

## **Characterization of African Elemi (*Canarium Schweinfurthii*)**

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**Abstract:** *The physicochemical and proximate compositions of African Elemi were investigated by analyzing the moisture, crude protein, crude fat, ash content, crude fibre and total carbohydrates in the seed and pulp. The association of official analytical chemists (AOAC, 1990) methods were used. Values obtained for the physicochemical and proximate analysis of whole seeds and pulps were; seed length( 4.5cm and 6.0cm), thickness (4.0cm and 6.0cm),shape (oblong),free fatty acid content (3.52% and 3.28%), miv (1.72% and 1.70%),melting point (32°C and 30°C),moisture (25.62% and 26.09%), dry matter, ash (3.14% and 3.31), crude fat (30.06% and 30.56%), crude fibre (0.76% and 0.78%), carbohydrate (20.03% and 20.05% ), protein (19.28% and 19.31%). The results suggest that the whole seeds and pulp of African elemi (*Canarium schweinfurthii* ), can serve as a good source of essential nutrients for humans and livestock.*

**KeyWords:** *African Elemi, Canarium schweinfurthii, pulp, seeds, proximate and physiochemical parameters.*

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### **1. INTRODUCTION**

The exploitation of several underutilized wild fruits and oilseeds as sources of vegetable protein, fats and vitamin C to augment supplies from the inadequate animal sources has been reported by several authors (Olaofe 1994, Ikhuoria and Maliki 2007, Dike 2010, Igidi and Edene 2014). One of these lesser known seeds is *Canarium schweinfurthii*, commonly known as **African elemi** or **canarium**. This is a specie of large tree native to tropical Africa. In Nigeria, the fruit is called ‘ube mgba’ in Ibo and “atili” in Hausa. The fruit is commonly found in large quantity in Pankshin, Plateau State of Nigeria and is also produced in similar quantities in other states of the northern and south-eastern Nigeria. The plant produces it’s fruits in the rainy season (usually between the months of April and September). The flowers grow in clusters at the end of the twigs and are small and dark green in colour. The fruits which are of two varieties-long spiral and short round in shape develop from the flowers. The fruits contain single triangular-shaped seed with small projections at the three edges. The seeds are embedded in a purplish green pulp which is oily and edible, with a desirable sweet but not too sugary taste similar to that of avocado pear. It can be eaten raw or softened in warm water to improve palatability. The pulp oil is about 71 % palmitic acid and 18 % oleic acid. The seed-kernel is oily and edible too. They contain several fatty acids including oleic (36 %), linoleic (28 %), palmitic (26 %), stearic (7 %). Whole seeds and pulp of African Elemi have been used as medicinal remedies, as source of vitamin C and as flavour in snacks and non alcoholic beverages. Elemi makes a good fuel wood, igniting readily and burning with a lot of heat. The resin burns readily and is used as a bush candle. The African elemi tree is one of several sources of the economically useful oleoresin known as elemi. In West Africa this resin is traditionally burned for fumigating dwellings and mixed with oil for body paint (Wikipedia, 2013). The physicochemical parameters of the fruit investigated in this study includes: % free fatty acid, % moisture, impurity and volatile matters (% miv), melting point and proximate compositions. Because of the edibility of African elemi, there is need to identify the nutritional composition of the specie and make recommendation to humans.

### **2. MATERIALS AND METHODS**

#### **2.1. Collection/Preparation of Sample**

The fruits of Africa elemi, *Canarium schweinfurthii* were bought from Afikpo market in Ebonyi state. The pulps were separated from the seeds, dried in an air tight oven at 105°C for 5hrs and ground into fine powder. The sample was analyzed using the Association of Official Analytical chemist (AOAC, 1990) methods.

### 3. RESULTS AND DISCUSSIONS

Proximate Composition and Physicochemical Properties of the Fruits of African Elemi, *Canarium schweifurthii* are presented in the tables below.

**Table 1.** Physicochemical properties of fruits of African Elemi *Canarium schweifurthii*

Parameter	Whole seed	Pulp
Fruit length(cm)	4.5	6.0
Thickness(cm)	4.0	6.0
Shape	Oblong	Oblong
% free fatty acid	3.52	3.28
Melting point (°C)	32	30
% moisture impurity & volatile matter(miv)	1.72	1.70

**Table2.** Proximate composition of the Pulp

Parameter	Whole seed	Pulp
%Moisture	26.09	25.62
%Ash content	3.14	3.31
%Crude fibre	0.78	0.76
%Crude fat	30.56	30.06
%Crude protein	19.28	19.31
%carbohydrate	20.03	20.05

The results on table 1 show that the fruit length values ranged from 4.5cm to 6.0cm. This corresponds to the period of the bluish black colour development in the fruit .

The percentage free fatty acid content and moisture, impurity and volatile matter values reported in this work are low. This makes the fruit suitable as edible fruit. Moisture content of a food sample is the unbound water in the food that encourage the growth of microbes on the food and eventually leads to rapid spoilage ( Onyeike *et al.*, 1995). Also the low %free fatty acid indicates that the oil will be less prone to rancidity (Maduelosi *et al.*, 2012).

