtained for calabash whole seed. Carbohydrate level in WHUS (58.88%) is higher than 44.6 and 47.44% reported for baobab pulp seed and *Prunus persica* respectively. Carbohydrate is a good source of energy.

These minerals are vital for the overall mental and physical well being; and are important constituent of bones, teeth, tissues, muscles, blood and nerve cells [17]. They generally help in maintenance of acid-base balance, response of nerves to physiological stimulation and blood clotting [18].

Table 2. Mineral Analysis of Dehulled and Whole *Hunteria Umbellata* Seed.

Elements	DHUS Value (mg/100g)	WHUS Value (mg/100g)
Ca	76	78
Mg	180	189
K	1130	1150
Na	87.5	90
Fe	60	63
Mn	5	7
Vit. C	0.15mg/g	0.73mg/g
Na/K	0.077	0.078

Calcium's importance is found in formation and stability of cell walls and in maintenance of membrane structure and permeability, activates some enzymes, regulates many responses of cells to stimuli The calcium value (76mg/100g) of DHUS and (78mg/100g) of WHUS are greater than 68.55mg/L reported for *Canna bidentata* [5]. The presence of Calcium in *Hunteria Umbellata* seed will help body structure and bones to be very strong. Potassium acts as Cofactor that functions in protein synthesis and activation of enzymes. The potassium value for DHUS (1130mg/100g) and WHUS (1150mg/100g) are in line with 1410.35mg/100g reported for baobab pulp [16] but extremely high compared to 29.52mg/100g obtained for *Blighia sapida* [8]. Potassium can be used to balance fluid and nerve transmission. The value (87.5mg/100g) DHUS and (90mg/100g) WHUS obtained for sodium is higher than the value 29.20mg/100g and 42.7mg/100g reported for *Blighia sapida* and Baobab seed respectively [8] and [16]. Na/K ratio of less than one is recommended [19] in our diet therefore; Na/K (0.077) and (0.078) will be good for hypertensive patients. Iron acts as component of cytochromes, electron transport, activates some enzymes, and plays a role in chlorophyll synthesis. Iron value (60mg/100g) of DHUS and (63 mg/100g) of WHUS are higher than 10.12 mg/100g, 5 mg/100g and 1.95mg/100g stated for Baobab seed, Calabash seed and *Blighia sapida* respectively [16], [11] and[8]. High value of iron indicates that *Hunteria umbellata* seed will be very useful in prevention of anemia and other related diseases. Iron is an essential trace element for haemoglobin formation, normal functioning of central nervous system and in the oxidation of carbohydrate, protein and fats [20]. Manganese is very active in formation of amino acids, activates some enzymes, coenzyme activity, required for water-splitting step of photosynthesis, chlorophyll synthesis. The value (5mg/100g) of DHUS and (7mg/100g) of WHUS obtained for Manganese are higher than the value 0.07mg/100g reported for *Blighia sapida* [8]. Manganese is another microelement essential for human nutrition. It acts as a cofactor of many enzymes [21]. Vitamin C was also detected in both samples. It is needed for the growth and repair of tissues in all part of the body. Vitamin C content in DHUS (0.15mg/g) and WHUS (0.73mg/g) are low compared to 1.82mg/100g value reported by calabash whole seed [9]. However the quantity shows that *Hunteria Umbellata* seed contain vitamin C.

Table 3. Results of Inorganic Elements of Dehulled Seed of Hunteria Umbellata.

Elements	DHUS Values (%)	WHOLE Values (%)
N	7.14	2.11
C	52.1	68.4
H	4.22	6.11
S	2.33	2.26
O	34.3	21.1

Nitrogen is an essential part of amino acids and play vital role in protein synthesis. The Nitrogen value (7.14%) of DHUS is higher than WHUS value (2.11%). This is traceable to high fat content in the outer cover of *Hunteria umbellata* seed which reduce the protein level in WHUS and Nitrogen value. Both values are low compared to the value (3.47%) reported for Cotton seed [22]. Due to low value of nitrogen in WHUS compared DHUS, the amino acids needed to build peptides and proteins will be lower in WHUS than DHUS. Carbon is the basic building block to most cells in the body. Carbon content 52.1% found in DHUS is lower than 68.4% found in WHUS and also similar to (61.47%) value obtained for cotton seed [22]. Presence of carbon in this seed shows that DHUS will help in cellular respiration by which body releases energy stored in glucose. Most of the hydrogen in the body is bound with oxygen to form water. Hydrogen value (4.22%) in DHUS is lower than (6.11%) of WHUS but both values are comparable to 4.01% reported for cotton seed [22].

DHUS can help the antibody lock on the antigen through a series of interactions including hydrogen bonds. Sulphur content in both samples DHUS (2.33%) and WHUS (2.26%) are very close to the value (1.88%) for cotton seed [22]. Sulphur is present in three amino acids which are cystine, cysteine and methionine. Connective tissue, skin, hair and nails are rich in Sulphur. Also, thiamine and biotin (member of vitamin B complex) and coenzyme A contain sulphur in their molecules [23]. Proteins vary widely in sulphur content, depending on their amino acid composition. The preformed amino acid and sulphur deficiencies are reflected as sulphur-containing amino acid deficiencies. High level of oxygen is very essential for optimum health. Oxygen combines with metabolic waste products to allow their elimination from the body. Oxygen value (34.3%) is higher in DHUS than WHUS (21.1%) but both values are very close to 29.17% values reported for cotton seed [22]. The presence of oxygen in DHUS will help to oxidize food in the process of respiration.

Conclusion

The result of this research showed the nutritional adequacy of *Hunteria umbellata*. It will be a very good and cheap source of macro and micro elements for human consumption. It could also be used to cure nutrient-deficiency related diseases, reduce the heartbeat rate, and decrease blood pressure.

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