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Sensory Evaluation at Various Level of Incorporation of *Eucheuma* -An Edible Seaweed in Pickle Recipe

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Abstract

Background: Edible seaweeds are macro algae that can be eaten as raw and used in the preparation of food. It typically contains high amounts of fiber, complete protein, vitamin and minerals. Seaweeds are used extensively as food in coastal cuisines around the world. Seaweeds have been a part of diets in China, Japan, and Korea since prehistoric times. **Objective**: To incorporate selected edible seaweed in pickle recipe and study its acceptability. **Methods**: *Eucheuma* was used for the preparation of pickle food recipe. The *Eucheuma* seaweed was incorporated in traditional recipe at different levels of incorporation ranging from 2, 4 and 6 percent. The recipe was evaluated for acceptability by five hedonic rating scales. **Results**: The organoleptic characteristics point out that *Eucheuma* had a bitter taste and fishy odour. The mean acceptability scores of seaweed incorporated recipe shows that *Eucheuma* incorporated pickle were more acceptable than standard pickle recipe. **Conclusion**: Seaweeds if incorporated in small amounts add taste to the products.

Keywords: Edible seaweeds, *Eucheuma*, Incorporated, Organoleptic Parameters

Introduction

Marine macro algae are plant like organisms that generally live attached to rock or other hard substrata in coastal areas, are called seaweeds (Hardy and Guiry, 2006). “Seaweeds” are marine macro algae that grow in the ocean as well as in rivers, lakes and other water bodies. Some

seaweed is microscopic such as the phytoplanktons that live suspended in the water column and provide the base for most marine food chains. Some are enormous like the giant kelp that grow in abundant "forests" and tower like under water redwoods from their roots at the bottom of the sea. Seaweeds are multicellular and macrothallic. They are photosynthetic and must be firmly attached to a stratum to stay in the photic zone where they can receive sufficient sunlight (Yang, 2002; Smith, 2004). Seaweeds are also called the benthic marine algae which just mean attached algae that live in the sea (Rindi, 2004).

There are about 20,000 species of seaweeds classified in three divisions according to pigment and storage contents in their thallus. Seaweeds form an integral part of marine coastal ecosystems. They include the macroscopic, multicellular marine algae that commonly inhabit the coastal regions of the world. It has also been estimated that, there are about 9,000 species of macro algae broadly classified into three main groups based on their pigmentation (for example, Phaeophyta, Rhodophyta and Chlorophyta or the brown, red and green algae respectively). Brown seaweeds are the second most abundant group comprising about 2,000 species which reach their maximum biomass levels on the rocky shores of the temperate zones.

Edible seaweeds are algae that can be eaten and used in the preparation of food. It contains high amounts of fibre and complete protein (Wong and Cheung, 2000). They may belong to one of several groups of multicellular algae: the red algae, green algae and brown algae. Seaweeds are used extensively as food in coastal cuisines around the world. Seaweeds have been a part of diets in China, Japan and Korea since prehistoric times (Bird, 2011).

Edible seaweeds have been consumed by coastal people across the globe. Seaweeds are still part of the habitual diet in many Asian countries. Now a day's seaweed consumption has been increased in Western cultures, because of notional health benefits associated with consumption. Isolated seaweed particles like polysaccharides are used in an increasing number of food applications due to improve product acceptability and extend shelf life. Seaweeds are harvested or cultivated for the extraction of alginate, agar, carrageenan and gelatinous substances collectively known as hydrocolloids or phycocolloids. Hydrocolloids have attained commercial significance, especially in food production as food additives (Romero Gonzalez *et al.*, 2001).

Research conducted in western and other Asian countries reveal that consumption of sea vegetables has prevented the onset and incidence of 24 cardiovascular disease, obesity, cancer, osteoarthritis and diabetes mellitus. In south India the Mandapam coast of Gulf of Mannar region harbors luxuriant growth of seaweeds (CSMCRI, 2005). Edible seaweeds produced in tones, possess high nutritional value is being poorly consumed as food by the people in these areas as well as in the other part of India. Exploiting natural food resources is an easy and quick solution to prevent the rising prevalence of lifestyle and nutritional disorders. In the modern and stressful unhealthy lifestyle seaweeds are promising as natural resource in terms of availability and nutrient density. Hence keeping these facts in mind, the study was carried out with the following objectives:

- Incorporation of selected edible seaweed *Eucheuma* in South Indian indigenous recipe as value addition.
- Sensory evaluation of the indigenous Indian recipe incorporated with the selected edible seaweed.

