Some Nutritional and Medicinal Importance of Nigerian Walnut "*Tetracarpidium conophoram*"

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ABSTRACT

Nigerian walnuts (Tetracarpidium conophoram) are used as a diet and medicine is on the increase to the extent that it is almost scarce in various regions where they are marketed. This study took a brief review on the nature, classification, properties, phytochemical components, nutritional values, and medicinal properties. There is rapid growth towards research and developments involving Nigerian walnut for drug development. From this study, it is discovered that Nigerian walnut has shown anti-oxidant, anti-inflammatory, anti-chelating nature, and high blood pressure control activities. Also, it has shown anti-lipidemic, anti-diabetes, anti-malarial, antimicrobial /antibacterial, and anticancer nature. The walnut has given reproductive assistance and aided sperm production and sperm quality, wound healing, anti-ulcer, and stomach disorders treatment features. The Nigerian walnut has energizing and weight management and diseases prevention capacity. It aids in bone health, skin or other tissues repairs, and could go a long way to assist in other health challenges. There has also encouraged usage in the aspect of complementary and alternative medicine. There seems to be a close relationship between walnut and bitter kola in nature, diet and medicinal properties Researchers and drugs producing companies should improve in their studies for more drug discoveries that could involve Nigerian walnut as it could assist in a Nobel discovery for treatment of difficult to treat diseases in the world.

Key Words: *Walnut, Ukpa, Nutrition, Medicine, Diseases, Bitter kola*

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INTRODUCTION

Nutritional and Medicinal plants and vegetables have been advocated for the management of difficult to treat diseases [1, 2]. Herbal and complementary medicine has been advocated [3] and approved by WHO [4] in the cases of need. Nigerian walnut is discussed here for their nutritional and medicinal importance in Nigeria and across the world. This article shall stimulate more studies on walnut especially in the areas where research on them have not been studied.

The Nigerian Walnut with the Botanical Name (Tetracarpidium conophoram) contains an important oilseed crop that is grown in the tropical Sederhana regions of the world. You are a climbing shrub Dalam Spora plukenetia. The Bukan or Adala, as it was named so because the Walnut even has superficial similarity with the Walnut. Adalah A nature in Central West Tropical Africa from Togo to Congo to Sierra Leone. Adalah is abundantly available in Nigeria, Cameroon, Republic of the Congo. It prefers the Hedges of the Dalam rainforest semi-shady places; secondary forest a low shrub; Iklan farms a kulat altitude 250-1400 (820-4590 strengthen appropriate). Although it is well registered in Sierra Leone, clearly Bukan originally did not come from Sierra Leone, as Bukan is registered in Liberia and Ghana, but the reproach Presence of Dalam Sierra Leone as a cause of the Return of Slaves as the reason why Bukan is known to come to Krio from Yoruba (Nigerian). Plukenetia conophora is the only plukenetia species native to Central West Africa. Others had to strengthen Platine originating from another part of Africa, of the Indian subcontinent, of South East Asia of America [5].

The scientific name of walnut is *Tetracarpidium conophoum* and classifies according to Arranz *et al*., [6] as follows:

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Kingdom	Plantae
Order	Malpighiales
Family	Euphorbiaceae
Sub Family	Acalyphoideae
Genus	Plukenetia
Species	Tetracarpidium

MATERIALS AND METHODS

This study sort for information required to investigate the topic based on the nutritional and medicinal importance of Nigerian walnut. The required materials were obtained from scholarly sources such as peer-reviewed journals and books. The used articles mostly published by Nigerians were containing extensively the required information readers can easily understand.

Not only that, the used articles and books were also based on research experience conducted in and outside Nigeria using the Nigerian walnut. The content of used journals and books were generated through searching the keywords of the study in Google which includes Walnut, Nigerian walnut, Nutritional values of walnut, Medicinal uses of walnut, Phytochemicals of Nigerian walnut, and Studies on Nigerian walnut.

RESULTS AND DISCUSSION

The search and literature reviews revealed much useful information about the Nutritional and medicinal uses of Nigerian walnut ranging from the local names of walnut in Nigeria, phytochemical components, physical and chemical properties of walnut, and their pictorial nature as shown in **Figures 1-3**.

