The Pharmaceutical and Chemical Journal, 2015, 2(4):36-39

Available online www.tpcj.org

Research Article

ISSN: 2349-7092
CODEN(USA): PCJHBA

Proximate and mineral content analysis of inflorescence of *Parkia biglobosa* (Jacq): A potential multipurpose tree species

Ojo PA*, Olaifa KA, Odewo SA, Agbeja AO, Ogundana SA

Forestry Research Institute of Nigeria.

Abstract Freshly harvested *Parkia biglobosa* inflorescence was processed and screened for their nutritional values including moisture content, crude fiber, crude protein, ash, fat and carbohydrate. The inflorescence of the species contained moisture content to be (16.76±0.45), crude fibre (7.09±0.53), crude protein (3.69±0.28), ash (8.96±0.58), fat (2.25±0.29) and carbohydrate (61.24±1.35). High percentage of the inflorescence is indicated as a good source of energy. The mineral content of the inflorescence were also assessed with a view of establishing and understanding their mineral active contents. Mineral constituents including N, Ca, Mg, K, P Cu, Na, Mn, Fe and Zn were found with values; N (0.59±0.06), Ca (0.90±0.12), Mg (0.55±0.78), K (0.30±0.17), P (0.59±0.71), Cu (0.61±0.01), Na (20.79±0.80), Mn (10.58±0.99), Fe (40.75±2.12) and Zn (5.68±0.59). The significance of *Parkia biglobosa inflorescence* in traditional medicine and importance of the nutritional values in the pharmaceutical industries were discussed.

Keywords Nutritional values, inflorescence, minerals, medicine, concentrations, pharmaceutical

Introduction

Parkia biglobosa belongs to the family Mimozoidae. It can be found in tropical Asia and Africa [1]. The common names are African locust bean and monkey cutlass tree. It is known as "dawadawa" in Hausa while Yoruba people know it as "igi Iru" [2].

It is an important economic tree legume of considerate multipurpose. Okullo *et al*; (2005) reported that the tree attracts bees and is a popular tree among bee keepers. Infact, the whole pods are eaten by domestic stock, including cattle and the young seedlings are nutritious and heavily browsed by livestock [3].

The seed can be boiled, fermented and consumed raw in Nigeria. It produces a black strong smelling tasty seasoning, rich in lipid (29%), protein (35%0, and carbohydrate (16%) [4]. It is also a good source of fat and calcium for rural dwellers. The tree is highly recognized as medicinal species used as mouth wash; vapour inhalant for toothache or ear complaints. It is used to cure leprosy, bronchitis, pneumonia, skin infections, sores, ulcers, malaria and many others [2].

Green pods are crushed and added to rivers to kill fish but the nutritional value of such fish is not adversely affected. The fruit pulp is used as an ingredient of feed for pigs and dogs. The seeds are added to poultry feed after treatment to remove their anti-nutritional properties. Moreover, the wood is suitable for making kitchen implements, such as mortars, pestles and bowls among others.

Campbell-Platt, (1980) reported parkia trees as nutrient recycler, also holding the soil particles together for easy penetrating of soil moisture [5].

One of the useful parts of *Parkia biglobosa* is the inflorescence. The part is removed partially with flowers especially in Nigeria for consumption. This inflorescence is highly recognized and basically consumed in Southwest of Nigeria, most especially Ekiti State, Ondo State, and Kogi State. According to the indigenes of aforementioned States, the inflorescence are grounded and used as condiments as well as food supplements. Recognition of the uses of this inflorescence has not been documented by any research scientists.

Plant parts:

Fruit: The fruit or seedpod is the most widely used and economically important part of the tree. It first fruits after eight to ten years. Typically, 20 to 25 pods arise from a single capitulum [6]. The pods when young are green, fleshy and pliable, and are sometimes eaten by humans after roasting the pods over embers. Throughout West Africa, *Parkia biglobosa* pods are favored foods of chimpanzees, baboons and other primates [7]. The length of the pod ranges between 12-35cm and the width is between 15-25mm. The pod is sub-cylindrical and compressed laterally in shape. Each pod contains 5-20 seeds, embedded in the spongy, yellow endocarp [1]. As the fruits mature, they darken to a red or brown color and the hulls of the pods become hardened, smooth and woody. The individual brown, smooth seeds are oval, 0.9- 1.5cm long by 0.8-1.1cm wide and weigh 0.25 grams each. Each seed consist of 30% testa and 70% green cotyledons. The seeds constitute 22% of the fruit while the pod is 42% and the pulp is 36% [5]. The pods are boiled to make a black liquid used for sealing floors [1]. The yellowish powder inside the seed pods is sweet and be eaten without preparation and can made into drinks. Its seeds are fermented to make dawadawa, a black, strong smelling, tasty food high in protein [8].

