

Proximate composition, phytochemical screening and mineral content of *Plukenetia conophora* leaves

Immotongha Stephen Buodeigha ¹, Kelechi Light Ekeke ^{2,*} and Divine Obichukwu Anakor ³

¹ Department of Biochemistry, Faculty of Basic Medical Sciences, Niger Delta University Wilber Force Island Bayelsa Nigeria.

² Department of Biochemistry, Faculty of Basic Medical Sciences, Gregory University Uturu Abia State Nigeria.

³ Department of Public Health, Faculty of Health and Welfare University of Suffolk, United Kingdom.

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Abstract

The aim of this research is to determine the proximate composition, phytochemical and minerals present in *Plukenetia conophora* leaf. Proximate, Phytochemical and mineral analysis of the leaves were determined using the standard spectrophotometric method. The result of the proximate composition showed that the leaf contains Carbohydrate (57.14%), Lipid (17.70%), Ash (11.57%), Moisture (9.01%), Fiber (1.73%), Protein (2.84%) and calorific value of 399.19%. The phytochemical screening revealed the presence of Alkaloids (13.6mg/100g), Cyanogenic glycoside (9.67mg/100g), Tanin (7.81mg/100g), Terpenoid (5.19mg/100g), Steroid (4.68mg/100g), Flavonoid (2.46mg/100g) and Lignan (1.58mg/100g). The result of the mineral content of the leaf was showed to be Na (0.51mg/kg), K (68.07mg/kg), P (4.50mg/kg), Ca (15.06mg/kg), Mg (8.21mg/kg), Fe (6.44mg/kg), Mn (1.71mg/kg), Zn (7.20mg/kg), Cu (3.11mg/kg), Se (0.26mg/kg), Cr (3.98mg/kg), Pb (1.42mg/kg), Cd (0.08mg/kg). The result showed that *Plukenetia conophora* leaf is a rich source of lipid, carbohydrate, alkaloids, glycosides, K, Ca, Zn, Cr and Fe. And can be used as medicinal leaf in treatment of some ailments.

Keywords: *Plukenetia conophora*; Proximate; Phytochemical; Minerals

1. Introduction

Plukenetia conophora formerly called *Tetracarpidium conophorum* is a member of Euphorbiaceae family, being a perennial climber, it is widely distributed and eaten in most cities of the Sub-Saharan Africa. The nuts derived from the plant is grown mainly for the purpose consuming them as snacks. *Plukenetia conophora* are rich in protein, carbohydrate, minerals, vitamins, fats and oil needed for development and overall nutrition required for the maintenance of human health [1].

The usage of medicinal plants has been highlighted as a remedy to several ailments adopted in various region of the world. *Plukenetia conophora* being one of these medicinal plants has been affirmed to possess several benefits which includes nutritional benefits, ethnomedicinal, pharmacological and phytochemical activities. Moreover, *Plukenetia conophora* has been highlighted as one of beneficial medicinal plants that could be a sustainable solution for effective healthcare management in African countries due to its uncountable importance as a potential functional food and towards the development of pharmaceuticals drugs [2].

Plukenetia conophora haven proven by other research works to have therapeutic potential that can serve as a medicinal plant; hence, the necessity of this research work. This research work was designed to evaluate the proximate

* Corresponding author: Kelechi Light Ekeke

composition, mineral content, and the phytochemistry of *Plukenetia conophora* leaf to ascertain the medicinal value of the leaves.

2. Material and methods

2.1. Sample Collection

Plukenetia conophora leaves were acquired from umuogbuagu village in Igboeze north local government of Enugu State in the southeast of the country, and it was identified at the department of Pharmacognosy and herbal process, faculty of Pharmaceutical Science Niger Delta University Amassoma Bayelsa State and given the voucher number NDUP/23/02. They were cleaned with water, allowed to air dry for 2 weeks, milled, and stored in a container with clear labels for Proximate, Phytochemical and Mineral analysis.

2.2. Proximate Analysis

Moisture composition of the leaf was determined by drying to constant weight at 60-80°C in an oven. Ash content was determined by ignition at 550°C in a muffle furnace for 4hrs, lipid content was determined by using soxhlet extraction with n- hexane as solvent, protein content was determined by the kjeldahl method, and crude fibre by the acid and alkaline digestive methods. The carbohydrate composition was estimated by subtracting the sum of moisture, protein, fat, crude fibre and ash percentages from 100 [3].

2.3. Phytochemical Screening

The phytochemical screening of the leaf was carried out using methods as described by Ajaiyeoba *et al.*, [4]. Modification was made for the alkaloid [5]. The dried leaves were homogenized and the alkaloid extracted from 20g of the sample for 4h using 40% v/v acetic acid in ethanol. The extract was filtered to remove cellulose debris and then concentrated to about one quarter of the original volume. Two percent NH₄OH was added drop wisely until a precipitate occurred. The crude alkaloid was dried to constant weight in an oven and the percentage alkaloid calculated.