Names of walnut in Nigeria

The scientific name is *Tetracarpidium conophoum*. The common name is walnut otherwise called Nigerian walnut or African walnut. This is because it came from *Juglan nigra* (the family Juglandaceae because of African origin. Though the walnut is called Nigerian walnut, different nationalities in Nigeria have specific names given to the plant/seeds based on their locality or nationality. Such Nigerian names for walnut are as follows: Ukpa in Igbo nation, Ukwa in Igala and Idoma, Ekporo as called by Efik and Ibibios, Okhue or Okwe as it is called by Edo people, Gawadi bairi in Hausa, and Awusa or Asala in Yoruba nationality [5, 7, 8].

Description of the walnut

Tetracarpadium conophorum has a long history of cultivation of food as a plant species in West Africa. Guinea and West and Central Africa distribute and consume it. Capsule bear larvae are green when growing and greenish-yellow when growing. The leaves are about 53 inches wide and about 3 inches long by rotating. Only the wings are shown solely to give a sense of proportion. The taste of hard fruit and eucalyptus. The seeds take 4 to 6 months to mature and are found in the local market between June and September. It covers every pillar and especially the trees that surround it. It is a botanical made from cocoa beans and cola and used. Because it is based on the high consumption of endosperm oil used by several people in Nigeria, Sierra Leone, and the province of Borge in Congo. It grows well along the coast of Africa and is believed to come from the southwest. It is common for farmers to grow food in tropical Africa on farms and gardens, only for families and for the local market. Tetra carpidium conophorum is a climber that grows to about 6-18m in height when it is born on the stem. When a successful tree gets taller, the tallest tree grows from the ground onto other trees. They are well received in warm conditions. It has a stem that can reach 70 meters or more. It climbs taller trees elsewhere to achieve greater sunlight and maturity. In some cases, the wood can be broken and one stays in place until it is sold. You must be around 16cm round and dark gray, but your current green hair is still small. The roots are very beautiful. Leaves are (10 cm x 5 cm) short, oval, with serrated sides. They turned and pointed carefully to the head. The leaves have three nerve endings with leaf petioles up to 5 cm long [9].

Ndukwu and Ejirika [10] describe the physical characteristics of Nigerian beans including: water content - 28.2% by weight, mass (m) at 5.5.6m 6.5g, shell thickness - 0.135 ± 0, 04 cm, core mass - 4.22 ± 0.26 g, core water - 28.9% Wb, porosity - 45%, grain density - 0.815 g / cm3, grain density - 0.45 g / cm3, the percentage of corn - 76% in the grain area -15.41 cm 2. Characteristics can influence behavior. Physical increase in water content, arable area, and variation in grain size. The fruits on the tree are shown in **Figure 1**; Ripe fruit content is shown in **Figure 2** while dried fruit is shown in **Figure 3**.

Figure 1. Showing the African Walnut seed in the process of maturation.

Figure 2. Ripped African Walnut seed showing the internal structure

Fantastic wild berries are grown in traditional farming systems in tropical lowlands. It can tolerate any type of soil as long as it is well drained and can hold water.

It is a deciduous tree, new, with few branches, sometimes appearing as a candelabra. The seed is a 6-10 cm long capsule with an important capsule containing a subglobular seed of 1–1.5 cm long and a thin brown shell-like a small nut, hence the name in English [11].

Peanuts are the property of any plant of the genus Juglans (family Juglandaceae), in particular, the Persian or English walnut Juglans regia. Technically, nuts are hard-boiled or rooted fruit, so it is not a good vegetable. It is used in cooking as a side dish for green walnuts or as a well-ripened vegetable. Juglans oriental bean curd, nigra is the smallest meat on the market, as well as Juglans cinerea bean buttery. Walnuts are a protein that contains essential proteins and fatty acids.

African walnut Apart from nuts, research has disclosed that other parts of this plant are very crucial for medicinal, remedial, and medicinal purposes [12].

Figure 3. Showing matured Walnut seed in a shell.