Timber: The timber is white with a brown core, and is relatively hard but rapidly spoiled by insects and fungi. It is used for fuel wood, as well as for tool handles. The bark is used as a mouthwash, vapor inhalant for toothache, or for ear complaints. It is macerated in baths for leprosy and used for bronchitis, pneumonia, skin infections, sores, ulcers, and washed for fever, malaria, diarrhea, and sterility. Roots are used in a lotion for sore eyes.

Materials and Methods

Leaves and inflorescence of *Parkia biglobosa* was collected from Odo-oko farm in Isan Ekiti, Ekiti state Nigeria. Inflorescences were identified at Forestry herbarium in Forestry Research Institute of Nigeria Ibadan. The inflorescence was screened using screening machine to remove unwanted particles from the samples. The bulky samples were air dried at 20 ^{0}C for 2 weeks and grounded using mechanical blender. The powdered samples was parked in a polythene bag and kept in desiccators for subsequent chemical analysis.

Proximate Analysis:

The sample were evaluated for the presence of moisture content, crude fibre, crude protein, ash, fat and carbohydrate, using methods described by Association of Official Analytical Chemists (AOAC, 1990). The nitrogen content was determined by micro kjeldahl method described by Pearson (1976) and the nitrogen content was converted to protein by multiplying by a factor of 6.25. Determination of crude fat content of the sample was done using soxhlet (cehmglass) type of the direct solvent extraction using 300 ml petroleum ether (boiling point 40-60^{0}C) as solvent. At the end of the extraction, the solvent was evaporated and the flask dried in the oven at 106 ^{0}C. Total carbohydrate was estimated by difference. All the proximate values were reported in percentage (%).

Mineral Analysis: The mineral composition of the sample was analysed by dry-ashing at a temperature of 500 to constant weight and dissolving the ash in volumetric flask using distilled ionized water with a few drops of concentrated hydrochloric acid. Sodium (Na), Potassium (K), Calcium (Ca), Magnesium (Mg), Manganese (Mn), Copper (Cu), Zinc (Zn), Iron (Fe), Phosphorus (P) and Nitrogen (N) were analysed.

Sodium and potassium were determined by using a flame photometer using sodium chloride (NaCl) and potassium chloride (KCl) to prepare the standards. All other metals were determined by using atomic absorption spectrometer.

Results and Discussion

Table 1: Proximate Composition (% dry weight) of *Parkia biglobosa* inflorescence

Composition	% by Weight
Moisture	16.76±0.45
Ash	8.96±0.58
Crude fat	2.25±0.29
Crude protein	3.70±0.28
Crude fibre	7.09±0.53
Carbohydrate	61.24± 1.35

Values are mean ±standard deviation of triplicate determination.

The proximate constituents obtained from the sample were presented in table 1 above. The moisture content value is (16.76±0.45 %). Moisture in food determines the keeping quality of the food. Also the digestion absorption and the rate at which assimilation of food takes place within the body system require water. It also enhances easy elimination of digestive waste from the body. The value is lower than that reported for some leafy vegetables such as (66.45 %) in *Vernonia amygdalina, Gnetum buchholsianium* (33.8 %), but closer to *Xanthosem saggilifolum* (14.7 %).The crude protein content is 69±0.28% which is lower compared to the value reported for *Vernonia amygdalina (*44.28 %) and (11.29 %) on basalm apple. Therefore it might not be suitable for application in drug synthesis. The crude fat value is 2.25±0.29 %. The value is greater than that reported for Chaya leaves (0.40 %), Spinach leaves (0.30 %) and *Amaranthus hybrid* leaves (1.60 %). 1g of lipid provides 8.37 Kcal which indicates that 5 g of *Parkia biglobosa* inflorescence will provide 42 Kcal of energy. The recommended daily dose of fat in food should not exceed 30 calories to avoid obesity and other related diseases.The ash content is 8.96±0.58 % . The value is higher compared to 1.8 % reported for sweet potatoe leaves and 5.0 % in *Tribulus terrestris* leaves, but lower than 19.61% in *Amaranthus hybridus* leaves and (12.48%) in *Vernonia amygdalina* (Sodamade, 2013). The crude carbohydrate content of the protein concentrate is (61.24±1.35%) which indicates that it is a good source of energy since food carbohydrate is an important source of energy and dietary fiber. The value is higher compared to some leafy vegetables like *Tribulus terrestris* (55.67%), (54.20%) for water spinach leaves and 23.58% reported for *Vernonia amygdalina*. Crude fiber which is known to promote softer stools with increased frequency and regularity of elimination is 7.01±0.53% which is lower compared to that reported for *Haematostaphis barteri* (33.04%) and *Hibiscus cannabinus* (29.61%) . Therefore it might not provide the daily fiber requirement of the body.