Material and Methods

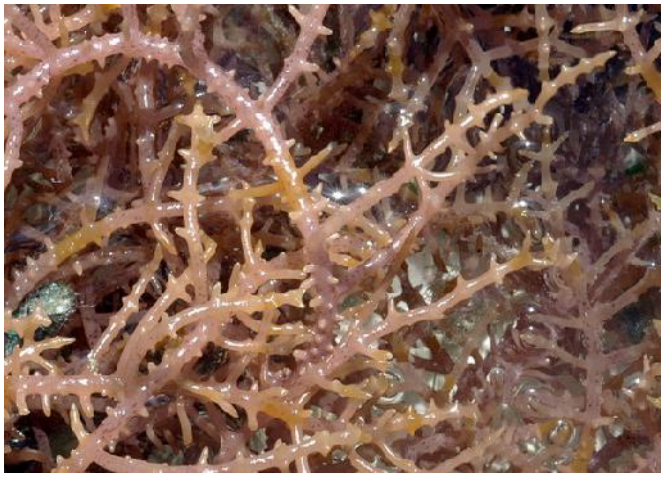
General characteristics of the selected edible seaweeds

Seaweeds are highly concentrated in the coastal belt of Gulf of Mannar, Rameswaram to Kanyakumari in Tamil Nadu. The data indicates that a total of 302 species of seaweeds are available in this belt and more than 263 species are edible. Mandapam area is important coastal zone of Gulf of Mannar where seaweeds are abundantly available and cultivated. With the guidance of scientists from Marine Algal Research Station and Central Marine Fisheries Research Institute (CMFRI), Mandapam the *Eucheuma* seaweed was identified.

The selected seaweed was edible seaweed consumed occasionally by the local population. Seaweed was collected fresh with the help of sea divers trained in handpicking the seaweed. The collected seaweed was rinsed first in sea water in the collected area and packed in aseptic bags. They were further cleaned several times with fresh water to remove extraneous matter such as epiphytes, sand particles, pebbles and shells. Plate I shows the collection of seaweed. Further, the seaweed was washed thoroughly to ensure that all the dirt was removed and spread out in room temperature for drying for a period of 24-32 hours. The morphological characteristics namely

type, colour, texture, shape and habitat of the collected seaweed were observed and the taxonomical classification of the selected seaweed was carried out according to Fritsch, (1935).

Plate – I: Collection of Edible Seaweed as Study Sample



Eucheuma

Incorporation of selected edible seaweed in south Indian indigenous recipe

Formulation of selected edible seaweed product

Value added product was developed with the incorporation of seaweed *Eucheuma*, so that they can be used to supplement humans and determine the nutrients content in the selected edible seaweed recipe.

Selected edible seaweed recipe

Eucheuma seaweed pickle was prepared also prepared without selected edible seaweed powder. The selection of the product was based on the easy in preparation and packaging. Dry selected edible seaweed powder of *Eucheuma* was prepared in 2%, 4% and 6% levels in pickle.

Preparation of recipes is a formula specifying the quality of each ingredient required to produce a specific quantity and quality of a particular food item (Khan, 1987). A written set of description was followed for each recipe. Each ingredient was weighed using a weighing scale before and after preparation. Portion size and duration of preparation were noted in each case. All the

recipes were standardized for one serving and repeated thrice to get consistent results. Table 1 shows the standardized recipe along with the ingredients used for preparation.

Table- 1 Ingredients used for value added edible seaweed *(Eucheuma)* pickle and standard

S.No	Ingredients	Standard Quantity	Level of incorporation		
			2%	4%	6%
1.	*Eucheuma* seaweed powder	-	2 gm	4 gm	6 gm
2.	Fenugreek powder	2 gm	2 gm	2 gm	2 gm
3.	Chilli powder	10 gm	10 gm	10 gm	10 gm
4.	Mustard powder	1 gm	1 gm	1 gm	1 gm
5.	Asafoetida	1 gm	1 gm	1 gm	1 gm
6.	Tamarind extract	5 gm	5 gm	5 gm	5 gm
7.	Gingelly oil	15 ml	15 ml	15 ml	15 ml

Method of Preparation

1. Heat gingelly oil and add mustard seeds, fenugreek powder, chilli powder, asafoetida, seaweed powder (*Eucheuma*) and tamarind extract.
2. Mix well and keep covered for a day.
3. Next day cover the bowl with a muslin cloth and keep in sunlight for few hours for a day.
4. Add the gingelly oil in the jar (The oil will be at least 1 inch above the pickle level).
5. Cover the jar with the lid and let it mature for a week before start using.

