



MUSLIM ARTS COLLEGE

THIRUVITHANCODE-629174, KANYAKUMARI DISTRICT
TAMILNADU.

National Level Seminar
on

**NUTRACEUTICALS AND FUNCTIONAL FOODS
IN HEALTH AND DISEASE PREVENTION**

Certificate

This is to certify that

Dr./Mr./Mrs./Ms. S. VISILA JASMIN, ASSISTANT PROF
Department of Zoology, Muslim Arts College

has participated in the

“National Level Seminar on

Nutraceuticals and Functional Foods in Health & Disease Prevention”

on 1st October, 2019 as a Delegate / Resource Person /


Presented a Paper / Poster entitled


on Nutrient Composition AND Functional
Food Applications of Seaweeds.

and won _____, organized by the Department of

Nutrition and Dietetics, Muslim Arts College, Thiruvithancode,

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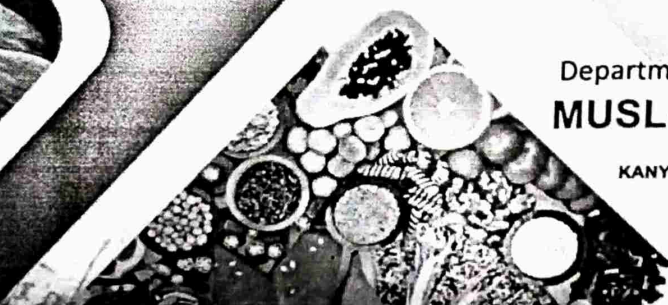
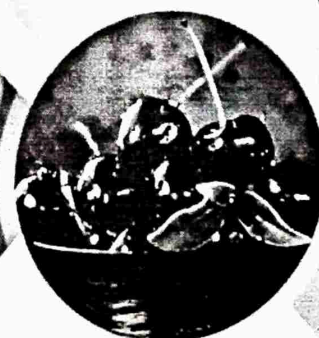
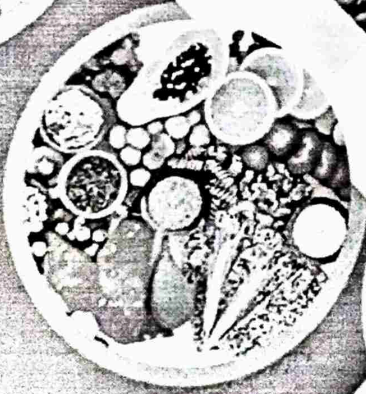
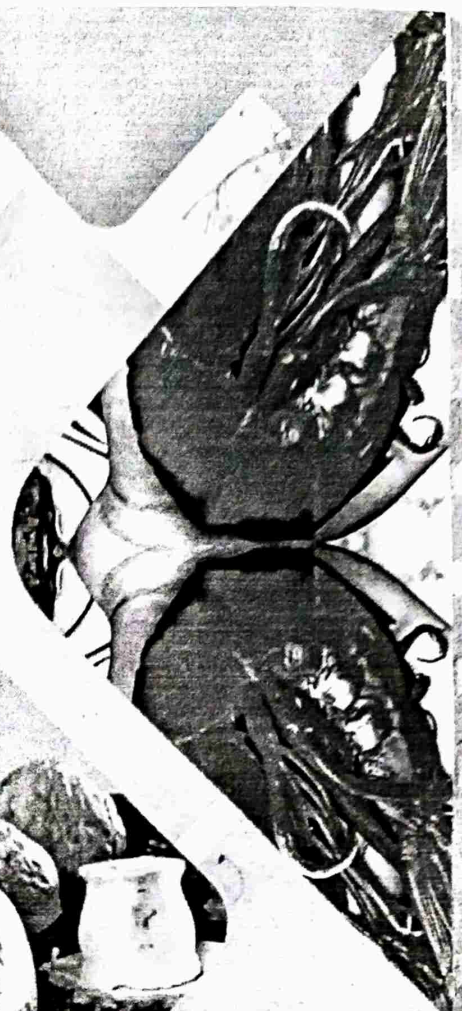
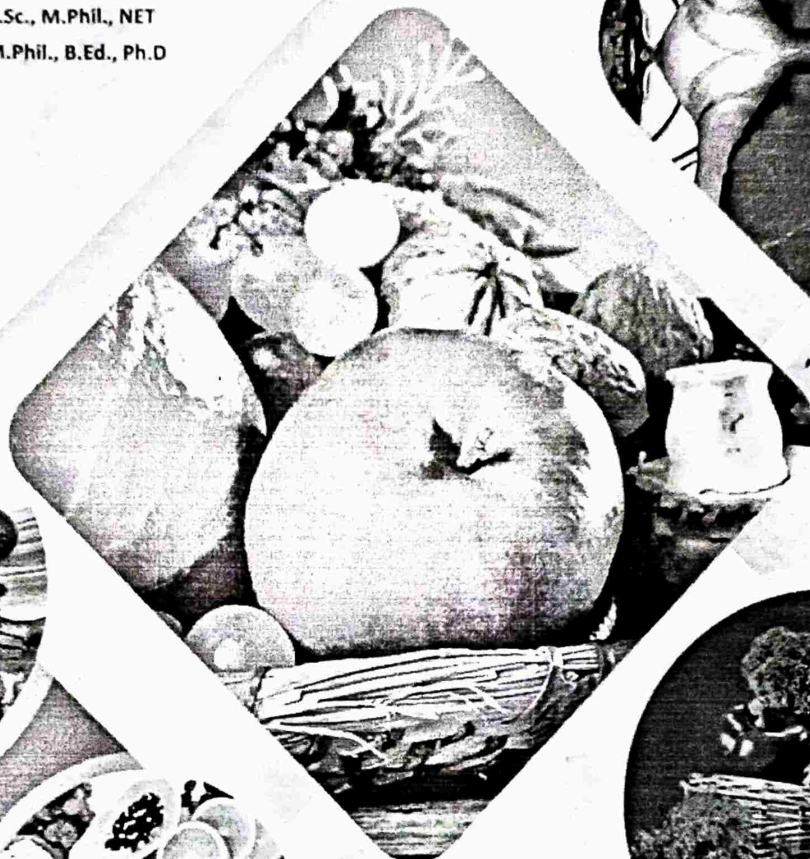
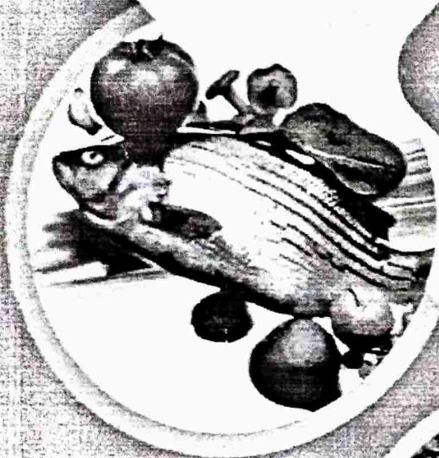

