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Proximate and Antinutrient Composition of Black Velvet Tamarind Seed Shell (*D.Guineense*), in Mubi North Adamawa State Nigeria

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Abstract
This study examined the proximate and anti-nutritional contents of black velvet tamarind seed shell (Dialium guineense). Standard analytical methods were used for all the analysis. The result of the proximate analysis indicates the presence of moisture 29.60±0.04%, ash 2.08±0.02%, crude fat 0.77±0.02%, crude fibre 3.12±0.02%, crude protein 7.05±0.03%, carbohydrate 57.25±0.01% and energy 264.13(KJ/100g). While the results obtained for the anti-nutritional composition were; Phytate 2.7±0.10, Tannin 0.31±0.01, Oxalate 4.99±0.01, which appreciably shows that Oxalate is higher. All the anti-nutrients studied were below the lethal doses recommended except oxalate which is 4.99±0.01. The results suggested that the seed shell D. guineense can serve as a good source of essential nutrients for human and livestock.

Keywords: proximate, antinutrient, black velvet tamarind and seed shell.

Introduction

Medicinal plants, since time immemorial have been used virtually in all cultures as a source of medicine. The use of medicinal plants is increasing worldwide, in view of the tremendous expansion of medicine and a growing interest in herbal treatments. Plants are used in medicine to maintain and augment health physically, mentally and spiritually as well as to treat specific conditions and ailments (Adesuyi *et al.*, 2012).

Dialium guineense commonly known as African black velvet tamarind, is a large tree found in many parts of Africa such as West Africa, Central African Republic and the Chad. The tree belongs to the family *Fabaceae-caesalpinioidaea*, it is 30 meters high, with a densely leafy crown, but often shrubby. The leaves are finely hairy, broadly elliptic, blunt at the apex, leathery and are a sunken midrib. Its flowers appear whitish and the branches are horizontally spread (Szolnok, T.W., 1985). Fruits are usually circular and flattened, black in colour with stalk 6mm long, a little collar is seen near the apex and a bristle shell encloses one or two seeds embedded in a dry, brownish edible pulp (Hong, 1996). Wild fruits are dietary supplement for rural dwellers in Nigeria during the dry season when fruits are scarce (George Mateljan Foundation, 2011). The fruits are used in medicinal remedies, as source of vitamin C, as flavour in snacks and non-alcoholic beverages (Effiong *et al.*, 2009). It is also found in Central and West African countries such as Cameroon, Central African Republic, Chad, Benin, Burkina Fasso, Ivory Coast, Ghana, the Guineas, Liberia, Mali, Senegal, Sierra Leone, and Togo. It is the most common and widespread *Dialium* in Nigeria. It is commonly known as "icheku" among the Igbo in the eastern part of Nigeria, as "awin" among the Yoruba in the western part of Nigeria and as "tsamiyar kurmii" among the Hausa in the northern part of Nigeria (Sadipo *et al.*, 2000).

Tamarind fruits are used traditionally as cathartic, astringent, febrifuge, antiseptic and refrigerant purposes, while tamarind seed husk act as a source of tannin to manipulate fermentation or nutrient digestion to the advantage of lactating cows instead

of the cost additive efforts in detannifying it. The xyloglucan polysaccharide derived from tamarind seeds are used as a potential gel (formed by *in situ* gelation of the xyloglucan gel) for percutaneous administration of non-steroid anti-inflammatory drugs otherwise a vehicle for oral drug delivery (Kawasaki *et al* 1999). Recent studies have also revealed that tamarind fruit is a good source of compounds active on complement system (Landi *et al* 2007) and was also showed that the xyloglucan gel formed from tamarind seed can be used as a sustained vehicle for intraperitoneal administration of Mytomycin C, a chemotherapeutic agent. Tamarind intake appears to have beneficial effects on the mobilization of deposited fluoride from bone by enhancing urinary excretion of fluoride (Kumar *et al.,* 2013)

