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Nutritional Composition of *Grewia mollis* Stem Bark

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Abstract The use of the stem bark of *Grewia mollis* as a condiment in the preparation of soup and other meals in Northern Nigeria is common. Analysis of its nutritional composition was carried out. The proximate composition was determined using the standard methods of the A.O.A.C. (1990) and mineral elements content was obtained using Energy Dispersive X-ray Fluorescence (EDXRF) transmission emission spectrometer carrying an Rh X-ray tube (50KV, 5mA) with thick foil of pure Rh used as target material for absorption correction. The results which referred to (%) dry weight showed that *G. mollis* stem bark contains 0.24% crude protein, 1.20% crude lipid, 9.65% moisture, 3.05% total ash, 66.16% total carbohydrate and 19.70% crude fibre. Mineral analysis reveals 12 elements whose concentrations range from 1.00-2007.00mg/Kg, with calcium and potassium having the significant concentrations of 2007.00mg/Kg and 605.00mg/Kg respectively. The results of this study provide evidence that the stem bark of *G. mollis* is likely to be an important contributor to nutritional requirement of humans.

Keywords *Grewia mollis*, stem bark, minerals, proximate analysis

Introduction

In time past, the primitive man gathered food materials from his environment and ate them without having an idea of the nutrient they contained. Today the analysis of food materials for nutritive value precedes the application of improvement techniques as improvement is based on the knowledge of deficiencies [1].

Grewia mollis juss; *F. tiliaceae* is a shrub or a small tree which is commonly found in bushes of Northern Nigeria and some African countries. In Nigeria, the stem bark powder is used as a thickener in soup and local bean cake called "kosai" in Hausa. The flowers and young shoots are sometimes used as a soup or sauce vegetable. Toxicity studies, however, showed that consumption of the plant materials at high concentrations is likely to elicit hepatotoxic effects in rats and possibly in humans [2].

The infusion of the bark obtained by cold or hot marceration in water is used in beating mud floors and walls to give them smooth surfaces. Some findings have also shown that the mucilage obtained from the stem bark can serve as a good binder in paracetamol formulations [3-4].

A wide range of applications of *G. mollis* in traditional medicine are known to man. The mucilaginous bark and leaves are applied to ulcers, cuts, sores, and snakebites. Extracts of bark and leaves are drunk to treat coughs and fevers. The Yoruba people in Nigeria use it medicinally at times of childbirth [5]. Phytochemical screening on the stem bark of *G. mollis* reveals the presence of saponins, flavonoids, tannins, glycosides, phenols, steroids and the absence of alkaloids [6].

The purpose of this study was to determine the proximate and elemental composition of the stem bark of *G. mollis* and therefore, beef up available information in the literature about the plant.

Materials and Methods

Sample collection and preparation

The bark of fresh *Grewia mollis* was collected from the wild tree in Kerang community of Mangu Local Government Area of Plateau State-Nigeria. The bark was air-dried at room temperature and pulverized using pestle and mortar.

Moisture Content

A known weight of the stem bark powder was placed in a pre-weighed crucible and dried in the oven at 110 ^{o}C for 2hrs. The crucible and its content were cooled in desiccators and weighed. The moisture content was calculated and expressed in percentage using the standard methods of the Association of Official Analytical Chemists [7].

Ash Content

The crucible was pre-heated in a Muffle Furnace at 500 ^{o}C, cooled in desiccators and weighed. Three grams (3 g) of the sample was put in the crucible and weighed. The crucible and its content were transferred into the Muffle Furnace at 600 ^{o}C for 12 h when white ash was obtained. The percentage ash was calculated using the standard methods of the A.O.A.C. (1990) [7].

Crude Lipid Content

Crude lipid content in the stem bark of *G. mollis* was determined by extraction with hexane in a Sohxlet apparatus following the standard methods of the A.O.A.C. (1990) [7].

Protein Content

Three grams (3 g) of powdered *G. mollis* stem bark was weighed into a 300 ml Kjeldahl digestion flask and few granules of 1.0 g of K_2SO_4 and anhydrous $CuSO_4$ were added to the flask. 25 ml of concentrated sulphuric acid (98 %) was added. The flask and content was then coupled to the Kjeldahl digestion jack and heated slowly at first until frothing subsided. The flask was titrated with 0.1 M hydrochloric acid, and the estimate of crude protein content was calculated by multiplication of the organic nitrogen content by a factor of 6.25. The percentage protein was calculated following the standard methods of the A.O.A.C. (1990).

Fibre Content

A 3.0 g of moisture free and hexane extracted sample was placed in a 250 ml capacity beaker containing 100 ml 0.25 N H_2SO_4. The mixture was boiled for 30 min and filtered. The residue was transferred to another 250 ml capacity beaker containing 200 ml of hot 0.314 N NaOH and boiled for 30 min. The mixture was again filtered and the residue was washed sequentially with water, 1 % HCl, and methanol. The residue was then oven dried at 130 ^{o}C for 2 h and allowed to cool in desiccators. The weight of the residue was recorded

Total Carbohydrate

Carbohydrate content was estimated by subtracting the sum percentage weight of protein, fibre, lipids and ash from the total dry matter.

Mineral Analysis

The mineral elements were determined on 20 g powder mixed with 4g of binder in an Energy Dispersive X-ray Fluorescence (EDXRF) transmission emission spectrometer carrying an Rh X-ray tube (50KV, 5mA) with thick foil of pure Rh used as target material for absorption correction.

Results and Discussion

Proximate Analysis: Data on proximate composition presented in Table 1 show that *G. mollis* stem bark has high proportions of crude fibre (19.70 %) and carbohydrate (66.16 %). Crude fibre is essential in nutrition as it has been reported to have beneficial effects on blood cholesterol and aids in the prevention of bowel diseases. In diabetic patients, it improves glucose tolerance. However, when it is found in high level in diet, it could lower the available energy in such foods [8]. The level of carbohydrate was found to equal those in varieties of green vegetables and Adansonia digitata leaves [9]. The moisture content of 9.65 % (on dry weight basis) was found to be relatively low. This implies that *G. mollis* stem bark can be stored for a long time without microbial attack.

Table 1: proximate chemical analysis of the stem bark of G. mollis (%)

Crude protein	0.24
Moisture	9.65
Lipids	1.20
Crude fibre	19.70
NFE	66.16
Ash	3.05

The low protein content of 0.24% makes meals prepared with *G. mollis* stem bark good for people suffering from illnesses such as hepatitis and kidney stones among others.

Mineral Analysis

Table 2: Mineral Composition of *G. mollis* Stem Bark (mg/Kg dry weight)

Parameter	**Amount**
P	52.50
S	1.50
K	605.00
Ca	2007.00
Ti	2.50
Cr	6.00
Mn	8.00
Fe	20.50
Ni	2.00
Cu	13.00
Sr	53.50
Ba	1.00

Among the elements determined, calcium and potassium were those found in large amount in the *G. mollis* stem bark; 2007.00 mg/Kg and 605.00 mg/Kg respectively. When compared with the Required Dietary Allowance (RD/1980), the *G. mollis* stem bark appears to provide good source of mineral elements in the body. The high calcium level here suggests that it may serve as a good source for calcium especially for children for bone formation and development

Conclusion

From the results of this study, it can be concluded that the *G. mollis* stem bark has high potential of being an important contributor to improving the nutritional needs of both rural and urban people of Northern Nigeria owing to its high content in fibre and carbohydrate. Furthermore, *G. mollis* stem bark can be considered as a good source of calcium and potassium for bone and teeth formation and development as well as cell formation and transmission of impulses in the nerve respectively.

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