2.4. Mineral Analysis

Mineral analysis was done using AOAC method. Ca, Na, K, Mn were evaluated using flame photometric method while Atomic Absorption Spectrophotometric method (AAS) was used for Fe, Zn, Mg, CU and Cr were determined by [3].

3. Results and Discussion

Table 1 Proximate composition of *Plukenetia conophora* leaves

S/N	PARAMETER	COMPOSITION (%) Mean ± S.D
1	Ash	11.57 ± 0.01
2	Moisture	9.01 ± 0.03
3	Crude Lipid	17.70 ± 0.01
4	Crude Protein	2.84 ± 0.01
5	Crude Fiber	1.73 ± 0.01
6	Carbohydrate	57.14 ± 0.01
7	Calorific Value	399.19 ± 0.09

values represent mean ± SD; (number of tests, n = 3).

Based on the result of proximate composition of the leaf, the low moisture content found in the leaf fall within the range reported for most seeds, leaves and nuts [6,7]. This low moisture content is an index of stability, quality, shelf life and also high yield [8]. The presence of the ash is a reflection of inorganic matter in a food sample. The result of the lipid suggest that the leaf is a rich source of oil. *Plukenetia conophora* is also a rich source of carbohydrate it can be used as boost for carbohydrate of most food products sold in the market.

Table 2 Phytochemical Screening Result of *Plukenetia conophora* leaves

S/N	PARAMETERS	CONCENTRATION (mg/100g) Mean \pm S.D
1	Alkaloid	13.6 \pm 0.03
2	Flavonoid	2.46 \pm 0.01
3	Terpenoid	5.19 \pm 0.01
4	Tannin	7.81 \pm 0.02
5	Cyanogenic glycoside	9.67 \pm 0.02
6	Cardiac glycoside	16.30 \pm 0.01
7	Steroids	4.68 \pm 0.01
8	Lignan	1.58 \pm 0.01

value represent mean \pm SD (number of tests, n=3)

The presence of alkaloids in the leaf makes it usefully in herbal medicine. Alkaloids are efficient plant substances used therapeutically [9]. And they belong to the class of mainly nitrogenous compounds that have significant pharmacological and physiological importance and not widely distributed in nature [10]. Pure isolated alkaloids and the synthetic derivatives are widely exploited and used as a pharmaceutical, stimulant narcotics and poison due to the potent biological activities [11]. This why the leaf is believed to stop asthma and is prescribed to be taken between bouts of asthma but not for acute asthma. It is used for elderly as a constipation cure [12].

The presence of Tannins in the leaf can support its strong use for healing of hemorrhoids, frost bite and varicose ulcer in herbal medicine [13]. Glycoside have specific characteristics and powerful action exerted on cardiac muscles and therefore is used in congestive heart failure due to determination of work capacity per unit weight off mycroches tissue. Medicinal interest on cardiac glycosides is because of its stimulant effect on the heart [14].

Table 3 Mineral Composition of *Plukenetia conophora*

S/N	MINERALS	COMPOSITION (mg/kg) Mean \pm S.D
1	Na	0.51 \pm 0.01
2	K	68.07 \pm 0.07
3	P	4.50 \pm 0.03
4	Ca	15.06 \pm 0.06
5	Mg	8.21 \pm 0.02
6	Fe	6.44 \pm 0.07
7	Mn	1.71 \pm 0.02
8	Zn	7.20 \pm 0.10
9	Cu	3.11 \pm 0.06
10	Se	0.26 \pm 0.01
11	Cr	3.98 \pm 0.02
12	Pb	1.42 \pm 0.02
13	Cd	0.08 \pm 0.00

value represent mean \pm SD (number of tests, n=3)

The result of the minerals clearly shows that the leaf contains rich source mineral elements. This result becomes so important when the usefulness of such minerals like Ca, Mg, Na and K in the body are considered. The low Na from the result is an added advantage because Na is essential for normal heart and muscle function. A high level of Sodium has adverse effect on the heart and a direct relationship with hypertension [15]. Potassium may help reduce risk of kidney stone and also bone loss as one gets old.

Coper is important for cellular function and essential for the formation of hemoglobin from Iron [11]. The presence of manganese shows that the plant can be used to protect bone disease [16]. The presence of Zn is an indication that the leaf may have some effects on nerve function and male fertility. Zn stimulates the activity of vitamins, formation of red and white corpuscles, healthy functioning of the heart and normal growth [17].

4. Conclusion

This research work revealed the proximate composition, phytochemical screening and mineral constituent of *Plukenetia conophora* leaf. The results have proven that the leaf possess therapeutic potentials and hence may be useful in medicine for curative purposes.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare no conflict of interest.

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