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ORIGINAL RESEARCH ARTICLE

Proximate Composition of Certain Selected Marine Macro-Algae form Mandapam Coastal Region (Gulf of Mannar), Southeast Coast of Tamil Nadu

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ABSTRACT

In the present day, the fresh and dried seaweeds are consumed directly or indirectly as a dietary supplement. The important key to know it consumable value is by estimating its proximate composition. Three seaweeds were collected during the low tide of the littoral and sub-littoral region from the shores of Mandapam coast located in the Gulf of Mannar biosphere Reserve, Southeast coast of Tamil Nadu. The three species *viz.*, *Gracilaria corticata* of Rhodophyta and *Sargassum longifolium* and *Turbinaria conoides* of Phaeophyta were estimated for its proximate composition such as Carbohydrate, Protein and Lipid contents. Among the seaweeds, *Gracilaria corticata* of Rhodophyta showed highest carbohydrate content and *Sargassum longifolium* showed high Protein and Lipid content.

Key words: Mandapam, *Gracilaria corticata*, *Sargassum longifolium*, *Turbinaria conoides* and Proximate composition.

1. INTRODUCTION

Eventhough, seaweeds are not considered as main source of energy they has been considered for its nutritional value regarding vitamin, protein and mineral contents [1,2]. Fresh and dried seaweeds are extensively consumed especially by people living in the coastal areas. They are nutritionally valuable as fresh or dried vegetables. In France, seaweeds have been authorized as vegetables and condiments [3], or as ingredients in a wide variety of prepared foods [4]. In Asian countries in particular like China, Japan and Korea seaweeds are used as food [5,6,7]. In particular, certain edible seaweeds contain significant quantities of protein, lipids, vitamins and minerals for human nutrition [2,8-12]. Depending on the type of seaweed, it is generally suitable for making cool, gelatinous dishes or concoctions. At the present time, seaweeds are used worldwide for different purposes: to obtain phycocolloids, as fodder, as a fertilizer and for direct use in human nutrition [13]. The nutrients compositions of seaweeds vary and they are affected by species, geographic area, season and temperature of water [8]. These sea-vegetables are of nutritional interest as they are low calorie food, but rich in vitamins, minerals and dietary fibers [14].

The nutritional properties of seaweeds are not completely known yet, and they are usually estimated from their chemical composition alone [3, 15]. Consumption of seaweeds can increase the intake of dietary fiber and lower the occurrence of some chronic diseases (diabetes, obesity, heart diseases, cancers, etc.), which are associated with low fiber diets of the Western countries [16]. The present study was mainly focused to evaluate the proximate composition of selected seaweeds form the Mandapam coastal region, southeast coast of Tamilnadu.

2. MATERIAL AND METHODS

Sample collection

The three seaweed samples *Gracilaria corticata*, *Sargassum longifolium* and *Turbinaria coronoides* with relevant biomass collected from the littoral and sub-littoral of Mandapam coastal region in the early morning of August 2011. These samples were thoroughly washed with surrounding sea water and were placed in conditioned plastic bags until carrying to the laboratory. Samples were then brought to the laboratory and washed 3 to 4 times with normal water to remove the debris, epiphytes and adhered sand/dirt particles. All these samples were dried at room temperature followed by 40ºC in the hot air oven for two days until and milled to particle size less than 2 mm and kept in air tight plastic bottles at room temperature. These powdered samples were used

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to estimate the proximate composition of the species.

Estimation of Proximate Composition

The proximate composition such as carbohydrate, protein, and lipid was analyzed using following methods. The carbohydrate was estimated by Phenol-Sulphuric acid method by Dubois *et al.* [17]. Protein was estimated by following the method of Raymont *et al.* [18]. The lipid was estimated by using chloroform methanol mixture as described by Folch *et al.* [19]. The powder samples were analyzed in triplicate. The data reported on a dry matter basis with its mean values ± Standard Error.