Table 2 represents the results of proximate analysis for the pulp of African elemi *Canarium schweifurthii* . The results showed that the %moisture, ash content, crude protein and carbohydrate values are higher in the pulp compared to the values obtained from the whole seed. The crude fibre results are similar to that reported by Ekoh, 2009. The crude fibre values are closely related to that reported for soyabeans, cashew nuts and beniseed which are 23.5%, 36.7% and 42.3% respectively( Aremu *et al.*, 2006 and Njoku *et al.*, 2010). These results also show that the protein and carbohydrate are in significant quantities and can consequently be used as alternative sources for these nutritive elements in diet for humans and live stock.

The ash contents reported in this work (3.14-3.31) are close to the reported values of 3.5% and 3.7% of *Napoleona vogelii* fruit and Sesame respectively ( Igidi and Edene 2014, Qin *et al.*, 2009). The ash content of a biological material is an analytical term which refers to the inorganic residue that remains after the organic matter has been burnt away. The importance of ash content is that it gives an idea of the amount of mineral element present in the sample while the organic matter gives an estimate of protein, lipid (fats), carbohydrate and nucleic acid content of the sample (Onwuka, 2005). The findings from this research show that African elemi is a good source of mineral.

The protein content of 19.28-19.31% is closely related to that in protein rich food such as beans, cowpea, pigeon peas, melon and pumpkin with ranges between 23.1-33.0% (Olaofe, 1994). The high level of protein is attributed to the low level of moisture content as reported by Onwuka, 2005.

The value of %crude fat reported in this work (30.06-30.56) is closely related to the values reported by earlier researchers ( Aremu *et al.*, 2006, Njoku *et al.*, 2010).

The percentage carbohydrate content of this seed (20.03-20.05) falls within the acceptable values for edible fruits (Kirk and Sawyer, 1991).

### 4. CONCLUSION

The findings from this study show that the composition of African elemi makes it good for use as nutritional and therapeutically valuable for human. It is also useful for synthesis/production of chemicals like paints.

REFERENCES

- [1] AOAC (1990) Official Methods of Analysis, (15<sup>th</sup> Edition) Association of Analytical Chemist, Washington D.C, US PP 95-224.
- [2] Aremu, M. O.; Olanisakin, A.; Bako, D. A.; Madu, P. C. (2006): Compositional Studies and Physiochemical- Characteristics of Cashew Nut (*Anarcadium Occidentals*) Flour. *Pakistan Journal of Nutrition*. 5(4): 328 – 333.
- [3] Dike, M. C. (2010): Proximate, Phytochemical and Nutrient Compositions of Some fruits, Seeds and Leaves of Some Plant Species at Umudike, Nigeria. *APRN Journal of Agricultural and Biological Science*. 5:7-10.
- [4] Ekoh, U. P. (2009): Nutritional, Anti-nutritional and Physiochemical Composition of African Elemi Pulp, p 40.
- [5] Igidi, O, J and Edene, C. E(2014). Proximate and Phytochemical compositions of Napoleona Vogelii. *Int. J. of Engineering and Science*, 3(6), 46-51.
- [6] Ikhuoria, E.U and Maliki, M(2007). Characterization of Avocado Pear (*Persea Americana*) and African Pear (*Dacryodes edulis*) extracts. *African Journal of Biotechnology*. 6(7) ,950-952.
- [7] Kirk, R.S. and R. Sawyer, 1991. *Pearson's Composition and Analysis of Foods*. 9th Ed. Longman Scientific and Technical England, pp: 607-617.
- [8] Meregini, A. O. A. (2005): Some Endegered Plants Producing Edible Fruits and Seeds in Southeastern Nigeria. *Journal of Food Science* 60 (3):211-220.
- [9] Maduelosi, N.J, Obomanu F.G, and Fekarurhobo, G.K (2012). Dye Sensitized Photo-oxidation of Some Vegetable Oils. *J. Emerging Trends in Eng. and Appl. Sci.* 3 (5): 740-742.
- [10] Njoku, O. U.; Boniface, J. A. E., Obitte, N. C.; Odimegwu, D. C. and Ogbu, H. I. (2010): Some Nutritional of Beniseed Oil. *International Journal of Applied Research in Natural Products* (4): 11-19.
- [11] Olaofe, I.O (1994). Proximate Composition and Functional Properties of Beans, Cowpea, Pigeon Peas, Melon and Pumpkin. *Supple Chemical Society*, 130-135.
- [12] Onwuka, G.I (2005). *Food Analysis and Instrumentation(Theory and Practise)*. Naphthala prints, Lagos, 140-160.
- [13] Onyeike, E.N., Olungwe, T and Uwakwe, A. A (1995). Effect of Heat treatment and De-fattening on the proximate composition of some Nigerian local soup thickeners, *food chemistry*, 53:173-175.
- [14] Qin, Y; Wu, X; Haung, W; and Gong, G. (2009): Acute Toxicity of Substances and Chronic Toxicity of Steroidal Saponin from *Dioscora Zingiberesis* in Rodent. *Journal of Ethnopharmacology*: 126(3): 543-650.
- [15] Wikipedia, "Canarium schweinfurthii". Retrieved on 2013-11-15.