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A NEED OF CONSERVATION OF MANGROVE GENUS *BRUGUIERA* AS A FAMINE FOOD

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Abstract
Mangroves forests are extremely important coastal bioresources, which are vital to socio-economic development. A vast majority of population lives in coastal area depend on local resources for their livelihood. Most of the local resources are ignored without testing their utility systematically especially for mangroves with special reference to nutritional value. Therefore, the present attempt is made to quantify the biochemical composition of moisture, ash, crude fiber, fat, carbohydrates, crude protein and energy content of true mangrove genus Bruguiera viz., B. gymnorrhiza L. (Lamk) and B. cylindrica L. (Blume). Also the mineral content was determined, which reveals that both the species are rich in essential minerals like calcium, iron and magnesium. Comparing proximate composition of leaves and propagules of both the species, the study reveals that the propagules could be a good supplement for carbohydrates. The highest proteins are present in leaves of B. cylindrica (13.1%) and also rich in carbohydrates, ash and energy content. The leaves and propagules of B. gymnorrhiza show highest value of crude fiber. Maximum energy content is observed in propagules of B. cylindrica (320.58 Kcal/100g). Mineral composition of Bruguiera species shows they are the rich source of all essential minerals. Proximate and mineral analysis of these mangrove species can help us to determine the health benefits achieved from their use as an emergency as well as famine food. The present results suggest both the species are rich nutritionally. However, these species have very restricted distribution and are disappearing fast from west coast of Maharashtra. Thus, there is an urgent need of conservation of such potential species.

Keywords: mangroves, bruguiera, proximate, biochemical, mineral

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1. INTRODUCTION

Mangroves, admittedly, are not only important but crucial for the coastal areas. These are important bioresources since time immemorial in the tropics and sub-tropics. These are associated with human existence, survival and their socio-economic history especially for coastal communities. Food demands have been accelerated with the exponential human population growth resulting in marginal land resource availability for growing the food crops. According to FAO, there are about 840 million undernourished people in1998-2000, of whom 799 million are in developing countries, 30 million in the countries in transition and 11 million in the industrialized countries (Sartaj, 2001; Diouf, 2002; Gilani *et. al,* 2010, Dini *et. al,* 2005). Rapidly increasing knowledge on nutrition, medicine and plant biotechnology has dramatically changes the concepts about food, health and agriculture and brought in a revolution on them (Zhao, 2007). The leaves and peeled seedlings are soaked, boiled and eaten. Seedlings *Bruguiera* species are the staple food in some parts of Papua New Guinea. Seedlings are sliced, soaked to leach out the tannins, and then ground into a paste to make a sweetmeat (Orwa *et. al* 2009). To apprehend the situation, interests have been centralized on the exploitation, quantification and utilization of coastal plants as an alternative emergency food. Coastal environment having fewer land resources to the local communities to satisfy their food demands. Therefore, in present study, leaves and propagules of *Bruguiera* species were screened for their nutraceutical status.

2. MATERIALS AND METHODS

Plant collection: Both the species of *Bruguiera* were collected from west coast of Maharashtra.

Sample Preparation: The samples were washed under running water and blotted to dry. The material was air-dried and ground to a fine powder. Powder is stored in air-tight containers prior to further analysis.

Proximate analysis: The moisture and ash content was determined by gravimetric method. The crude fiber was calculated by acid-base digestion. Crude protein was determined by Macro-Kjeldahl method. Crude fat content was determined gravimetrically following Soxhlet extraction with ether according to Official AOAC method (AOAC 963.15). Available carbohydrate was estimated "by difference" using the formula, TCH (%) =100-%(CP+A+CF+M). The energy value were estimated by calculation method using following formula, Energy value (g/100g) = [4 x crude protein] + [4 x carbohydrate] + [9 x crude fat].

Mineral Analysis: Acid digestion was carried out by the method followed by Toth *et .al* (1948). The mineral elements like Cu, Zn, Co, Fe, Ca, Mg, Mn etc. were analyzed by Atomic Absorption Spectrophotometer (AAS).