Characteristics of Nigerian walnut

Beans are single-walled round fruits, usually eaten when ripe. After perfect cooking, the elimination of the husk affirm the wrinkled walnut shells that are usually found on both sides (3D marks can also begin). During adolescence, the chest breaks and stiffens and he knows it's time. The cortex covers the core of tissue, which is usually divided into two parts by a divider. Cells are often like shells. Dip the walnuts in brown beans, which contain antioxidants. Antioxidants protect fruit oils from oxygen, thus preventing acidity [7].

The beans do not arrive during the growing season, no more than mid-spring. They store chemicals in the soil to inhibit weeds from contending to grow. For this reason, you shouldn't plant flowers or gardens near them. Oatmeal is made up of 14% carbohydrates, 15% protein, 4% water, and 65% fat comprising 7% fiber [8, 13].

Storage of walnut

Nuts, like other fruits, must be properly prepared and stored. Poor conservation makes walnuts vulnerable to attack by insects and fungal diseases; the latter, which produce aflatoxins, are potent carcinogens. The beans should be removed completely [5].

The ideal low-temperature range is -3 to 00 ° C (27 to 320 ° F) and low humidity for home and industrial storage. However, this cooling technology is not available in developing countries where walnuts are produced in large quantities. There, the nuts are best stored at temperatures up to 250 ° C (770 ° F). Temperatures above 300 degrees Celsius (860 degrees Fahrenheit) and humidity above 700% can cause rapid leaks and severe damage. With humidity above 75%, fungal strains that secrete harmful aflatoxins can develop [7, 14].

Phytochemistry of Nigerian walnut

Tetracarpidium conophoruim has unprecedented health benefits, although it is still on the list of lesser-known foods. Phytochemical analysis of T. conophorum root leaves showed that it is involved in active compounds such as oxalates, phytates, tannins, alkaloids, flavonoids, and terpenoids. The presence of these phytochemicals indicates different aspects of the use of T. conophoruim in herbal medicine [12].

Nowajkbe *et al*. [15] Saponins 8.37 and 5.03 mg / kg were found separately in boiled nuts / dried nut juice and peanut powder. Eggs and lentils contain protein (14.92%), oil (45.84%), crude fiber (1.14%), micronutrients (3.52%) and carbohydrates (15.38%) and others such as tannins (0.89 mg / 100). g), oxalate (1.28 mg / 100 g), phytic acid (3.105 mg / 100 g), trypsin inhibitor (1.84 mg / 100 g), saponins (985.0 mg / 100 g) and alkaloids (40.91 mg / 100 g).

Arenola and Adesina [16] reported that the proteins, fats, ashes, and intestinal contents of the Nigerian beans were reduced and cooked.

The study by Akpogheli *et al*. [17] identified 3.18% of Ash, 39.27% of water, 8.40% of fiber, 5.19% of fat, 20.74% of protein, and 23.22% of sugar, while minerals revealed 4029.14 mg of K per kg, 3480.00 mg of Na per kg, 3.014.28 mg of Ca per kg, 726.11 mg of Mg per kg, 68.00

mg of Fe per kg, 24.01 mg of Zn per kg, 19.00 mg of Mn per kg, and 14.00 mg of Cu per kg. Chijoke *et al*. [18] also reported Nigerian beans containing alkaloids for 2.29 mg per 100g, glycosides -2.19 mg per 100 g, saponins - 8.07 mg per 100 g, flavonoids -0.02 mg per 100 g, tannins -0.89) per 100g, reducing sugars -4.10 mg per 100g and soluble carbohydrates for 1.06 mg per 100g. Likewise, the economy is exposed to a high content of water (31.40%), nutrients (6.01%), fiber (8.66%), proteins (28.85%), starch (21.30%), and high energy value (234.57 kcal) [19].

Oddee and others [20] recorded Phenols (7.44 mg / ml and 7.04 mg / ml), flavonoids (3.5 mg / ml and 1.66 mg / ml) and ascorbic acid (54.56 mg / kg and 44.00 mg / kg) for raw and ripe beans respectively.

Onawumi *et al*., [21] studies have shown water (29%), fats (5.63%), fiber (14.92%), proteins (16.62%), ash (12.89%) and starch (20.94%) contain alkaloid (2670). mg / kg) and microtannins (0.56 mg / kg).

