Evaluation of Quality Characteristics and Utilizations of Locally Available Seaweed Species of Industrial Potential

by

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ABSTRACT

Principally, seaweeds are excellent sources of many essential elements including dietary fiber, vitamins, minerals and long-chain polyunsaturated fatty acids and are characterized by being low in calories.In global context; the seaweed industry provides a wide variety of products estimated at total annual value of 5.5-6 billion. Several surveys have indicated that a few main species of commercial importance are available in commercially exploitable quantities. However, there are no sufficient studies carried out to assess extraction method of bioactives of physicochemical properties and value added products from their polysaccharides.

Therefore, the present study was intended to evaluate chemical and physical properties, antimicrobial and antioxidant activities and nutritional compositions of commercially important six seaweed spices and their extracts. The value added products based on agar-agar and carrageenan were developed and compared with commercially available counterparts. Seaweeds samples were collected from North West and South West coastal belt of Sri Lanka and transported to the laboratory. The present study also focused to develop a nutritious instant vegetable soup mixture incorporated with cereals, legumes and hydrochollids extracted from different seaweed species were used to replace pectin.

In acid treatments, *Gracilaria edulis*gave a higher agar yield (16.6%) compared to *Gracilaria verrucosa* (15.5±6.4). The gel strength was higher in alkaline treatments

(429±6.4 g. cm^2) on *G. verrucosa*. Freeze-thawed method gave the highest yield (37.3±0.2 %) and the gel strength (715±4.54 g/cm^2) in kappa carrageenan extracted. The highest alginate yield 35% was obtained from *Sargassum wightti* in hot extraction. The mean sodium contents of extracted polysaccharides and commercial product were found 2584mg/kg, 100 mg/kg; 9786 mg/kg 1600 mg/kg; 221mg/kg, 468mg/kg while mean Calcium contents were 79018, 600 mg/kg; 8222 mg/kg, 8000 mg/kg; 678mg/kg, 435m/kg in agar, carrageenan and alginates respectively.

The three soup formulations developed had the highest viscosity (698 cp, 766 cp, 951cp), water activity (0.618, 0.586, 0.437), crude protein (9.3 %, 7.2 %, 1.7 %), carbohydrate (64.54%, 61.3%, 51.32%), iodine value and (0.35, 0.32, 0 mg/L) respectively in agar-agar incorporated soup, carrageenan incorporated soup and commercial vegetable soup mixture. Agar-agar or carrageenan was introduced as a thickening agent to replace pectin which is a major ingredient in fruit based jams. The best carrageenan content in the jam mixture selected in the sensory panel contained 3% (w/w) and the optimal amount of agar-agar was 6% (w/w).The significantly highest (9.62±2.78) protein value was found in *Ulva* jam. Iodine values were in the range from 0.245±0.01-0.98±0.67, 7.5±1.5 -8.3±0.78 and 5.69±0.25 – 6.52±1.90mg/l respectively in commercial, carrageenan, agar jams.

The findings of the present investigation support in proving nutritional properties of above economical important seaweed varieties on the basis of their efficacy in preventing nutritional deficiencies and other than prevention of oxidative stress of chemical hazard foods. Seaweed polysaccharides meet nutritional requirement of food, industry as gelling agent, food thickener and natural colors by challenging artificial food substitute.