3. RESULTS AND DISCUSSION

- **Proximate Analysis:**

The results of proximate composition of both species of *Bruguiera* (leaves and propagules) are shown in table-1. The ash content which is index of mineral contents, for *B. gymnorrhiza* propagules the value of 9.17% was more than to the values of others. It has been reported that, protein-calories malnutrition deficiencies is a major factor responsible in nutritional pathology (Roger *et . al*, 2005).)The highest crude proteins was observed in the leaves of *B. cylindrica* (13.1%) followed by leaves of *B. gymnorrhiza* (9.62%). The fat content observed was much less in leaves as well as propagules of *Bruguiera* species. Comparing the moisture content in leaves and propagules of both the species it was found that, leaves of *B. gymnorrhiza* had highest moisture. The estimated carbohydrate contents in propagules of *B. cylindrica* and *B. gymnorrhiza* were standing to be higher than the leaves. The crude fiber content in both the species was more ranging from 6.79-15.72%. The leaves of *B. gymnorrhiza* showed rich source of crude fiber. Intake of dietary fibers can lower the serum cholesterol level, risk of coronary heart disease, hypertension, diabetes and breast cancer (Ishida *et . al*, 2000). The total energy content was estimated to be 320.58% and 300.29% for the propagules of *B. cylindrica* and *B. gymnorrhiza* respectively, which is an indication that it could be an important source of dietary calorie.

- **Mineral Analysis:**

Bruguiera species are good sources of minerals as shown in graph (1-4). The highly soluble minerals like Calcium, Magnesium, Iron etc. help in the maintenance of acid-base balance of hydrogen ion concentration of the body tissues.

Table-1: Proximate analysis of leaves and propagules of *Bruguiera* species

Sr. No.	Name of the sample	Moisture (%)	Ash (%)	Crude protein (%)	Fat (%)	Crude fiber (%)	Carbohydrates (%)	Total energy (Kcal/100g)
1.	Leaves of *B. gymnorrhiza*	8.49	8.47	9.62	0.72	15.72	56.98	272.88
2.	Leaves of *B. cylindrica*	7.32	8.94	13.1	0.93	9.37	60.34	302.13
3.	Propagules of *B. gymnorrhiza*	6.68	9.17	4.37	0.81	10.09	68.88	300.29
4.	Propagules of *B. cylindrica*	9.4	4.64	5.25	0.78	6.79	73.14	320.58

They help to complete the absorption of vitamins, proteins, fats and carbohydrates of the food (Islam et .al, 2004).

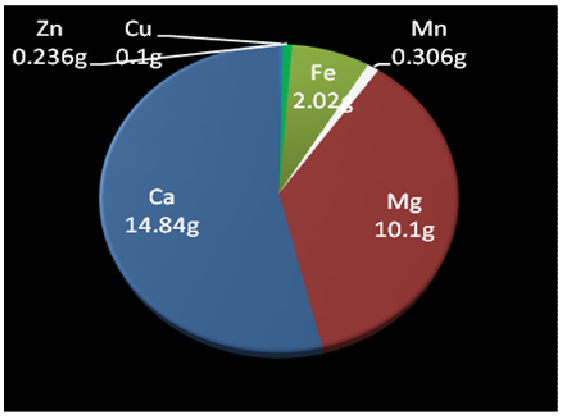

Fig.1: Minerals in propagules of *B. gymnorrhiza*

Calcium and Iron furnish all the cells and tissues of the body with the elements and the nutritional enzymes which they need. Calcium, iron and magnesium present in leaves and propagules of both the species of Bruguiera in appreciable amount. In propagules of B. gymnorrhiza copper and manganese are present in very least amount as compare to magnesium, iron and calcium while in leaves magnesium and calcium present in higher amount (Fig.1 & 2).

