

## ASSESSMENT OF THE PHYTOCHEMICALS, PROXIMATE & ELEMENTAL COMPOSITION OF CHRYSOPHYLLUM AFRICANUM (UDARA)

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### ABSTRACT

The freshly ripen samples of *Chrysophyllum africanum* commonly known as “udara” among the Igbos and belong to the family sapotacea were obtained from tree plants at Umukwa village in Awka, Anambra state. The phytochemical analysis of the methanol, water, ethylacetate extracts, proximate analysis and the evaluation of the elemental constituent of the fleshy edible part of the *Chrysophyllum africanum* were carried out. The methanol, water and ethylacetate extracts gave a positive test for the presence of alkaloids, flavonoids, saponin while phenols and glycosides were absent. Tannin was present in the methanol and ethylacetate extracts but absent in water extract. The proximate analysis showed the following results; protein contents (6.42%), moisture contents (70.8%), crude fibre contents (2.6%), ash contents (2.4%), carbohydrates (14.28%), Vitamin C (4.549mg/100g), Vitamin A (0.01mg/100g). The elemental analysis gave values for the metals; Ca (16.0mg/kg) > Cr (2.0mg/kg) > Zn (3.2mg/kg) > Fe (0.46mg/kg). The levels of Pb occurred at none detectable limit of the instrumentation.

**Keywords:** Glycoside, flavonoid, vitamins, edible , and elemental analysis

### INTRODUCTION

Fruits, vegetables and other plant foods, contain scores of functional phytochemicals and their consumption has long been associated with physical well being[1]. Among phytochemicals with health benefits are flavonoids, alkaloids, phenolic acids and other polyphenolics which have been demonstrated to exhibit positive effects on certain types of heart disorders[2-5]. Anti-nutritional factors such as tannins, glycosides, phenols and their derivatives are poisonous to humans or in some ways limit the nutrient availability to the body[6-9]. Plants evolve these substances to protect themselves and to prevent them from being eaten up by other animals [10-11]. Antinutritional factors are present in different food substances in varying amounts, depending on the kind of food, mode of its propagation, chemicals used in growing the crop as well as those chemicals used in storage and preservation of the food substances[12-14].

Generally, tannins are made up of complex phenolic polymers which are classified into two structural groups: hydrolysable and condensed tannins inhibit the activities of some enzymes such as trypsin, chymotrypsin, amylase and lipase tannins also interfere with the dietary iron absorption. Tannins cause severe growth depression in rats. This effect may be due to reduction in the digestibility of dietary protein and to a lesser extent that of available carbohydrates and lipids [15-17]. Every person and every other living organisms needs certain substances called nutrients to build and maintain the body's structure and to supply the energy that powers all vital activities[18-19]. Food is made up of different nutrients needed for growth and health, which include proteins, carbohydrates, fats, water, minerals and vitamins. All nutrients needed by the body are available through food substances in which *chrysophyllum africanum* popularly known as “udara” is inclusive[20]. Udara is commonly consumed in various communities in Nigeria hence the need to evaluate the chemical composition necessitated this study.

### Materials and Methods

The fresh samples of *chrysophyllum africanum* were collected from Umukwe village in Awka South L.G.A. of Anambra State. The samples were identified by Dr. E.I. Mbaekwe of the Department of Botany, Nnamdi Azikiwe University.

### Test for the Phytochemicals

20g of the fleshy edible part of the sample was used for the extraction in which extractant was ethylacetate the presence of alkaloid, tannins, glycoside, flavonoid, saponin and phenol were determined using standard methods[1,11,15 & 18].

### Proximate analysis

Moisture content was determined in an electric oven at 105°C using the standard method [21].

### Crude Fibre

Two grams of the sample was introduced into round bottom flask. 100ml of 0.25M H<sub>2</sub>SO<sub>4</sub> was added and the mixture was boiled under reflux for 30min. The hot solution was quickly filtered under section. The residue was washed with hot water until acid free. The residue was transferred into a flask and 100ml of hot 0.3M NaOH was added, and the mixture boiled again under reflux for 30min and filtered quickly under section. The resulting insoluble residue was washed with hot water until base free. The residue was dried to constant weight in an oven at 100°C for 2 hours, cooled in desiccators and reweighed. The weighed sample was then incinerated, and reweighed. The percentage crude fibre content was calculated[20 & 22]. The protein, fat, ash, carbohydrate, vitamin A and vitamin C were determined according to the standard methods [18, 20 & 21].

### Elemental Analysis[21]

1g of the ashed sample was digested using acid mixture of HClO<sub>4</sub> and HNO<sub>3</sub>. The digested solution was analysed for Ca, Cr, Pb, Zn, and Fe using FAAS (CY urican 2900 model).

### RESULTS AND DISCUSSION

The results of the phytochemical analysis of the extract of *chrysophyllum africanum* using different solvents as extractants is represented (Table 1).

The result (table 1) as presented showed absence of glycosides and phenol in all the extractant (water, methanol and ethylacetate). The non-presence of these antinutritional factors in the “Udara” is an indication good help implication of the fruit. Phenols and its derivative are known to exhibit some antinutritional effects on

dietary [18]. Tannin which also anti-nutritional, was only weakly present in the methanol extract only but absent in both water and ethylacetate extracts. The methanol extract revealed strong presence of alkaloids and saponins. Infact, alkaloids and saponins were present in all the extractants.