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NUTRACEUTICALS AND FUNCTIONAL FOODS IN HEALTH AND DISEASE PREVENTION

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NUTRIENT COMPOSITION AND FUNCTIONAL FOOD APPLICATIONS OF SEAWEEDS

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Abstract

Seaweeds are macroscopic algae, which form an important component of the marine living resource. They are available largely in shallow coastal waters wherever there is a substratum on which they can grow and flourish. Based on their pigmentation, the seaweeds are broadly grouped into green, brown and red macroalgae. They are harvested by man for centuries, particularly in Japan and China, where they form a part of the staple diet. The uses of seaweeds as food, fodder and manure are well known in many countries. Fresh, dried and processed seaweeds are utilized as human food and the food value depends upon the minerals, trace elements, proteins and vitamins present in them. They are eaten as salads, curries, soup and vegetable. This review will outline the biochemical, nutritional and applications of seaweeds.

Key words – Marine living, protein, seaweeds, food, nutrient

Introduction

Human activities lead to many changes in the environment, which ultimately upset the natural balance between living organisms and encourage disease causing pathogens to multiply rapidly, thereby increasing the risk of disease outbreak. Natural resources have become the focus of drug research to deal with the pathogenic microbes, which in many cases, provided vital leads for the development of synthetic compounds. Unmindful use of conventional antibiotics led to the development of resistance in human pathogens, including multi-drug resistance. So, the search for novel and potent antibiotics from natural resources has become indispensable to combat both new diseases and drug resistance. Seaweed is a rich source of nutrients included in Asians traditional cuisine and is being extensively explored for its other merits as a food. Apart from its proven nutritional properties, bioactive molecules found in seaweeds have attracted the interest of health conscious societies, as seaweed is regarded as a remarkable marine medicinal food.

Seaweed

Seaweed, also called as algae, is taxonomically classified under four groups namely: red algae (rhodophyta), brown algae (phaeophyta), green algae (chlorophyta), and blue-green algae (cyanophyta). Macroalgae, which include above three groups of seaweed other than blue-green algae, have a long history of utilization as direct or processed food across the globe. Seaweeds are traditionally used in human and animal nutrition. Their protein contents differ according to the species and seasonal conditions. Little information is available on the nutritional value of algal proteins and, especially, on the compounds that decrease their digestibility. The optimal advantage of

seaweed is that it is a phenomenal source of a nutrients missing in almost every other food. Algae extracts have been utilized for treatment in medical conditions since ancient times. Traditionally more concentrated on biologically active compounds of Seaweeds (fucoidan, alginic acid, carotenoids, phlorotannins, and peptides) have been demonstrated to play an emergent role in eradication of certain degenerative diseases such as cancer, inflammation, arthritis, diabetes and hypertension.

