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## CHARACTERISTICS AND COMPOSITION OF THE FRUIT OF *AVICENNIA MARINA*

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The fruit of *Avicennia marina* was investigated for its proximate chemical composition. The crude protein, fat, total carbohydrates, moisture, crude fibre, ash and gross energy content were estimated. The fruit was found to contain significant level of Na, Ca, Mg, K and P. The chromatographic analysis of ethyl alcohol water extract showed that it contains essential amino acids like arginine, methionine, phenylalanine, leucine, valine and sugars as arabinose, galactose, glucose, maltose, mannose and lactose.

**Key words:** *Avicennia marina*, Fruit, Proximate chemical composition.

### Introduction

One of the most outstanding system of tropical coastal zone is the mangrove, the ugly duckling that has only recently acquired its swan feathers in the eyes of scientific community. The biomass, wood, leaves and fruit of these marine macrophytes contributes directly to mankind and indirectly contributes to eco-system energy dynamics. Mangrove detritus has been reported to be the basis for the transformation of energy rich organic matter into consumers food chain [1]. The use of mangrove foliage by living organisms has existed for a long time. Mangrove leaves are used as fodder by livestock in many parts of the world. The cows fed on mangrove leaves yield better quality of milk than other fodders [2].

Biochemical components of mangrove foliage has been recognized by many workers [3]. Recently [4] reported on the seasonal variations in the chemical composition of mangrove vegetation of Karachi, but there is paucity of such study on other parts (fruits) of the plant. Present studies are undertaken to provide basic information on some chemical characteristics.

### Materials and Methods

*Avicennia marina* produces lima bean shapes fruits. Fruits of *Avicennia marina* were procured as drift from Karachi coast. The fruits were thoroughly washed then weight, length and breadth were measured for individual fruit. The fruits were dried in oven at about 100°. They were macerated by first pondering in a porcelain mortar and then placing in a warning blender. The seeds were analysed for moisture, lipids, proteins, ash and crude fibre by AOAC methods. Total nitrogen was determined by the micro kjeldahl method and protein is estimated by computing as N x 6.25. Total carbohydrates were calculated by difference. The calorific value was obtained by multiplying the mean value of the crude protein, lipid and carbohydrates by Atwater factor of 4.9 and 4 respectively and taking the sum of the products expressed as kilo calories.

The moisture contents of fresh fruit was determined by drying at 130° to constant weight. The ash content was

determined by incineration of the fat free sample at 600°. The cation analysis (Na, K, Ca and Mg) was performed on the solution obtained by dissolving the sample of ash in nitric acid (HNO<sub>3</sub>, 50% v/v) diluted with double distilled water 1:10. The results were determined on Perkin Elmer atomic absorption spectrophotometer [6]. Phosphorus was determined colorimetrically [7]. Fat was extracted by diethyl ether (boiling point 35°) using Soxhlet extractor for 5 hr.

The soluble carbohydrate (sugars) and amino acids present in the sample were estimated according to the methods as described by Harborne [8].

### Results and Discussion

Table 1 shows the characteristics of the fruit of *Avicennia marina*. The chemical composition, gross energy and mineral contents of the fruits are given in Table 2 and 3 respectively.

TABLE 1. CHARACTERISTICS OF FRUIT *AVICENNIA MARINA*.

	Range of values
Shape	Lima bean shaped
Weight (gm)	4.09
Length (cm)	2.43
Breadth (cm)	2.21
Weight of skin (gm)	0.91
Weight of cotyledons (gm)	3.18

\* Each value is mean of 10 samples.

TABLE 2. APPROXIMATE CHEMICAL COMPOSITION OF FRUIT OF *AVICENNIA MARINA*.

	(Expressed as % dry weight)
Moisture	60.4
Dry matter	39.6
Ash	1.9
Organic matter	98.1
Protein	11.2
Crude fibre	14.6
Total lipids	0.7
Gross energy (KC)	630.202
Total carbohydrates	25.8

The crude protein level (average 11%) and total carbohydrate contents (average 25.6%) suggests that it would be a useful feed supplement. The protein content is lower than in the common oil seed cakes. Such as ground nuts 48%, soyabean 37.03%, but it is richer than the protein of maize 10%, rice 8%; sorghum 11% and wheat 8%. The carbohydrate contents (25.8%) is lesser than that of winged bean (34%) [10,11] and near to soybean cake (28%) and peanut cake (27%) [12].

The crude fibre content of the fruit was high at 14.5%, which is quite high and may influence the digestibility of the fruit and may also aid the peristaltic movement of the intestinal tract [9]. The ash contains high molecular weight elements (Table 3). It is rich source of K, Ca, Mg and P. The calculated food energy was 630.2 KC/100.

TABLE 3. MINERALS COMPOSITION OF FRUIT OF AVICENNIA MARINA.

Minerals	% ash
Sodium	16.5
Pottassium	17.6
Calcium	1.2
Magnesium	1.36
Phosphorus	3.2

TABLE 4. FREE AMINO ACIDS OF DEFATTED FRUIT OF AVICENNIA MARINA.

Amino acids	R <sub>f</sub> values of samples	R <sub>f</sub> values of standards
Arginine	0.121	0.121
Alanine	0.316	0.325
Methionine	0.5	0.492
Glycine	0.298	0.282
Phenylalanine	0.613	0.607
Leucine	0.618	0.607
Tyrosine	0.466	0.452
Tryptophane	0.690	0.678
Valine	0.453	0.428
Glutamic acid	0.391	0.318

A total of ten amino acids were detected in this fruit (Table 4). The contents of essential amino acids are not worthy especially for a plant source.

Free sugars identified in *Avicennia marina* fruit are shown in Table 5. A total six spots developed which were identified as arabinose galactose, glucose, maltose, mannose and lactose. The presence or absence of certain amino acids is the most reliable parameter for judging the quality of food

TABLE 5. FREE SUGARS COMPOSITION OF AVICENNIA MARINA FRUIT.

Free sugars	R <sub>f</sub> values of sample	R <sub>f</sub> values of standards
Arabinose	0.455	0.437
Galactose	0.308	0.303
Glucose	0.274	0.261
Maltose	0.219	0.217
Mannose	0.405	0.40
Lactose	0.209	0.21

samples. The analysis of free amino acids profile of *Avicennia marina* fruit may be used as a tool for quality assurance.

To assess biologically the nutritive value of *Avicennia marina* fruit, animal feeding experiments are underway. It appears that this fruit can serve as a good source of some nutrients and hence may be used for upgrading other animal foods deficient in some minerals, sugars and amino acids.

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