

Proximate and Mineral Composition of Seed Shell Pericarp of *Chrysophyllum albidum*.

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ABSTRACT

The seed shells pericarp of *Chrysophyllum albidum* were studied and the analysis of proximate and mineral composition were carried out. The aim was to show the relevance of seed shell pericarp of *Chrysophyllum albidum* in water and waste water treatment among other uses. The results show viz: moisture content 12.90%, ash content 1.27%, crude fiber 14.82%, crude fats 2.38%, protein 0.98%, and carbohydrates 67.65%, while the mineral composition determined using standard analytical tools were measured in mg/100g viz: P = 10.80, Ca = 31.04, Mg = 0.61, Na = 0.36, K = 2.30, Fe = 35.20, Zn = 100, and Mn = 0.40.

(Keywords: seed shell, *Chrysophyllum albidum*, white star apple, proximate, mineral composition)

INTRODUCTION

Chrysophyllum albidum (white star apple, Ashanti: Adesawa, Bini: Otien, Igbo: Udala, Yoruba: Osan) is a tropical edible fruit tree. It belongs to the family sapotaceae which has up to 800 species and makes up almost half the order [1]. It is primarily a forest tree species, its natural occurrences have been reported in diverse ecozones in Nigeria, Uganda, Niger Republic, Cameroon, and Cote d'Ivoire.

The plant often grows to a height of 36.5m though it may be smaller. The African star apple fruit is a large berry containing 4 to 5 flattened seeds may sometimes become a crop of commercial value in Nigeria. The fleshy pulp of the fruit is eaten especially as snacks and relished by both young and old. The seeds are also used for local games. *Chrysophyllum albidum* fruit is common in both

urban and rural centre especially during the month of December to April. The fruits are not usually harvested from the trees, but left to drop naturally to the forest floor where they are picked [2].

EXPERIMENTAL

Material

The seeds of *Chrysophyllum albidum* shell pericarp were gathered into a clean plastic bag from Igueben and environs in Edo State, Nigeria and were cleaned with water and air dried. The outer shells pericarp of the seed were cracked open and grounded. The grounded seed shell pericarp were sieved with a mesh of 2mm pore size.

The moisture, ash and other extracts like fiber, crude fat, etc., were then determined using standard method [3]. Nitrogen was determined by the micro-Kjeldahl method [4] and the crude protein was taken as N% x 6.25 (constant factor), where N is equals to Nitrogen content per 100g samples. Total carbohydrate was determined using the phenol-sulfuric acid method [5]. The crude fiber was obtained from the difference between total carbohydrate and soluble sugar [6].

The mineral analyses were carried out using the solution obtained by dry ashing of the sample at 550°C, dissolved in 10% of HCl (25ml) and 5% lanthanum chloride (2ml) boiled, filtered and made up to standard volume with distilled, deionized water. Sodium (Na) and Potassium (K) were determined by the Jenway P9P7 Flames photometer method. Phosphorus was determined using the Spectronic 20 calorimeter by the

phosphovando Molybdate method [3,6]. Calcium (Ca) and Magnesium (Mg) were determined by EDTA method [9] while heavy metals, were determined using Atomic Absorption Spectrophotometer.

RESULTS AND DISCUSSION

The seed shell pericap of *Chrysophyllum albidum* composition is shown in Table 1. Most of the values are high and analysis showed that soluble carbohydrate had the highest value which indeed gives an indication that it compares favorably with other fast energy foodstuffs hence it can be added to some food content as additive [7]. Since carbohydrate has oxygen and hydrogen as constitute element and while in solution the formation of charges such as hydrogen and oxygen ions. The oxygen ion which is negatively charge can attract metallic ions [8].

Table 1: Proximate Composition of Seed Shell Pericap of *Chrysophyllum albidum*.

Parameter	Value (%)
Moisture content	12.90±0.02
Ash content	1.27±0.01
Crude Fiber	4.88±0.05
Fat/Oil Crude	2.38±0.02
Protein	0.98±0.01
Carbohydrate	67.65±0.05

The ash content is an indication of the presence of carbon compounds and inorganic component in the form of salt and oxides [9] in the seed shell pericap of *Chrysophyllum albidum*.

Carbon plays a vital role in the adsorption of substance due to its porous nature which is an indication that powdered carbon form of seed shell pericap of *Chrysophyllum albidum* can effectively help in the removal of metallic ions and other particulate matters, odor, and colors from aqueous media of water and waste water

The fiber content of seed shells pericap of *Chrysophyllum albidum* enhances the hardness of the seed pericap [10] and this also aids in ability of removing insoluble particles from solution acting as a semi permeable which traps heavy particles in solution.

From Table 2, the value for calcium and phosphorus were lower than the results reported by Adeyeye [5]. From Oyanugai, calcium was 82.0mg/100g and phosphorus 62.0mg/100g. However, this sample showed high iron content of 35.20mg/100g compared to that of Oyenugai's report of 0.7mg/100g and that of Egbon's report [11] of 8.47mg/100g.

Iron is one of the most abundant metals on Earth. It is ranked as the 9th most abundant metal [12] and is used in a variety of ways. For example, Iron (III) chloride is used as a coagulant in the treatment of water and waste water especially in the removal of heavy metals and particles. The mechanism of this reaction is that when in solution, it forms the hydroxide for example Fe(OH)₃. This is one possibility for the relevance of seed shell pericap of *Chrysophyllum albidum* as a coagulant in the treatment of water and waste water [13].

Table 2: Mineral Composition of Seed Shell Pericap of *Chrysophyllum albidum*.

Mineral	Value (mg/100g)
P	10.80±0.10
Ca	31.04±0.05
Mg	0.61±0.01
Na	0.36±0.02
K	2.30±0.02
Fe	35.20±0.51
Zn	100.00±0.15
Mn	0.40±0.02

A study of the treatment of municipal sewage containing some heavy metals where treated with iron (III) chloride at pH 4.1 and optimum dosage of 300mg/l shows effective treatment as reported [14]. Hence, there is correlation between this and the report. The other metals present are Zn and Mn which are also useful in various ways though they could be toxic in large proportion at high concentration.

CONCLUSION

The study shows that carbohydrate has the highest percentage value from the proximate composition followed by crude fiber value while Zinc has the highest value followed by iron in the mineral composition analysis. *Chrysophyllum albidum* seeds can be an effective biomaterial in

water and waste water treatment among many other uses.

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