Nutritional and medical needs of Nigerian nuts

There are two types of nuts, in shells or shells. The body can be whole, divided, or partially due to the structure. Cooked walnuts are most commonly used, but they can be used in other foods. Pickled walnuts, which are all fruits, can be sweet or salty depending on the preservative solution. Peanut butter can be made at home or bought raw and cooked. All beans can be eaten on their own (raw, roasted, or pickled), as part of a mix like muesli or as a side dish. For example, peanut soup and peanut bread are enriched with peanuts [22].

Barber and Obinna-Echem [23] recommended Nigerian walnut flour as a better substitute to wheat flour based on the nutritional composition.

Popular with bean curd, ice cream toppings, and walnuts are utilized as a garnish in few dishes, Nicino is an alcoholic wine made from green, fresh fruit made with wine. alcohol is added to the syrup. Nut oil is available in the market and is utilized as a food, especially in salad dressings. It has a low smoke area, which averts its use for frying [5, 7].

At 100 grams of food, walnuts provide 2,> 40 kilojoules (654 calories) and a rich diet of minerals, mainly 163% AV manganese and vitamin B. Good functions of the human body include Thiamine, Riboflavin, Folate, Cyanocobalamin (Vitamin) B1, B2, B3, B5, B6, B12, C, and E), Niacin, Manganese, Arginine, Pyridoxine, Selenium, Acrobatic Acid, Melatonin, Pantothenic. Acid, tocopherol, ellagic acid, polyphenols, omega-3 fatty acids, zinc oleic acid, calcium, phosphorous, potassium, sodium, H20, carbohydrates, and proteins [5, 8].

Various studies have shown a few healing properties of nignut walnut. Wound healing is a complex prepare in which the skin or other tissues repair themselves after an injury. It has been found that the use of T. conophorum showed a rapid therapeutic effect of wound healing after 5% or 10% T. conophorum treatment for 8 days [24].

As a follow-up to the wound healing property of Nigerian walnut, an anti-ulcer feature has been shown. Ezealisiji *et al*. [25] and Anosike *et al*. [26] showed anti-ulcer, cytoprotective, and wound healing properties in their studies.

The utilize of Nigerian walnut in the therapy of gastrointestinal ailments and the control of high blood pressure was described by Ayoola *et al*. [27]. Nwachoko and Jack [28] also found that a hot aqueous extract of Nigerian walnuts protected rats from castor oil-induced diarrhea.

Antimicrobial /antibacterial studies have shown that Nigerian walnut has the potential. Akinwande [29] and Ajaiyeoba and Fadare [30] reported antimicrobial activities of Nigerian walnut.

Nigerian walnut has shown some anti-chelating nature in a study. An in-vitro chelating nature of Nigerian walnut showed a dose-dependent decrease in chelating nature [31].

Based on anti-inflammatory features of Nigerian walnut, Olaniyi *et al*. [32] and Oladokun *et al*. [33] showed that Nigerian walnut had a significant level of inflammation inhibition.

Amaeze *et al*. [12] investigated the antioxidant properties of Nigerian walnut leaf extract and concluded that dried leaves have higher antioxidant activity than fresh leaves. The antiperoxidative activity of T. conophrium leaves was assessed by measuring their ability to lower malondialdehyde (MDA) levels in the reproductive organ and accessory glands of rats. The decrease of lipid peroxidation in conceptive and frill organs that extract Nigerian walnut has been reported by Akomolafe *et al*. [34], Kanu, and Okorie [8].

Walnut has anti accident properties that help the body to fight stress or oxidative stress which causes loss of red blood cells in the body, remove tree radicals help to support the immune system, help to protect against environmental and chemical toxins, help in sequencing agents of heavy metals and significantly help or protect quick aging [35].

Some studies around the reproductive assistance of Nigerian walnut, Akomolafe *et al*. [36] shows that Nigerian Walnut fights off pregnancy sicknesses and boost the development of the fetal brain.