Table 2: Concentration of Mineral Elements in *Parkia biglobosa* inflorescence

Mineral Elements	Concentration (mg/100g)
Nitrogen	0.57±0.06
Calcium	0.90±0.12
Magnesium	0.55±0.08
Potassium	0.30±0.02
Sodium	20.80±0.81
Manganese	10.58±0.99
Iron	40.75±2.12
Zinc	5.68±0.59
Copper	0.61±0.01
Phosphorus	0.60±0.07

Sodium content of *Parkia biglobosa inflorescence* is lower (20.80±0.81mg/100g) when compared to 45 mg/100g reported for *Senna obtusfolia* and higher when compared to 5.00±06 mg/100g reported for *Tribulus terrestris* leaves. High sodium content of food is of great importance for health because too much of sodium could lead to high blood pressure. So, it could be a good source of food for hypertensive patient [9].

Manganese content in *Parkia inflouresence* (10.60±0.99mg/100g) is high when compared to 3.16mg/100g obtained for bitter leaf, 2.54mg/100g in Indian spinach, but is closer to that obtained for *Amaranthus hybridus* (10.06mg/100g) (Asaolu et.al, 2012). Iron (40.75±2.12mg/100g) also follows the same trend. Values obtained for Zinc (5.68±0.59mg/100g), Copper(0.61±0.01mg/100g) and Potassium(0.30±0.02mg/100g) are lower when compared to those obtained for the above mentioned leaves.

Conclusion

The present study has shown that *Parkia biglobosa* inflorescence is a good source of energy and dietary fiber due to its high carbohydrate content. It is low in sodium making it good as food supplement in diet for hypertensive patients but may not be suitable for drug synthesis due to its low protein content. It also has high keeping quality due to its low moisture content. Therefore, further study is needed to be carried out on the characterization and its effect on the body system.

References

1. Hall, J. B., Tomlinson, H.F., Oni, P.I., Buchy, M. and Aebischer, D.P. (1996). *Parkia biglobosa*: *A monograph*. School of Agricultural and Forest Sciences Publication No 9, University of Wales, Bangor, United Kingdom. 107pp.
2. Sofowora, A. (1993). Medicinal Plants and Traditional Medicine in Africa 2nd Edition, Spectrum Books Ltd. 387-390p.
3. Okullo, J. B, Hall, J. B and Masters. (2003). Reproductive biology and breeding systems of *Vitellaria paradoxa.* pp. 66–84. In: Teklehaimanot Z. (ed.), Improved Management of Agroforestry Parkland Systems in Sub-Saharan Africa. EU/INCO Project Contract IC18-CT98 0261, Final Report, University of Wales Bangor, UK.
4. Amoo S.O, Ayisire B.E. (2005). Proximate and mineral composition of Nigerian leafy vegetables. *Afri J Biotechnol*, 4: 68-71.
5. Campbell-Platt ,G. (1980). African locust bean and it's West African fermented products-Dadawa. Eco. Food Nutr. 9: 123–132.
6. Booth, F.E.M. and Wickens, G.E.(1988). *Non-timber uses of selected arid zone trees and shrubs in Africa*. FAO Conservation Guide 19. Food and Agriculture Organization of the United Nations. Rome. pp 103-109
7. Hopkins, B. (1983). The taxonomy, reproductive biology and economic potentials of Parkia in Africa and Madagascar. *Bot. J. Linnean Soc.* 87: 135 – 167.
8. Steinkraus, K.H. (1996). *Handbook of Indigenous Fermented Foods*. 2nd edition. Marcel Dekker, New York. the United Nations. Rome. pp 103-109.
9. Sodamade,A. (2013)Proximate analysis, mineral content, Amino Acid composition and functional properties of Vernonia amygdalina vegetable leaf protein concentrates..pp 3-6.