Sensory evaluation of the indigenous Indian recipe incorporated with the selected edible seaweed

Sensory properties, among many other factors influence considerably the quality of food products. A product could have an excellent composition and satisfy the highest nutrition criteria, but if it is unsatisfactory in appearance, taste or odour it will not find the way to

consumers. Sensory evaluation means it's a scientific method and used to evoke measure, analyze and interpret those responses to products through the senses of sight, smell, touch, taste and hearing. The developed recipes were organoleptically evaluated by 5 panel members. The panel members were selected on the basis of their age, health, cooperation, willingness and knowledge of sensory analysis and also the ability to discriminate the various criteria's for sensory evaluation.

The sensory evaluation was carried out in a suitable time around 11am to 12 pm before lunch time. The result was recorded and analyzed appropriately. Traditional recipe was prepared in the foods laboratory in the Department of Home Science (Food & Nutrition), Thassim Beevi Abdul Kader College for Women, Kilakarai. Water was provided to sensory evaluator before and after tasting the recipe. Score card is a tool which helps in evaluation through direction and degree of judgment using suitable defined scores. The panel members did the organoleptic evaluation of these recipes based on five point scale developed by Peryam and Pilgrim (1957).

A five point Henodic Scale was developed for the purpose of evaluation of the appearance, flavour, texture and overall acceptability. The mean score of the organoleptic evaluation was calculated and on the basis of the total obtained scores. In general, the acceptability trial revealed that selected edible seaweeds incorporated recipe was most acceptable. Hence, the selected *Eucheuma* seaweed can incorporate in our daily diet to improve the nutritional status.

Results and Discussion

General characteristics of the selected edible seaweed sample

The selected seaweed namely *Eucheuma* general characteristics and taxonomy is given in the Table 2. The taxonomy of the selected seaweeds is classified according to Fritsch (1935).

Table -2. General characteristics of the selected edible seaweed *(Eucheuma)* sample

Name of the edible seaweed	General characteristics of edible seaweed			
	Type	Color	Texture	Habitat
Ulva reticulate Order - Ulotrichales Family- Ulvaceace Class - Chlorophyta	Green chlorophyta	Grass green	Silky	Free floating mass

Incorporation of selected edible seaweeds in south Indian indigenous recipe

The seaweeds containing diet was able to keep the total cholesterol at levels similar to baseline, leading the authors to suggest the incorporation of seaweed into the diet might be important in the reduction of total cholesterol (Carvalho *et al.*, 2009). The organoleptic characteristics point out that *Eucheuma* had a bitter taste and fishy odour. The selected seaweed sample was dried, powdered and incorporated into pickle recipe.

Sensory evaluation of the indigenous Indian recipe incorporated with the selected edible seaweed

The selected seaweed *Eucheuma* was incorporated in traditional recipe at different levels of incorporation ranging from 2, 4, and 6 percent. The recipe was evaluated for acceptability by five hedonic rating scales. Tables 3 show the mean acceptability scores of seaweed incorporated recipe.

Table-3 Mean acceptability scores of selected edible seaweed *(Eucheuma)* incorporated pickle

Contents	**Standard**	***Eucheuma powder***		
		2%	**4%**	**6%**
Appearance	5	4.5	4.3	3.8
Colour	5	4.4	4.1	3.7
Flavour	5	4.2	4.0	3.5
Texture	5	4.5	4.0	3.9
Taste	5	4.8	4.5	4.1
Mean acceptability score	5	4.4	4.1	3.8

From the table shows that *Eucheuma* incorporated pickle recipe to be more acceptable than standard pickle recipe.

Conclusion

Edible seaweeds is a food stuff that has been historically consumed around the globe but is only consumes in appreciable amounts in certain areas of the world today. Edible seaweeds from the Mandapam coast were analysed for nutrients and ash content. The nutrient analysis is found to be higher in all levels of incorporation *Eucheuma* are a good nutrient supplement, which can help in enriching the existent nutrient quality of the common recipe. So that, incorporation with the

edible seaweed powders can be made more acceptable. Selected edible seaweed may be used as potential food supplements to improve the Nutritive value of the diet. To conclude from these studies, selected edible seaweeds namely *Eucheuma is* safe for human consumption. From these studies we recommended to prepare various recipes by using the seaweed contain no toxicity for human consumption.

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