

PHYTOCHEMICAL AND NUTRIENT EVALUATION OF *TETRACARPIDIUM CONOPHORUM* (NIGERIAN WALNUT) ROOT

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ABSTRACT

Sample of *Tetracarpidium conophorum* root (Nigerian walnut) was analysed for phytochemical composition, Vitamins and Mineral constituents. Phytochemical screening and subsequent quantification revealed the presence of bioactive compounds. Tannin, 0.545mg/g Saponin, 10.705mg/g, Alkaloid, 0.41mg/g, Oxalate, 0.895mg/g, Phenols, 0.215mg/g.

The mineral analysis revealed K, 0.002mg/g, Ca, 0.004mg/g, Na, 0.002, Mg, 0.105mg/g, Fe, 0.004mg/g, Zn, 0.000045, Mn, 0.000021mg/g, Cu, 0.00009mg/g, Cr, 0.000029mg/g.

Vitamin composition results showed that the plant roots contained Thiamine (B₁) 0.002mg/g, Ascorbic acid (C) 4.1mg/g, Riboflavin (B₂) 0.004mg/g, Niacin, 0.004mg/g, Cyanocobalamin (B₁₂) 0.001mg/g.

The results proved that *Tetracarpidium conophorum* root could be a potential source of useful drugs formulation.

Key words: *Tetracarpidium conophorum*, *Coula edulis*, phytochemical, nutrient, root

1. INTRODUCTION

Walnut, common name for small flowering plants are important for the nuts and timber most of them produce and for its representative genus. Walnut comprises such families as *Juglandaceae* (English walnut), *Euphorbiaceae* (African walnut) and *Olacaceae* (African walnut). Each family has its own peculiar characteristics but they have some things in common such as the nuts. *Juglandaceae* is mostly found in the Southeast Europe, to Japan and more widely in the New world. *Tetracarpidium conophorum* (family *Euphorbiaceae*) is found in Nigeria and Cameroon while *Coula edulis* (family *Olacaceae*) which is also referred to as African walnut is found in Congo, Gabon and Liberia (Wikipedia, 2008). This report looked into the root of *Tetracarpidium conophorum*.

Tetracarpidium conophorum is a climbing shrub 10-20ft long, it is known in the Southern Nigeria as ukpa (igbo), Western Nigeria as awusa or asala (Yoruba). It is known in the littoral and the western Cameroon as *kaso or ngak* (Dalziel, 1937). It is found in Uyo, Akamkpa, Akpabuyo, Lagos, Kogi, Ajaawa-Ogbomoso and Ibadan. This plant is cultivated principally for the nuts which are cooked and consumed as snacks (Oke, 1995). A bitter taste is usually observed upon drinking water immediately after eating the nuts. This could be attributed to the presence of chemical substances such as alkaloid. Ayodele (2003) reported the presence of oxalate, phylates and tannin in the raw *Tetracarpidium conophorum* nuts. Edem (2009) reported on the proximate composition, ascorbic acid and heavy metal contents of the nut. Oyenuga (1997) reported on the amino acid and fatty acid components of the nut and on the use of its leaf juice for the treatment of prolonged and constant hiccups. Nwokolo (1987) also reported on the impact of traditional processing on the nutrient and sensory qualities of the nut. Okpero (2001) reported on the methods of processing the *Tetracarpidium conophorum* nuts while Okafor (1988) reported on the use of *Tetracarpidium conophorum* seeds and processing waste in livestock feed formulation. Comparative studies of the level of toxicant in the seeds of *Terminalia latappa* (Indian Almond) and *coula edulis* (African walnut) was reported by Ekpo, (2005). The lipid content of this seeds has also been reported by Ekpo and Eddy. The nutritional evaluation of some Nigerian wild seeds, Ganiyu and Mofoluso, (2004) reported the proximate, mineral, antinutrient composition and zinc bioavailability of some Nigerian wild seeds including *tetracarpidium conophorum*. Walnuts are considered to be an herb in Traditional Chinese medicine. They are said to tonify kidneys, strengthen the back and knees, moisten the intestines and move stool. It 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. (Wikipedia, 2009). The bark is used in tea as laxative and chewed for toothache. It helps to prevent and control high blood pressure. Though the nuts are generally eaten in Nigeria, no work has been reported on the root there has been paucity of data on the root contents, which is known to cure chronic cough. Therefore, the objective of this work is to evaluate the phytochemicals, mineral content and vitamin composition of *Tetracarpidium conophorum* root in order to ascertain its possible usefulness as food and in formulation of drug.