Tamarind is also used as a raw material for the microbial production of citric acid. The Malabar tamarind may be effective in the treatment of obesity but the mechanism is not fully understood. Tamarind has also been used to reduce the calculogenic properties in urine. The seed extract has been used as a replacement for phosphoric acid citric acid and other acids that are added to soft drink as a result of its high pH and flavor profile equivalent to or better than beverages sweetened with aspartame. The seed extract also exhibits antioxidant potentials by reducing lipid perioxidation in vitro and anti-microbial activity (Barakat *et al.,* 1993). In Nigeria, the tree flowers from September to October and brings out fruits from October to January, during the harmattan season. The weather could contribute to the very low moisture content of any item of food could be used as an index of stability and susceptibility to fungi infection (Okegbile *et al*., 1991). This research work is aimed at studying the proximate and anti-nutritional composition of black velvet tamarind seed shell (Abolaji *et al.,* 2007).

Materials and Methods

Sample collection and preparation

The sample was collected from Mubi North Local Government Area of Adamawa State, Nigeria. The black velvet tamarind shell was separated from the seed by pilling with hands and the shell was obtained only. The shell was dried at room temperature for two weeks. The dried shell was pulverized to a fine powder using laboratory mill at the Department of Chemical Laboratory, Federal Polytechnic Mubi.

Proximate analysis

The proximate composition (moisture, crude fibre, crude fat, ash content, protein and Carbohydrate) of powdery sample of black velvet tamarind shell was determined following the method described by AOAC (2003).

Anti-nutritional Content Analysis

The anti-nutrient contents (oxalates, phytates and tanins) were determined using High Performance Liquid Chromatography (HPLC) following the procedures adopted by AOAC (2000).

Statistical Analysis

All determinations were replicated three times and results were reported in mean (±) standard deviation.

Results and Discussion:

Table 1: Proximate composition of black velvet tamarind seed shell

S/N	Nutrients	% Composition	WHO Standard
1.	Moisture	29.60±0.04	5.00
2.	Ash	2.08±0.02	3.00
3.	Crude Fats	0.77±0.02	10.00
4.	Crude Protein	7.05±0.03	22.00
5.	Crude Fibre	3.12±0.02	4.80
6.	Total Carbohydrate	57.25±0.01	72-90
7.	Energy	264.13(kj/100g)	

Data are mean of triplicate results ± standard deviation of triplicate determinations.

Table 2: Anti-nutritional analysis Black velvet tamarind seed shell

S/N	Parameters	Result (mg/ml)	(WHO) Standard
1	Phytate	2.7±0.10	4.80
2	Tannin	0.31±0.01	5.00
3	Oxalate	4.99±0.01	10.00

Data are mean of triplicate results ± standard deviation of triplicate determinations.

Table 1 Shows the proximate composition of Black Velvet tamarind seed shell which is richer in moisture, ash, crude fat, crude fibre, crude protein, with values of (29.60±0.04), (2.08±0.02), (0.77±0.02), (3.12±0.02), (7.05±0.03), respectively. Also, the seed shell is richer in carbohydrate as (57.25±0.03). This shows that Black Velvet tamarind seed shell is richer in carbohydrate. The moisture content of the seed shell obtained was (29.60±0.04). Other workers like (Okegbile *et al*., 1991) recorded 10.96% wet weight of the whole seed, hence it can be said that, the value obtained in this research was not close to that obtained by the previous workers, the moisture content could vary depending on the stage of ripeness of the fruit. The fruit is generally considered ripe when the pulp is dried and easily reduced to powdered form. The ash content of *D. guineese* seed shell was recorded as (2.08±0.02). This was similar with the value of the whole seed reported by (Okegbile *et al.*, 1991) that recorded 2.86%. The difference in the value could be due to time and place of collection. If the sample collected or used had been exposed to dust or dirt and other and the contaminants, this could lower the ash content. The value of ash is useful in assessing the quality or grading certain edible material.

The crude protein content of the seed shell of *D. guineense* shown in Table 1 was obtained by using a conversion factor of 6.25 which converts the amount of nitrogen which was determined to a protein basis. This is because most proteins are about 16% nitrogen. The crude protein constituted of the seed shell is (7.05±0.03), on dry weight basis. The value of the whole seed reported by (Okegbile *et al.,*1991) was 8.91% on dry weight in this research which was lower compare to the one obtained from the whole seed.