Obianime *et al*. [37] and Obianime *et al*. [38] demonstrated that Nigerian walnut aided sperm production and quality in male guinea pigs. This was proven by Akomolafe *et al*. [39] and Ikpeme *et al*. [40] who showed that Nigerian Walnut improves sperm quality. Acumulavi *et al*. [34] Determination of the effect of Nigerian death adjustment. Akomolafe and Oboh [34] also showed a significant increase ($p < 0.05$) in lactate dehydrogenase (LDH), glucose-6-phosphate dehydrogenase (G-6PDH), glycogen

content, and 3- and 17-activity -hydroxysteroids (HSD) in testes and epididymis. Zn and Se content is present in the biochemical parameters of the testis, but also with a significant decrease in cholesterol. Studies showed a significant increase in serum testosterone, LH, and FSH levels, sperm count, motility, and viability, and a decrease in sperm abnormalities at p <0.05, indicating the importance of spermatogenesis, parameters, and volume.

Acumulavi *et al*. [41] showed a significant increase (p <0.05) in LDH activity, G-6PDH activity, glycogen content, and HSD activity 3 and 17 ° in testis, epididymis, zinc, and silicon; There is also a decrease in the number of spermatozoa in the testes, their viability and a significant increase in the number of sperm abnormalities, a set of criteria for sperm analysis and, consequently, a decrease in fertility hormone levels when drinking alcohol. Alcohol is probably not good for male fertility problems.

Akpoghelie *et al*. [17] reported the diseases prevention capacity of walnut because of the presence of Omega-3 fatty acids (eicosapentaenoic acid called EPA and docosahexaenoic corrosive called DHA). Based on anticancer activities, some studies demonstrate that prostate and breast cancer can be reduced by consuming Nigerian walnut [42].

Nigerian walnut consumption is also important in anti-diabetes. Onwuli *et al*. [43]; Ogunyinka *et al*. [44] Ogbonna *et al*. [45] reported that Nigerian walnuts can reduce high glucose levels in the blood. It is also anti-lipidemic as reported by Ezealisiji *et al*. [46] and Analike *et al*. [47].

Kanu, *et al*. [48] demonstrate that Nigerian walnut aids in bone health. It seems good for bone growth and strength.

Anti-malarial properties of Africa Walnut have been studied by Dada and Ogundolie [49]. In the cause of the study, Ogundolie *et al*. [50] used ethanol seed extract and discovered that it increased packed cell volume (PCV), red blood cells (RBC), hemoglobin (HGB), and platelet (PLT). This may provide another mechanism where malaria is well treated and hematological parameters may be increasing which is different from the medical approach of withdrawing haematinics during malaria treatment.

Nigerian walnut has shown energizing and weight management properties and these properties no doubt are traced to their physiochemical properties [15-20, 48]

Other important aspects of walnut use are still being researched. Walnut, according to Anosike *et al*. [26], can be used to treat the gastrointestinal tract and can help reduce premature deliveries in pregnant women because it has culinary uses, such as soup preparation; it can boost cognitive function due to the presence of vitamin B6 and omega-3 unsaturated fats, and it can also help as an anti-aging agent due to the presence of vitamin B6 and omega-3 unsaturated fats.

CONCLUSION

Nigerian walnut is an emerging plant/fruit that has great potential for nutrients and drugs. The Nigerian walnut could be related to bitter kola in nature, properties, and usage. The use of walnut should be encouraged among healthy and unhealthy individuals. Walnut has shown numerous medicinal properties that could solve one or more health-related challenges.

From this study, it is discovered that Nigerian walnut has shown anti-oxidant, anti-inflammatory, anti-chelating nature, and high blood pressure control activities. Also, it has shown anti-lipidemic, anti-diabetes, anti-malarial, antimicrobial /antibacterial, and anticancer nature. The walnut has given reproductive assistance and aided sperm production and sperm quality, wound healing, anti-ulcer, and stomach disorders treatment features. The Nigerian walnut has energizing and weight management and diseases prevention capacity. It aids in bone health, skin or other tissues repairs, and could go a long way to assist in other health challenges.

It is recommended that research should continue so that the use of walnut in complementary and alternative medicine could one day lead to modern medicine discovery.

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