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MINERAL AND PROXIMATE COMPOSITIONS OF *NAUCLAE LATIFOLIA* ROOT BARK FROM ABAKALIKI EBONYI STATE

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ABSTRACT

The study was designed to evaluate the proximate and mineral compositions of *Nauclae latifolia.* Proximate and mineral compositions were determined by the Standard method of association of analytical chemist (AOAC) and atomic absorption spectrophotometric (AAS) method. The results showed that *Nauclae latifolia* root bark contain 63.0±0.40% of carbohydrate, 21.96±027 % of moisture, 6.89±0.60% of fibre, 3.77±0.71% of Ash, 2.75±0.48% of protein and 1.62±0.96 % of fat respectively. The results of the mineral composition revealed that phosphorus (4.06±0.35mg/100g) and Zinc (2.87±0.2mg/100g) were the major minerals present in the root bark of *Nauclae latifolia*. This reveals that *Nauclae latifolia* root bark is a good source of carbohydrates and some other nutrients.

Keywords: Proximate, Mineral, *Nauclae latifolia,* root bark and Atomic absorption Spectrophotometric method

INTRODUCTION:

All living organisms require energy to carry out their different life activities. This energy is provided by the oxidation of foods such as carbohydrates, fats and proteins (George, 2000).The capture of solar energy by photosynthetic organisms and its conversion to the chemical energy of reduced organic compounds is the ultimate source of nearly all biological energy (Nelson and Cox, 2008). Thus all energy used by most organisms comes directly or indirectly from the sun and is gradually used up as it passes in one direction through the ecosystems. The first stage of energy's journey is its capture by green plants and algae in photosynthesis, making plants the sole source of life driving energy for animals that eat them (George, 2000).

Plants are autotrophic, in that they make their own food and thus sustain themselves without eating other organisms. The chloroplast of plant cells captures light energy that has travelled about 150 million kilometers from the sun and converts it to chemical energy that is stored in glucose and other organic molecules made from carbon dioxide and water (Campbell *et al*., 2000). Plants are therefore producers; that is they transform energy in sunlight into chemical energy. This energy then flows through and is used by other organisms (Uno *et al*., 2001). Plants have high vitamin, mineral, fibre, phytochemical and antioxidant in their pulps leaves and seeds which most times are discarded due to ignorance of their nutritive and medicinal values (Fila *et al.,* 2013).

Proximate analyses of plants samples gives valuable information about the nutritional composition of such sample and help to access the quality of the sample. It provide information on moisture content, ash content, carbohydrates, protein, fat/oil and crude fibre (Lee, 2005). Ash is the inorganic residue remaining after water and organic matter has been removed by heating, which provides a measure of total amount of minerals within the food (Lee, 2005). Studies have shown that fruits, seeds and vegetables contain among other vital nutrients an appreciable quantity of carbohydrate, proteins, fats, fibres and phytochemicals (Liu, 2004). Carbohydrate is the chief source of energy to the body; they are constituent of compound lipid, conjugated protein and mucopolysaccharides which form ground substance of mesenchymal tissues (Chatterjea and Shinde, 2007). Protein provides amino acids which are the substrates required for the support of body protein synthesis and maintenances of cell

and organ. Thus it furnishes amino acid, the building block of all protein (Godner *et al*., 2004). The functions of lipid may be divided into two categories. The lipid in food and in animal bodies serving as the densest form of stored energy and the physiological role in the body are organ protection, temperature regulation, and as major component of biological membrane (Gibney *et al*., 2007). Minerals provide rigidity and strength to the teeth and skeleton, some allows for proper muscle contraction and release, influence nerve and muscle functions, blood clothing and as cofactor to various enzymes (Gibney *et al*., 2007).

Nauclae latifolia is a genus flowering plant in the rubiaceae family. It is a deciduous shrub or tree with an open canopy, usually branching from low down the bowl. It varies widely with height from around 10 meters up to 30 meters according to soil and moisture conditions. The edible fruit is gathered from the wild for local use. The terminal vegetative buds are usually strongly flattened. The generic name is derived from the ancient Greek words "*naus"* and *'kleio'* meaning to close. It is called "uvuruilu" in Igbo language of Nigeria.

The plant has been a common medicinal plant in Ebonyi State, Nigerians. No information has been published to ascertain the nutritive value of the root bark which is the most common parts of *Nauclae latifolia* use in the preparation of herbal drug locally in Abakaliki, Ebonyi State. The data from this study will go a long way to stimulate interest in its utilization beyond the traditional localities more especially in nutritional requirement of individuals. It could also serve as a raw material for both nutritional and pharmaceutical industries. Therefore, this study evaluates the mineral and proximate compositions of *Nauclea latifolia* root bark locally found in Abakaliki, Ebonyi State.

MATERIALS AND METHODS:

Materials

Chemical and Reagents: The chemicals and reagents used in this study were of analytical quality.

