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# Chemical Profile of the Mesocarp of three Varieties of *Terminalia catappa L* (Almond Tree)

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***Abstract:*** *Five mineral composition (macro element) and proximate composition of the mesocarp of the three common varieties of Terminalia catappa were investigated using standard analytical procedure with a view to evaluating their nutritional potential. The proximate composition of the fruit samples revealed the moisture content 4.81±0.01 to 7.48±0.002, Crude protein; 5.21±0.08 to 6.94±0.08, Crude fibre; 17.27±0.01 to 55.77± 0.004, Crude Fat; 3.66±0.001 to 7.66±0.002, ash; 2.05±0.01 to 7.14±0.01 and nitrogen free extract 25.77±0.04 to 54.79±0.02. The mineral content of the three samples indicated that P, Na, Ca, Mg and K are the most abundant of the five minerals examined. The study revealed that both the chemical composition and proximate composition are comparable with other fruits. Also, the three varieties do not vary much from each other. The representative anti nutritional factors- tannis and phytate was reported present at concentrations that may not pose health problems for human consumption. The study recommended that the three varieties are good for human consumption like other fruits.*

## I. Introduction

*Terminalia catappa* tree, commonly called tropical almond, wild almond, India almond, sea almond, almond tree etc belong to the family of *Combretacea* (Nwosu et al 2008). It originated from tropical Asia , India, The Malay Peninsula, Taiwan, Burma though thrives well in other tropical regions of the world including Nigeria. The fruits are very nutritious and contain significant amount of high quality proteins and minerals (Eley 1976). The fruits are eaten raw and cherished by children particularly in Southern Nigeria. It is considered to have aphrodissac and anti bacteria properties (Christian & Ekhun 2006). The world's production of this fruit stands at 700000tons annually and Nigeria produces 100000tons annually (Annongu 2005). There are several species of the *T. catappa* but the most common is *Prunus amygdalus* which has two types viz: *Prunus delcis vardulas* – the sweet variety and *Prunus var mara* the bitter variety. The white variety is also common in Nigeria.

Christian & Ekhun (2006) reported the proximate composition of the nuts of *T. catappa* and Nwosu et al (2008) compared the mesocarp of the plant with *Hyphanae thebaica* (dum palm) but there had not been reports on comparison of the three common varieties in Nigeria. This work is on proximate compositions of the mesocarps of the three common varieties of *T. catappa* in Southern Nigeria with the intent of supplying nutritionists with more information on this plant.

## II. Materials and Methods

**Sample collection and pretreatment:** Mature ripe fruits for this study were collected by handpicking in Oyo town of Oyo State in Nigeria. Oyo town is located in the Southwest of Nigeria. The collections and subsequent treatment was done in June 2008. The fruits were identified in the Department of Biology, Emmanuel Alayande College of Education, Oyo and confirmed at Forest Research Institute of Nigeria (FRIN), Ibadan. Initial screening was done to separate the good one from the bad ones. The good ones were scooped with knife and then sundried for seven days. The samples were then grounded into powder and stored in desiccators. All analyses were done on dried samples.

**Mineral analysis**: The metal ions – calcium Ca, magnesium Mg, sodium Na, potassium K, Iron Fe and non metal phosphorous P were determined using the method of Association of Official Analytical Chemists (AOAC, 1990) with the aid of atomic absorption spectrophotometer (Buck Scientific model 200). The samples were dry-ashed at $550^0$C. The ash was boiled with 10ml of 20%hydrochloric acid and filtered into a 100ml standard flask and deionized water was used to make the mark. Triplicate analysis of each of these samples was carried out by aspirating the digested samples into the instrument separately and the mean signal responses recorded at each element's respective wavelength. Blank determination was conducted also.

**Prximate analysis:** Proximate analyses were carried out according to the procedure of AOAC, 1990. Triplicate determinations were done for each of the parameters using 2g of the dry matter. Moisture content was determined by drying 2g of the dry sample in an oven overnight at $105^o$C until constant weight was obtained. Crude fat was soxhlet extracted in petroleum ether between $60^0$ - $80^0$C exhaustively. The total nitrogen was determined by microkjedahl method described by Pearson(1976) and converted to crude protein by multiplying

by corrective factor 6.25. The total ash was obtained by incinerating 2g of the dry sample in a muffle furnace at $550^0$C until fully burnt to ash at constant weight. Carbohydrate was determined by difference (Pearson, 1976).

**Quantification of anti nutritional factors: tannins and phytate**

**a. Determination of tannins:** Tannins content was determined by method described by Price et al (1978). Calibration curve was prepared for catechin standard solutions using freshly prepared vanillin-hydrochloric acid reagent. Blank solution was also prepared and the absorbance taken at 500nm. Absorbance of blank was subtracted from that of the standard and the difference was used to plot the curve. 2g of the ground sample was then extracted with hydrochloric-methanol solution and reacted with vanillin-HCl reagent. The absorbance was taken and the difference with absorbance of blank solution was used to obtain the tannin in mg/g from the standard catechin curve.