**Table 1: Phytochemicals in the Chrysophyllum africanum extract**

| Parameter | Water | Methanol | Ethylacetate |
|-----------|-------|----------|--------------|
| Alkaloids | ++    | +++      | +            |
| Glycoside | -     | -        | -            |
| Tannin    | -     | +        | ++           |
| Phenol    | -     | -        | -            |
| Saponin   | +     | +++      | ++           |
| Flavonoid | +     | +        | +            |

**Strongly present (+++), mildly present (++); present (+) absent (-).**

The proximate analysis results is represented (Table 2)

**Table 2: Results of the proximate analysis**

| Parameter        | Value        |
|------------------|--------------|
| Proteins         | 6.42%        |
| Moisture content | 70.8%        |
| Crude fibre      | 3.5%         |
| Fat content      | 2.6%         |
| Ash              | 2.4%         |
| Carbohydrate     | 14.28%       |
| Vitamin C        | 4.549mg/100g |
| Vitamin A        | 0.01mg/100g  |

The result of proximate analysis showed the protein content (6.42%), moisture content (70.8%), crude fiber content (3.5%), fat content, (2.6%), Ash content (2.4%), carbohydrate content (10.28%), vitamin C content (4.036mg/100g) and vitamin A content (0.01mg/100g) of chrysophyllum africanum fruit. The moisture content of the fruit from the analysis was (70.8%) which is higher than (52.10%) earlier reported for the same fruit [18]. The moisture content of any food is an index of its water activity[19] and is used as a measure of the stability and susceptibility to microbial contamination[19]. The high moisture content of the fruit shows that the fruit will have short shelf-life. It also implies that dehydration would increase the relative concentrations of the other food nutrients and improve the shelf-life of chrysophyllum africanum fruits[20]. The ash content of the fruit obtained in this study (2.4%) is lower than the value (2.95%) earlier reported for the same fruit[18]. The low ash level of the fruit indicates a decrease in the inorganic mineral elements of the sample. This confirmed the report of Okaraonye et al., (2009) that the ash content of a sample indicates the inorganic element in the sample. The protein content of the fruit obtained from this analysis (6.42%) is lower than the value (8.75%) earlier reported for the same fruit[18]. This result shows that the fruit from this location is low in its protein content. This value can be improved by the dehydration of the fruits[19]. The crude fiber content of the fruit (3.5%) obtained from the analysis is lower than the value (4.50%) earlier reported for the same fruit[18]. The consumption of the fruits with high crude fiber content may contribute to a reduction in the incidence of certain disease like colon cancer, coronary heart diseases, diabetes, high blood pressure, obesity and other digestive disorder[22]. The carbohydrate content (10.28%) obtained from the analysis is lower than the value (72.20%) reported for Averrhoa carambola fruit[20] and higher than the value (52.13%) and (58.5%) reported for Solarium bergine and solarium bergine fruit respectively [21]. The crude fat content of the fruit (2.6%) obtained from the analysis is lower than the value (11.7%) reported for Averrhoa carambola fruit and also lower than (4.00%) reported for S. aubergine fruit [21]. This indicates that Chrysophyllum africanum fruit contains low amount of crude fiber. The vitamin C content (4.0364) obtained from the analysis is close to the value (4.60%) reported for Averrhoa carambola fruit[20].

High level of ascorbic acid in fruit shows that the fruit could be used to promote healthy living such as protection against scurvy and

other ascorbic acid deficiency related ailments. The vitamin A content (0.01%) obtained from the analysis lower than 0.05% earlier reported for the same fruit [18].

The result of the elements analysis of chrysophyllum africanum is shown (table 3).

**Table 3: Result of elemental analysis.**

| Metal | Value      |
|-------|------------|
| Ca    | 16.00mg/kg |
| Cr    | 2.00mg/kg  |
| Pb    | Nil mg/kg  |
| Zn    | 3.20 mg/kg |
| Fe    | 0.46 mg/kg |

The result of elemental analysis showed the calcium content (16.0mg/kg), chromium content (2.0 mg/kg), lead content (0.00 mg/kg), zinc content (3.2 mg/kg) and iron content (0.46 mg/kg) of chrysophyllum africanum fruit using an atomic absorption spectrophotometer (AAS). Calcium which is high in the fruit is an essential element which is used in mineralization of bone and shells[16]. The moderate amount chromium in this fruit plays an important role in how insulin helps the body to regulate body sugar level, zinc plays a crucial part in the health of the skin, teeth, bones, hairs, nails, muscles, nerves and brain function [16]. Iron content in the fruit helps in transport of oxygen in the blood, it is also vital in brain development. The absence of lead indicates the non-toxicity of the fruit.

## CONCLUSION

In conclusion, therefore, Chrysophyllum africanum fruit should be listed as one of the good fruits desirable for human consumption and ready source of vitamin C and minerals. They rich chemical constituent of chrysophyllum africanum fruit especially alkaloids and saponin, suggested that the fruit has striking potentials in achieving the treatment of certain diseases.

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