Collection and Preparation of *Nauclae latifolia* Root bark

The root bark of *Nauclae latifolia* was collected after digging out the fresh root from Ishieke at Abakaliki local government area in Ebonyi State, Nigeria and was identified by a taxonomist in the department of Applied Biology, Ebonyi state University, Abakaliki, Nigeria. A part of the plant was also kept in the herbarium for reference purposes.

Sample Preparation: The root bark sample was removed from the main root and dried

for two weeks under room temperature. It was then pulverized to powdery form using a manual grinding machine. The sample was then kept in an airtight container in the refrigerator until required for the analysis.

Methods:

Proximate and minerals analyses were carried out according to the procedure of Association of Official Analytical Chemist (1997) to determine the carbohydrates, protein, oil, crude fibre, ash, moisture, calcium, phosphorus, magnesium, calcium, iron, zinc, copper and sodium components of the sample.

RESULTS:

The result of the proximate analysis of *Nauclae latifolia* root bark showed that the carbohydrate had the highest value, followed by the moisture then fibre and ash contents while fats and protein contents were the least as shown in Figure 2. The result of mineral analysis of *Nauclae latifolia* root bark showed that phosphorus has the highest value followed by zinc, iron, sodium, copper, potassium and calcium while magnesium was observed to have the least value as shown in Figures 3 and 4.

Figure 1: Picture of *Nauclea latifolia*

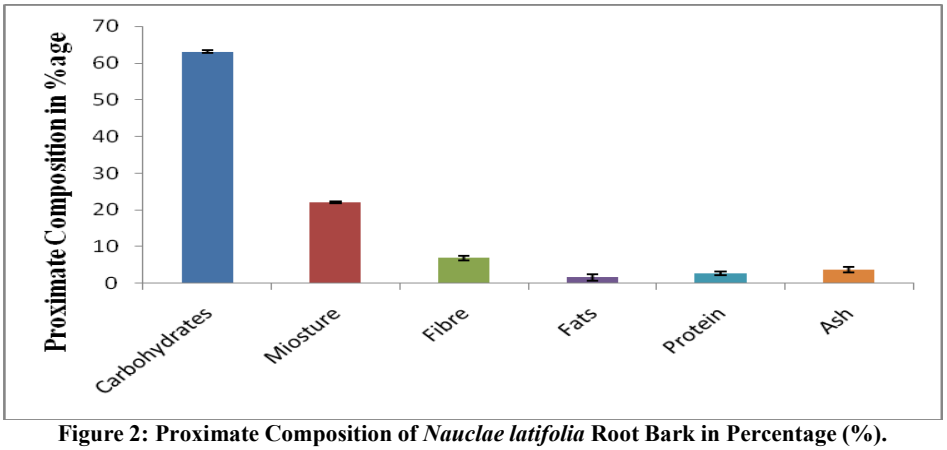

Figure 2: Proximate Composition of *Nauclae latifolia* Root Bark in Percentage (%).

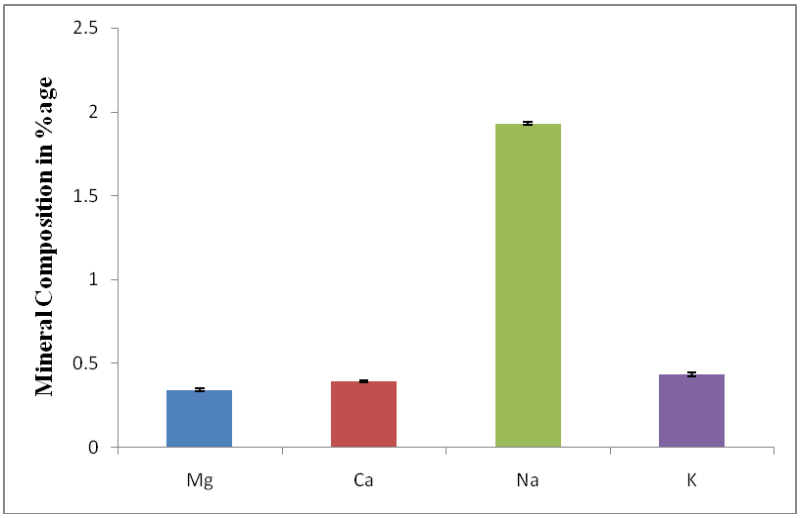

Figure 3: Mineral composition of *Nauclae latifolia* Root Bark in percentage (%)

