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Evaluation of the proximate components of Hog plum (*Spondias mombin* linn–*anarcadiaceae*)

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ABSTRACT

The proximate constituents of *Spondias mombin* was analyzed. Analyses were carried out in the leaf, bark and root of the plant. Standard methods were used for the proximate analyses. The result of the proximate analysis clearly showed that the leaf of *Spondias mombin* had moisture content of 10.75±0.02%, root 8.90±0.02% while the bark had 8.27±0.09%. The differences among these values discussed were significant at 0.05 probability level. The bark contained dry matter of 91.74±0.01, root 91.10±0.09 and the leaf 89.25±0.07. The ash content of the root was also higher 17.38%, leaf 13.72% while the bark 12.71%. The crude fibre values were 15.27±0.07 (root); 14.74±0.07 (bark) and 12.72±0.07 leaf. The results showed that Spondias mombin are rich in ash and crude fibre.

Keywords:Proximate, *Spondias mombin,* Hog plum, ash, moisture, fibre

INTRODUCTION

Man depends on plant and plant products directly for his basic needs as food, clothing and shelter [1]. It also depends on plant indirectly for their beneficial influence on the climate and maintenance of his immediate and remote environment. Our survival and continued existence in turn depends on the efficiency with which man, with all the resources and technology available to him, harnesses, develops and utilizes plants and plant products [2]. A plant becomes a medicinal plant only when its biological activity has been ethno botanically reported or scientifically established [1,2]. In 1978, the World Health Organisation (WHO) emphasized the importance of scientific research into herbal medicine. Many developing countries of the world look upon native medicinal plants as possible addition to the WHO's list of "essential drugs" once their values have been clinically proven [3]. A simple first-principle biological technique in the evaluation of plant with no known biological activity is to conduct a screening test [4]. *Spondias mombin* is a fructiferous tree having habitat in Nigeria, Brazil and several other tropical forests in the world [5]. It belongs to the family Anacardiaceae. It grows in the rain forest and in the coastal area. The root is used for emergency water source. The stem as living fences in farm land, shelter by artisans and has low quantity wood [6]. The wood in carpentry for match sticks, match boxes, physicians spatulas, stick for sweet, meats, pencils, pen-holder, racking cases, interior sheathing of homes and boats and as a substitute for cork. In Brazil, used as bottle stoppers and to make seal wax [7]. In Tropical Africa, it serves as poles for huts, garden poles and for axes and hoe handles. In Costa Rica, it is used as fuel, wood ashes in Africa and also as indigo-dye. The bark is used in carving figures like amulet, statuettes, cigarette holder and various ornamental objects and also as dyeing agent and gum glue [8]. The young leaves are cooked as green vegetable and fruit edible – eaten out of hand in stewed with sugar, extracted to prepare ice-cream, cool beverages and jelly in Costa Rica and Brazil. It is used as jam in Panama, Peru and Mexico; wine in Guatemala and Mexicans pickle the green fruit into vinegar [9]. It is widely valued as feed for cattle and pig. The flowers are used for decoration and the nectar is worked on intensively by honey bees [10]. *Spondias mombin* is widely relied on various herbal remedies for numerous conditions and virtually every part of the tree is used from its thickly corky bark, to its leaves, root, fruits and even its flower [11]. The fruits are edible and other parts could be mixed together, boiled and steamed

and the steam inhaled and or used in bath or drink for cure of malaria, stomach problems and general weakness [12]. These unpublished claims can only be ascertained by first identifying the constituents of the plant. The aim and objectives of this present study is to isolate the natural compounds present in *Spondias mombin* determining their percentage composition, its proximate, mineral and vitamin content while considering its anatomical features, with a view to advancing further research into its potential medicinal and pharmacological value to mankind [13].

MATERIALS AND METHODS

Source of material

Spondias mombin used in this study was collected from a garden in Science Village of Nnamdi Azikiwe University Awka, Anambra State. They were certified and authenticated by Professor C.U Okeke of the Department of Botany, Nnamdi Azikiwe University Awka, Anambra State.