The value of carbohydrate for seed shell was found to be (57.25±0.03) while the value of the whole seed obtained by (Okegbile *et al.,*1991) was reported to be 23.7%. In this research the value of the seed shell was greater compare to the one obtained from the whole seed, as reported by (Okegbile *et al.,*1991). Carbohydrates are probably the most common organic substances in nature. Carbohydrates are found in all organisms and are involved in many vital functions. In living cells, the carbohydrate ribose is an essential part of nucleic acids (RNA and DNA), but carbohydrates are also elements in many other molecules such as coenzymes, antibiotics and toxins. In plants and algae, carbohydrates are among the first organic compounds formed during photosynthesis. Carbohydrates can be used as an immediate source of energy by largely all cells, but in many photosynthetic organisms a major portion of the carbohydrates will be used for production of structural compounds, e.g., cellulose in cells walls, or for synthesis of storage products such as starch.

From the result obtained, the seed shell can serve as good source of dietary need. The recommended dietary allowance (RDA) crude fibre in food or plant is an indication of level of non-digestible carbohydrate (cellulose) and lignin. They are needed in the diet to aid digestion absorption of glucose and fat. Research has also found out that increased intake of dietary fibre can have beneficial effects against chronic diseases, such as cardiovascular diseases, diverticulosis, diabetes and colon cancer (Cara, *et al.*, 1992).

The fibre content (3.12 %) is appreciably lower than that determined from ripped fruit of black velvet 14.75% by (Pugalenthi *et al.,* 2004) and the value of 2.9% reported by Abolaji *et al.*, 2007. The seed shell can serve as good source of fibre for dietary need and in nutrition.

The recommended dietary allowance (RDA) for protein is 56 g for individual weighing 70 kg and 46

g for adult weighing 50 kg; children may consume 2 kg/day. Black velvet tamarind seed shell is a good source of protein. Protein is an important part of every diet. The amount of protein an individual need depends on their age and sex. Protein is a part of every cell in the body. It helps the body to build and repair cells and tissues. Protein is a major component of the skin, muscle, bone, organs, hair, and nails. According to the Food and Drug Administration (FDA), most people in the United States get enough protein from their diets to meet their needs.Protein is present in every body cell, and an adequate protein intake is important for keeping the muscles, bones, and tissues healthy. Protein plays a role in many bodily processes, including: blood clotting, fluid balance, immune system responses, vision, hormones and enzymes

Protein is important for growth and development, especially during childhood, adolescence, and pregnancy. Protein has many roles in your body. It helps repair and build your body's tissues, allows metabolic reactions to take place and coordinates bodily functions. In addition to providing your body with a structural framework, proteins also maintain proper pH and fluid balance.

Table 2 shows the anti-nutrient of black velvet, from the table Phytate (2.7± 0.10 mg/ml) (inositol hexaphosphate) in plants binds calcium in the intestinal lumen, preventing its absorption as well as other minerals including zinc, are also chelated by phytate (Adesuyi *et al.,* 2012). Tannins (0.31± 0.01 mg/ml) which is below the standard acceptable limit and have also been reported to exert other physiological effects such as to accelerate blood clotting, reduce blood pressure, degrease the serum lipid level, produce liver necrosis and modulate immunoresponses. K. T. 1999. Oxalate is an anti-nutrient responsible for kidney stone, electrolyte imbalance and irritation of digestive system in man and animal (Egbuna, and Ifemeje, 2015) black velvet tamarind seed shell has oxalate (4.99g ± 0.01mg/ml) which is high. Oxalates affect calcium and magnesium metabolism and react with proteins to form complexes which have an inhibitory effect in peptic digestion (Akande *et al.*, 2010). Thus, this result revealed that the antinutrient composition of black velvet tamarind seed shell was generally low except oxalate such that none of the anti-nutrients was above the lethal dosage approved by standard bodies like National Agency for Food and Drugs Administration and Control (NAFDAC) in Nigeria (Bolanle *et al.,* 2014).

Conclusion:

The result of the proximate composition showed the nutritive value of the plant, which indicates that The Black Velvet Tamarind Seed Shell (*D.Guineense*) analyzed have a great potential as sources of food particularly considering their proximate composition. The anti-nutrient reveals the presence of Phytate, Tannin and Oxalate

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