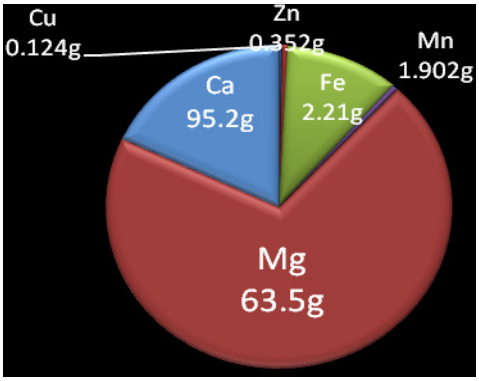

Fig. 2: Minerals in propagules of *B. cylindrica*

The higher calcium content (952mg/100g) in propagules of *B. cylindrica* suggests that they would be more advantageous to the body in the functions associated with minerals (Fig.3). Dairy products supply 50-80% of diatary calcium in most industrialized countries, while foods of plant origin supply about 25%.

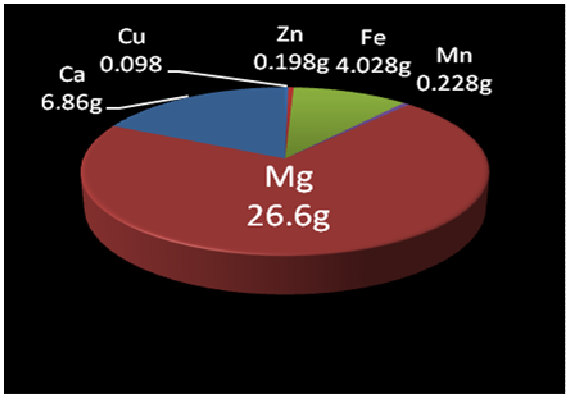

Fig.3: Minerals in leaves of *B. gymnorrhiza*

The calcium concentration in propagules of *B. cylindrica* was found highest among all. Calcium is required for bone and teeth formation and in proper functioning of the nervous system. Iron is essential trace element for haemoglobin formation, normal functioning of central nervous system and in the oxidation of carbohydrates, proteins and fats (Adeyeye &Otokiti, 1999). Iron is present in much more amount in propagules of *B. cylindrica.* Magnesium in leaves is quite higher than propagules of *B. cylindrica*, which is recommended for hypertension patients because it is useful in reduction the blood pressure (Fig.4).

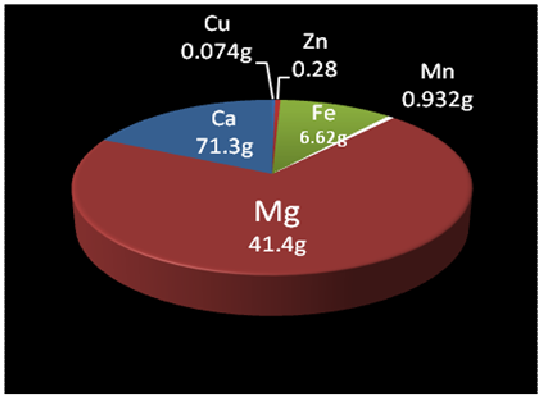

Fig. 4: Minerals in leaves of *B. cylindrical*

According to FAO, food balance data, it has been calculated that about 20% of the world's population could be at risk of deficiency of

essential minerals. In all the leaves and propagules of *Bruguiera* the range of copper is less than 5mg, which is recommended by WHO.

4. CONCLUSIONS

From the present investigation, it is concluded that, propagules of *Bruguiera* species rich nutritionally. The nutritional value of *Bruguiera* species is reported for the first time here. Both the species having a potential energy value, which proves the importance of species with respect to nutritional status. All the results +suggest that, both the species are rich in nutrition and recommend for future emergency food or famine food in coastal areas.

5. ABBREVIATIONS

AOAC Association of Official Analytical Chemists
FAO Food and Agricultural Organization
WHO World Health Organization

6. ACKNOWLEDGMENT

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