Preparation of Samples

Aqueous Extract

Samples of the leaf, bark and root of *Spondias mombin* were collected and prepared by soaking 200g of the powdered sample in 1.2 liters of distilled water for 24 hours in amber coloured bottles. The contents of the bottles were filtered with Whatman no.1 filter paper and the filtrate collected was evaporated to dryness with steam on water bath (40°C) and used for the analysis.

Ethanol Extract

Five grams of dried plant powder was extracted for 4-5 hrs with (150ml) ethanol by hot continous perlocation method in Soxhlet apparatus. After the effective extraction, solvent were concentrated using rotary flash evaporator and water was removed by evaporated to dryness on a hot water bath to yield a soxhlet crude extract.

PROXIMATE ANALYSIS

The proximate which are present in the aqueous and ethanol extracts of *Spondias mombin* were determined and quantified by standard procedures.

Determination of Protein

To 0.1g of the sample 2ml digestion mixture was added. The mixture evaporated on heating on a hot plate until it leaves a clear solution. The sample was collected and diluted with 10ml distilled water. The 0.5ml of the diluted sample was pipette and diluted further to 4.5ml of the sample to make up 5ml. The 0.5ml of nesslars was added to the sample. The absorbance was read at 480nm using a spectrophotometer.

$$\frac{\text{Abs} \times C \times 100}{\frac{SL}{1000000}}$$

Abs = absorbance of the test sample, C = concentration of the standard in mg/ml, C = correction factor, SL= slope (graph of absorbance against concentration).

Determination of Ash

Three grams of the sample was weighed out and ash in a furnace noting the weight of empty crucible and weight of crucible and sample.

$$\frac{W_2 - W_1}{G} \times 10$$

W1= weight of empty beaker

W2= weight of empty beaker and ash sample

G= gram of stock used

Determination of Ether Extract

Five grams (5 g) of the ground leaf sample was placed in a thimble lined with a circle of filter paper. The thimble with its contents was placed in a 50 ml beaker and dried in an oven for 6 hours at 105 ºC. The thimble with its contents were transferred to a Soxhlet extractor. The beaker was rinsed three times with ethyl ether and emptied into the Soxhlet extraction flask. The sample contained

in the thimble was extracted with ethyl ether for 6 to 8 hours at a condensation rate of 3 - 6 drops per second. At the completion of the extraction, the fat extract was transferred from the extraction flask into a pre-weighed evaporating dish with several rinsing of ethyl ether. The evaporating dish was placed in fumehood with the fan on, to evaporate the ethyl ether until no odour was detectable. The dish with its contents was dried in an oven for 30 minutes at 105 ºC, removed from the oven, cooled in a desiccator to constant temperature and weighed. The percentage crude fat was calculated as :

Ether extract W2-W1 100/*S*

Where:W1 = weight of empty evaporating dish

W2 = weight of evaporating dish + content after drying.

S = sample weight before drying.

Determination of Moisture content

The three grams of leaf, bark, root of *Spondias mombin* were weighed in a triple beam balance and ground. Then the samples were oven dried for two hours and the difference in weight is the moisture content of the samples. 100% subtracted from moisture content showed the dry matter content present in the samples.

$$\frac{(W_1 + G) - W_2}{G} \times 100$$

W1=weight of empty beaker

W2=weight of empty beaker and dry matter

G= gram of stock used

Determination of Fibre

To the sample used to determine moisture content 200ml of 0.255molar concentration of sulphuric acid (H2SO4) was added. It was allowed to boil for an hour and filtered. To the residue 200ml of 0.313 normal sodium hydroxide was added. It was boiled again for an hour and filtered, distilled water was used to wash and ash in furnace determined the fibre presence.

$$\frac{W_2 - W_1}{G} \times 100$$

W1=weight of empty beaker

W2=weight of empty beaker and fibre sample

G= gram of stock used

Statistical analysis

Each treatment or assay was repeated or replicated three times. Data were analysed statistically using analysis of variance to compare variations. Results were reported as means ± standard deviation and test of significance were carried out at 95% level of probability.