2. MATERIALS AND METHODS

Fresh root sample of study plant was collected from Ajaawa, Ogo-oluwa Local Government Area of Ogbomoso in Oyo State, Nigeria. The material was washed, cut into small pieces to facilitate dryness, and sundried in the open air for seven days, and then oven dried. The dry sample was crushed into fine powder and stored in an air tight bottle prior to analysis.

The phytochemical screening was done on the sample using methods as described (Sofowara,1993; AOAC, 1980). Alkaloid were extracted using a slightly modified method of Maxwell et al (1995). Here, the dried sample was homogenized and the alkaloid extracted from 10g of the sample for 4h using 20% 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. One percent NH_4OH was added dropwise until a precipitate occurred. The crude alkaloid was dried to constant weight in an oven and the percentage alkaloid calculated. The AOAC,(1980) method was used for the mineral determination of the test sample. calcium, sodium, potassium, magnesium were determined by flame photometric method while iron, zinc, manganese, copper and chromium were determined by atomic absorption spectrophotometric method. The composition of the water-soluble vitamins such as thiamine (B_1), riboflavin (B_2), niacin (B_5), cyanocobalamin (B_{12}) were determined by the method of scalar analyzer (2000) While ascorbic acid (vitamin c) content was determined by the method of (AOAC,1980). The Bohmand Kocipai-Abyazan method (1994) was used for the determination of tannins, oxalate while saponins was analyzed using that of Peng and Kobayasli (1995).

PLATE 1: SHOWING WALNUT SEEDS



PLATE 2: SHOWING WALNUT TREE AS A CLIMBER(CLIMBING COCOA TREE)



3. RESULTS AND DISCUSSION

Table 1: PHOTOCHEMICAL SCREENING OF TETRACARPIDIUM CONOPHORUM ROOT

Constituents	Bioassay
Tannins	+
Saponins	+
Alkaloids	+
Phenols	+
Oxalates	+

+ Represent presents, -No activity, Results are mean of three determinations.

Table 2: QUANTITATIVE ESTIMATES OF PHYTOCHEMICALS OF TETRACARPIDIUM CONOPHORUM ROOT.

Constituents	Quantity (w/w)mg/g
Tannins	0.545
Saponins	10.705
Alkaloids	0.41
Phenols	0.215
Oxalate	0.895

Results are mean of three determinations

Table 3: MINERAL COMPOSITION OF THE ROOT OF *TETRACARPIDIUM CONOPHORUM* ON A DRY WEIGHT BASIS EXPRESSED IN MG/G.

Mineral	Mg/g
K	0.02
Na	0.002
Ca	0.004
Mg	0.105
Fe	0.00415
Zn	0.0000445
Mn	0.000021
Cu	0.000087
Cr	0.000029

Table 4: VITAMIN COMPOSITION OF THE ROOT OF *TETRACARPIDIUM CONOPHORUM* ON A DRY WEIGHT BASIS EXPRESSED AS MG/G.

Vitamin	Amount (mg/g)
Ascorbic acid (C)	4.11
Riboflavin (B ₁)	0.004
Thiamine (B ₂)	0.002
Niacin	0.004
Cyanocobalamin (B ₁₂)	0.001

Results are mean of three determinations.

Table 1. shows the phytochemical screening results of *Tetracarpidium conophorum* root, it shows that the root contain oxalate, alkaloid, saponin, tannin and phenols.

Table 2.shows the amount of phytonutrient present in the root sample analyzed. The root is rich in tannins , saponins, oxalate, alkaloids and phenols. The presence of saponin shows that *Tetracarpidium conophorum* has cytotoxic effect such as permealization of the intestine. It also gives the plant the bitter taste, saponin has relationship with sex hormones like oxytocin. Oxytocin is a sex hormone involved in controlling the onset of labour in women and the subsequent release of milk (Okwu and Okwu,2004).

Tetracarpidium conophorum is a good source of manganese and copper, two elements that are very useful to mankind. manganese is used in the management of diabetes.(Edem et al,2009)

Table 3. This is the result for the mineral analysis is as follows 0.02mg/g potassium(K), 0.004mg/g Calcium(Ca) ,0.002mg/g sodium(Na), 0.105mg/g magnesium(Mg), 0.00415mg/g iron(Fe), 0.0000445mg/g zinc (Zn),0.000021mg/g manganese(Mn), 0.000087mg/g copper(Cu),0.000029mg/g chromium(Cr).