**b. Detemination of phytate :** Phytate of the mesocarps of the three samples was determined by the method described by Nahm(1992)

## III. Results and Discussion

The result of the proximate composition is presented in Table I. It reveals considerable amount of fibre ranging from 17.27±0.01 to 55.77±0.004.fibre in food independently lowers blood pressure and reduces the risk of cardiovascular disease. The repoted value is good for human's body. The carbohydrate content is (25.77±0.04 to 54.79±0.02). The carbohydrate content is slightly lower in sample B but sample A and C can contribute meaningfully to the recommended daily allowance. The crude protein content ranges between 5.21±0.08 and 6.94±0.08. The protein contents of the three species are not significantly different at 95% confidence limit. Proteins however are needful diet consumption of human beings. It is essential for growth and cell replacement. WHO/FAO suggests a daily intake of 0.88g of protein per kg body weight for children in the age range of 1 – 10years. This study reveals that the mesocarp of almond fruits can be a good supplement for plant protein.

**Table I: Chemical Composition of the Mesocarps of the three Varieties of *T. catappa*. g/100g**

| Parameters | Sample A | Sample B | Sample C |
|---|---|---|---|
| Moisture | 4.81±0.01 | 6.50±0.01 | 7.48±0.002 |
| Crude Protein | 6.94±0.08 | 5.21±0.08 | 5.66±0.08 |
| Fibre | 41.03±0.16 | 55.77±0.004 | 17.27±0.01 |
| Fat | 5.23±0.004 | 3.66±0.001 | 7.66±0.002 |
| Ash | 2.05±0.01 | 3.09±o.08 | 7.14±0.01 |
| Carbohydrate | 39.84±0.05 | 25.77±0.04 | 54.79±0.02 |

±Mean standard deviation of triplicate determination

The fat content falls within the range of 3.66±0.001 and 7.66±0.003. This value reveals that the mesocarp is low in fat compared with that of the nuts of the same plant reported by Christian and Ukhum (2006).

The ash content of 2.05±0.01 in the red species and 7.14±0.01 in the white species is low and suggests low content of inorganic minerals. The mesocarp contains moisture between 4.81±0.01 in the red species and 7.48±0.002 in the white species. The low level of moisture allows for longer storage because of reduced microbial activities (Hassan et al, 2007).

**Table II: Mineral Composition of the three Varieties of *T. catappa mg/100g***

| Minerals | Sample A | Sample B | Sample C |
|---|---|---|---|
| Mg | 101.3 | 110.7 | 95.2 |
| K | 59.1 | 71.6 | 80.3 |
| Ca | 81.9 | 65.8 | 90.5 |
| Na | 111.6 | 109.2 | 121.6 |
| Fe | 11.5 | 9.6 | 10.1 |
| P | 1387 | 1260 | 1586 |

Table II reveals that the mesocarps mineral composition consists of magnesium, potassium, calcium, sodium, iron and phosphorous in reasonable amounts. These nutritionally important components of this fruit are found to be comparable to values reported for some Nigerian agricultural fruits by Duke (1984) and Umoh (1995) in Oloyede (2005). The samples are also rich in dietary phosphorous. Phosphorous according to Christian and Ukhum (2006) makes up 22% of total body minerals.

The presence of anti-nutritional factors is reported in Table III. These are tannin and phytate. Tannin is toxic in bloodstream (Bello, 2006). Excessive consumption of tannin is both mutagenic and carcinogenic (Shamberger, 1998). Tannin value of 0.68Ta/100mg which is the highest in the three samples is very low to be

of any nutritional significance. On the other hand at low concentrations as reported by Nwos et al (2008), tannin is advantageous. It plays the role of anti-inflammatory agent.

**Table III: Composition of Representative Anti nutritional Factors in the Mesocarp of the three Varieties of *T. catppa.mg/100g***

| Parameter | Sample A | Sample B | Sample C |
|---|---|---|---|
| Tannin (Ta/100g) | 0.85 | 0.68 | 0.65 |
| Phytate (mg/g) | 6.68±0.13 | 3.36±0.03 | 7.84±0.08 |

Phytate, the other anti-nutritional factor quantified in the fruits binds essential mineral nutrients in digestive tract and can result in minerals deficiencies (Bello, 2006). Phytate diet of 10-60mg/g consumed over a long period of time has been reported to decrease bioavailability of minerals in monogastric animals (Thomson, 1993). Phytate level of 3.36±0.03 to 7.84±0.08 reported in this study will not be of any nutritional significance,

## IV. Conclusion

The mesocarps of *T. catappa* investigated is a good fruit for consumption. The mineral and proximate compositions are good supplements to food and are well comparable with other fruits. The anti-nutritional factors reported are not so much to cause any concern to nutritionist. The three varieties investigated are comparable.

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