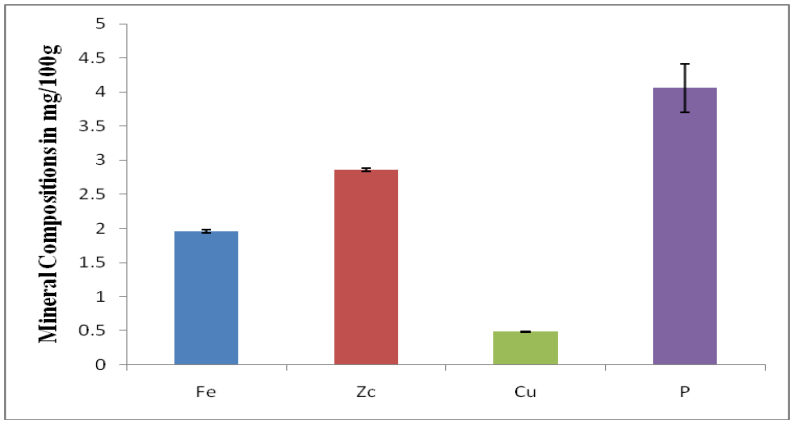

Figure 4: Mineral composition of *Nauclae latifolia* Root Bark in mg/100g

DISCUSSION

The result of this study revealed that the root back of *Nauclae latifolia* contain an appreciable amount of carbohydrate with the highest value of 63.029±0.3959 %, followed by moisture, fibre and ash with values 21.955±0.265, 6.8857±0.603 and 3.7663±0.709% respectively. Protein and fats have the least value of 2.7477 ±0.475 and 1.6163±0.961% respectively. This confirms that *Nauclae latifolia* root bark as a good source of these nutrients and the major function of carbohydrate is to provide the body with energy. Fat plays a very important role with substantial amount of energy, absorb certain nutrient and maintains your core body temperature. This result is in correlation with Nwali *et al.* (2014) that reported 72.92 ± 1.08% carbohydrates in *Bryophyllum pinnatum* leaves. Igwenyi *et al*. (2011) also reported 42.18% of carbohydrates in *Ipomea aquatic*. The result

of Aja *et al.* (2013) also revealed low percentage of carbohydrates (23.60% and 18.00%) in *Moringa oleifera* leaves and seeds. Proximate compositions of *Irvigna gabonesis* and *Citrullus colocynthis* also revealed that they are rich in carbohydrate and oil, but low in protein (Igwenyi *et al.,* 2011). Aja *et al.* (2015) also reported 57.06% of carbohydrates in *Parkia biglobosa* fruits. The observed low levels of crude fibre and ash revealed that *Nauclae latifolia* root back is not a good source of crude fibre and ash as shown in Figure2. The result is in correlation with the observed low level of crude fibre in *Parkia biglobosa* fruit by Hassan *et al*. (2007) which revealed the crude fibre value of *Parkia biglobosa* fruit to be 3.17± 0.29%. Aja *et al.* (2015) also reported 2.55% of crude fibre in *Parkia biglobosa* fruit. Fibre plays a role in the prevention of a number of diseases by reducing the level of cholesterol. This result is in accordance with the result of Aja *et al.* (2013) which reported low percentage of 10.0 ± 0.30% of moisture, 1.40 ± 0.1% of protein and 20.0 ± 0.50% of fat /oil in *Moringa oleifera* leaves and seeds. The result does not agree with proximate composition of *Parkia biglobosa* fruits by Aja *et al.* (2015) which revealed high oil content in *Parkia biglobosa* fruits. Dietary fiber in dates helps to move waste smoothly through the colon and helps prevent LDL (bad) cholesterol absorption by binding with substances containing cancer-causing chemicals (Moyer, 2014).

The result of mineral content of *Nauclae latifolia* root bark showed that phosphorus has the highest value of 4.0597±0.36 mg/100g. This result does not agree with the report of Nwali *et al.* (2014) that revealed high values of potassium (3.49±0.01and 3.74 ±0.04 %) and calcium (4.99±0.01 and 6.82 ± 0.04 %) in *Bryophyllum pinnatum* leaves in wet and dry samples. Whereas, Igwenyi *et al.* (2011) reported relatively high values of iron, magnesium and calcium in µg/ml and low values of phosphate, manganese, sulphate and nitrates in *Ipomea aquatic* leaves. Aja *et al.* (2013) revealed Calcium concentration of 1.475 x 10^2 ± 0.15mg/l, Chlorine concentration of 2.482 x 10^2 ± 0.01mg/l and Phosphorus concentration of 3.85 ± 0.20mg/100g in seed of *Moringa oleifera* whereas the concentration in the leaves recorded calcium (1.151 x 102 ± 0.02mg/l), Chlorine (0.319 ± 0.07mg/l) and Phosphorus (3.85 ± 0.04mg/100g). Phosphorus formed part of the constituents of bone tissue and they form compounds needed for energy conversion. Potassium plays a vital role in normal cell function including neurotransmission, muscle contraction, and

maintaining acid-base balance. Lower copper content of *Nauclae latifolia* has been associated with disturbances to the nervous system and bone diseases. Magnesium is essential for healthy bones and proper functioning of muscle and nerve tissue. The iron content, a component of hemoglobin in red blood cells, determines the balance of oxygen in the blood. When low or deficient, it leads to fatigue, anxiety, nausea and low bone density. Magnesium is essential for health bones and proper functioning of muscle and nerve tissue. When low or deficient, it leads to fatique, anxiety, nausa and low bone density. Also low copper content of the *Nauclae latifolia* has been associated with disturbances to nervous system and bone diseases.

CONCLUSION

The study revealed that root bark of *Nauclae latifolia* is a good source of phosphorus, zinc, iron and sodium and can contribute to the major nutrient of man.

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