As a result of the presence of ascorbic acid in the root ,the plant can be used in herbal medicine for the treatment of skin conditions, including eczema, pruritus, psoriasis and parasitic skin conditions (D'Amelio, 1999). This vitamin can also be used for the treatment of common cold and other diseases like prostate cancer (Okwu and Okwu,2004; Okwu and Okeke, 2003). Other vitamins though in trace amount are essential for body metabolism. There is also an interesting ability of ascorbic acid as an antioxidant, to prevent or at least minimize the formation of carcinogenic substances from dietary material (Hunt et al, 1980). Deficiency of ascorbic acid is associated with pains in the joint and defect in skeletal calcification, anaemia, manifestation of scurvy haemorrhage from mucous membrane of the mouth and gastrointestinal track (Hunt et al, 1980). Walnut is used in treatment of indigestion, constipation and diarrhoea (Wolters,2009).

Alkaloids are the most efficient plant substances used therapeutically. Pure isolated alkaloids and the synthetic derivatives are used as the basic medicinal agent because of their analgesic, antispasmodic and bacterial properties . This is why the root is believed to stop asthma and is prescribed to be taken between bouts of asthma, but not for acute asthma, it's used for elderly as a constipation cure (Wikipedia,2009). The presence of tannins in root of *Tetracarpidium conophorum* can support its strong use for healing of haemorrhoids, frost bite and varicose ulcers in herbal medicine (Igboko, 1983; Maduiyi, 1983). The presence of phenolic compounds in the roots shows that the plant may have antimicrobial potential. This is because phenols and phenolic compounds have been extensively used in disinfections and remain the standards with which other bacteriocides are compared (Okwu,2001). The result of mineral composition clearly shows that *Tetracarpidium conophorum* root contains rich source of mineral

elements. This result become so important when the usefulness of such minerals like Ca, Mg, Na, K in the body are considered, However, the lower Na content (0.00019mg/g) of *Tetracarpidium conophorum* is an added advantage because of the direct relationship of Na intake with hypertension in human (Dahl, 1972). This may be the reason why the plant is used to prevent and control high blood pressure (James, 2009).The presence of chromium even at low concentration is an indication that the plant may be useful for the management of diabetes. It is a cofactor with insulin in carbohydrate metabolism. Therefore if chromium is deficient, insulin will not be effective (Gbolahan,2001). The presence of copper may be responsible for the absorption of iron, it is therefore often seen with iron naturally. Copper is important for cellular defence and protection of the mucous membrane, antianaemic and essential for the formation of haemoglobin from iron (Claude and Paule,1979). The presence of manganese shows that the plant can be used to protect bone disease (James,2009). The activity of this element is noticed in the metabolism of food incorporated into the bone. According to Claude and Paule (1979), manganese is necessary for the functioning of the pituitary gland, the pineal gland and the brain, it promotes hepatorenal function, combat anaemia and also essential for growth. The presence of zinc is an indication that the root may have some effect on the nerve function and male fertility. It is important for normal sexual development, especially for the development of testes and ovaries, it is also essential for reproduction. Zinc stimulates the activity of vitamins, formation of red and white corpuscles (Claude and Paule, 1979), healthy functioning of the heart and normal growth (Elizabeth,1994).

4. CONCLUSION

The present study has shown the phytochemicals, vitamins and minerals composition of *Tetracarpidium conophorum* (African walnut) root. This partly shows the use of this plant in herbal medicine. As a rich source of phytochemicals, coupled with the presence of the essential vitamins and minerals, *T. conophorum* can be seen as a potential source of useful food and drugs. The presence of Saponins supports its anti-inflammatory property. This also proves that the plant may be helpful in asthma, rheumatoid and arthritis. High content of ascorbic acid also indicates that the plant can be used to prevent or at least minimize the formation of carcinogenic substances from dietary material. Further studies has to be carried out to isolate, characterize and elucidate the structure of the bioactive compounds from the plant for industrial drug formulation.

PLATE 3: SHOWING WALNUT HULLS IN VARIOUS SIZES; SINGLE AND DOUBLE PODS



5. REFERENCE

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