RESULTS

The result of the proximate analysis clearly showed that the leaf of *Spondias mombin* had moisture content of 10.75±0.02%, root 8.90±0.02% while the bark had 8.27±0.09% (table 1). The differences among these values discussed were significant at 0.05 probability level. The bark contained dry matter of 91.74±0.01, root 91.10±0.09 and the leaf 89.25±0.07. The ash content of the root was also higher 17.38%, leaf 13.72% while the bark 12.71% (table 1). The crude fibre values were 15.27±0.07 (root); 14.74±0.07 (bark) and 12.72±0.07 leaf (table 1).

Table 1. Proximate composition of the leaf, bark and root extracts of *Spondias mombin (%).*

	Proximate Composition %					
Plant Part	MC	DM	Ash	CF	EE	CP
LEAF	10.75±0.02	89.25±0.07	13.72±0.07	12.72±0.07	1.11±0.01	14.77±0.04
BARK	8.27±0.09	91.74±0.01	12.71±0.07	14.74±0.07	0.26±0.03	5.89±0.05
ROOT	8.90±0.02	91.10±0.09	17.38±0.92	15.27±0.07	0.18±0.01	4.77±0.06

Results are Mean ± SD **p<0.05

DISCUSSION

This study determined the proximate composition of *Spondias mombin*, a local plant used in herbal medicinal practice in Nigeria. The results indicated that the moisture values obtained for *S. mombin* were lower and not within the range of moisture content for fruits and vegetables (60-83g/100g) as reported by [14]. This observed variation might have resulted from geographic, climatic and seasonal variations. [15] stated that the low moisture content was indicative of high dry matter content and possible shelf life. The observed low moisture content of the leaf, bark and root of *Spondias mombin* within range (10.75-8.27%) implies that it may have a long shelf life since microorganisms that cause spoilage does not thrive in foods having low moisture content. The crude fibre was present in appreciable amount in the leaf, bark and root of *Spondias mombin*. *Pterocarpus. soyansii* and *Pterocarpus. santalinoides* have also been recognized as an excellent source of fiber, which is an important consideration for people who suffer from elevated cholesterol levels and in helping to cleanse the colon [16]. The value of the ether extract of *Spondias mombin* was low compared to the leaf of *Pterocarpus. soyansii* which were moderate and high [17]. Dietary fat functions in the increase of palatability of food by absorbing and retaining flavours. A diet providing 1- 2% of its caloric of energy as fat is said to be sufficient to human beings as excess fat consumption is implicated in certain cardiovascular disorders such as cancer and aging.

The protein content of the leaf of *Spondias mombin* was high in the leaf but moderate in the bark and root. Protein content makes leaves suitable for consumption, and a necessity for body development. The proteins are sources of amino acids that are essential for maintenance and growth. Proteins are the structural components of all tissues, blood, enzymes, hormones and immunoglobulins [18]. The ash content of the leaf, bark and root of *Spondias mombin* were relatively high when compared to ash content of leaves of *Pterocarpus soyansiii* (9.46%) and *Pterocarpus santalinoides* 7.83% [17]. High ash content in plant always shows high nutritional content.

CONCLUSION AND RECOMMENDATION

The present study has shown the proximate composition of aqueous and ethanolic extracts of leaf, root and bark of *Spondias mombin*. The proximate profile showed the percentage composition of ash, moisture content and dry matter etc. *Spondias mombin* is a powerful plant with many biological compounds that should be respected and taken with caution or according to labelleddosages.

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APPENDIX 1: PROXIMATE COMPOSITION (%)

N	**MEAN**					
LEAF	MC	DM	ASH	CF	EE	CP
	10.76	89.24	13.80	12.78	1.08	14.80
	10.74	89.26	13.64	12.65	1.13	14.74
	10.75	89.25	13.72	12.75	1.11	14.77
BARK	8.23	91.77	12.62	14.69	0.23	5.92
	8.30	91.70	12.80	14.78	0.29	5.86
	8.27	91.74	12.71	14.74	0.26	5.89
ROOT	8.94	91.06	18.30	15.24	0.16	4.74
	8.86	91.14	16.45	15.30	0.19	4.80
	8.90	91.10	17.38	15.27	0.18	4.77