3. RESULTS AND DISCUSSION

Proximate composition such as a Protein, Carbohydrate and Lipid were analysed from three different seaweeds *Gracilaria corticata* of Rhodophyta and *Sargassum longifolium* and *Turbinaria conoides* collected from Mandapam coastal region, Southeast coast of Tamil Nadu. Carbohydrate plays important as energy supplier role for metabolic process. In the present study, *Gracilaria corticata* (43.33±2.61) showed highest percent of carbohydrate content when compared to the other Sargassaceae members *Sargassum longifolium* (16.8±0.7) and *Turbinaria conoides* (14.9±1.08). Carbohydrates comprise 50 – 60% of dry weight of seaweed [20]. The *Sargassum longifolium* (18.65±1.21) seems to have highest percentage of protein content compared to *Turbinaria conoides* (15.9±1.22) *Gracilaria corticata* (6.33±0.43). Compared to these three selected seaweeds the low protein content is seen to be reported in *Gracilaria corticata*. *Gracilaria tenuistipitata* appeared to be an interesting potential source of food proteins as it had protein contents similar to *Halymenia formosa* (21.2%) (21), *Gracilaria cervicornis* (23.0% DW) (22) and *Grateloupia turuturu* (22.9% DW) (23). However, the protein contents of the two species were lower than those of other seaweed species such as *Porphyra tenera* (47% DW) and *Palmaria palmata* (35% DW) (24). These levels varied depending on algal species, season and environment [14].

Edible macroalgae are rich in protein and dietary fiber [25] compared with fruits and vegetables [26]. Lipids serve as a storage material in living organisms and on oxidation process it produces more energy. In this present study, *Sargassum longifolium* (8.2±1.57) shown to have highest percent of lipid content followed by *Gracilaria corticata* (5.2±0.94) and *Turbinaria conoides* (3±0.56). Fat contents of seaweeds were found within the range of 1–6 g/100 g DW with high concentrations of long-chain polyunsaturated fatty acids [15,27]. Fatty acids are important for human and animal health because they are precursors in the biosynthesis of eicosanoids, which are important bio-regulators in many cellular processes [28].

Table 1: The mean (±SD) contents of Carbohydrate from selected Mandapam coastal region (Gulf of Mannar), Southeast coast of Tamilnadu during August 2011

S. No	Name of the Species	Carbohydrate (in %)
1	*Gracillaria corticata*	43.33±2.61
2	*Sargassum longifolium*	16.8±0.7
3	*Turbinaria conoides*	14.9±1.08

Table 2: The mean (±SD) contents of Protein from selected Mandapam coastal region (Gulf of Mannar), Southeast coast of Tamilnadu during August 2011

S. No	Name of the Species	Protein (in %)
1	*Gracillaria corticata*	6.33±0.43
2	*Sargassum longifolium*	18.65±1.21
3	*Turbinaria conoides*	15.9±1.22

Table 3: The mean (±SD) contents of Lipid from selected Mandapam coastal region (Gulf of Mannar), Southeast coast of Tamilnadu during August 2011

S. No	Name of the Species	Lipid (in %)
1	*Gracillaria corticata*	5.2±0.94
2	*Sargassum longifolium*	8.2±1.57
3	*Turbinaria conoides*	3±0.56

4. CONCLUSION

The seaweeds *Gracilaria corticata* of Rhodophyta and *Sargassum longifolium* and *Turbinaria conoides* of Phaeophyta were analyzed in this present study for its proximate composition and it shown to have good amount of carbohydrate content and appreciable level of protein and lipid content. In this study, the carbohydrate content of *Gracilaria corticata* was about 40 % in its total composition. These accounts *Gracilaria* spp. for more than half of the world agrophyte production and are cultivated on a commercial scale in several parts of the world. Other necessary contents like amino acids, fatty acids, vitamins, mineral, and other bioactive compounds are need to carry out to know its knowledge and promote the exploitation of these marine algae.

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