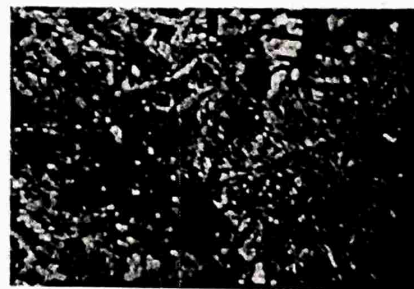
Seaweed nutrients

Seaweeds are rich sources of many trace elements, minerals, protein, iodine, bromine, vitamins, polysaccharides, bioactive substances and micronutrients (Chapman and Chapman, 1980). Seaweeds are used as food in many countries like Malaysia, Indonesia, Korea, Australia, Japan and Singapore especially in the form of salads, soups, jellies and in vinegar dishes and its use as food and medicine prior to 2000 BC has found a mention in ancient Chinese medicinal literature (Abbott, 1996). The species used as food includes *Caulerpa sp.*, *Codiurn sp.*, *Hydroclathurn sp.*, *Sargassurn sp.*, *Porphyra sp.*, *Laurencia sp.* And *Enterornorpha*, *Gradiaria*, *Sargassurn*, *Padina* and *Dictyota sp.* are used as feed for cattle and poultry (Qasim, 1998).



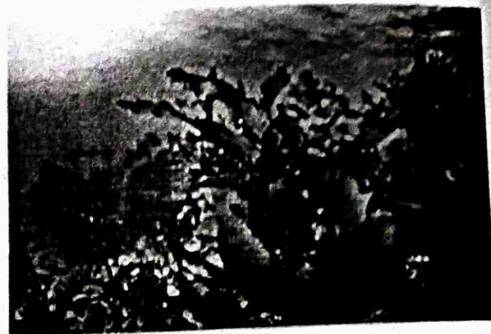
Nutraceuticals

Seaweeds are low in calories from a nutritional perspective. The lipid content is low, and even though the carbohydrate content is high, most of this is dietary fibres and not taken up by the human body. Cofrades S. et al (2010) studied about nutritional and antioxidant properties like total dietary fiber(TDF), mineral contents, fatty acid and amino acid profiles, polyphenolic concentration and antioxidant activity of two brown (*Himanthalia elongate* and *Undaria pinnatifida*) and red (*Porphyra umbilicalis*) seaweeds. Skrovankova S. (2011) indicated seaweed vitamins as nutraceuticals. He reported that seaweed vitamins are important not only due to their biochemical functions and antioxidant activity but also due to other health benefits such as decreasing of blood pressure(vitamin C), prevention of cardiovascular diseases (beta-carotene), or reducing the risk of cancer (vitamins E and C, carotenoids). Misurcova L, et al.(2010) reported seaweed minerals as nutraceuticals. PUFAs effectively reduce the risk of cardiovascular diseases, cancer, osteoporosis, and diabetes. Nevertheless, growing requirements of healthy functional foods have led to produce PUFAs as nutraceuticals in controlled batch culture of marine microalgae, especially *Thraustochytrium* and *Schizochytrium* strains. Kasimala M. B. et al.(2015) studied on biochemical composition and nutritional aspects of seaweeds. They reported the importance of seaweed by their high protein content, which are more important for the food industry. Sea weeds are good additive to improve the nutritive quality of various foods.



Uses of seaweeds

The seaweeds have immense biomedical potential and have been used in folk medicine for a variety of remedial purposes such as in eczema, gallstone, gout, scrofula, cooling agent for fever, menstrual trouble, renal problems, scabies etc. (Chapman, 1970; Hoppe, 1979). The sulphated galactan polymers, agar and carrageenan, obtained from various red seaweeds, have been used for gelling and thickening in confectionary and food industries and as stabilizer for the preparation of cheese and salad. Agar is also used as a drug vehicle medium, in bacterial, fungal culture and as constituents of skin creams and ointments. Alginates have been used in the manufacture of tablets, pills, ointments, tonics, creams, making of dental molds and as denture fixative (Kaliyaperumal, 2003).

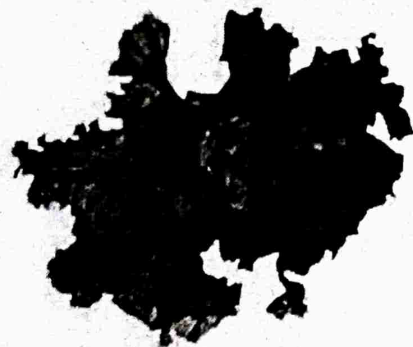


Seaweed Flora of India

With a coastline of about 7,500 km, the Indian subcontinent has some of the longest uninterrupted coastal ecosystems in the world which support rich seaweed diversity. Most important seaweeds in India in terms of ubiquitous nature are *Ulva* and *Caulerpa* among greens, *Hypnea* and *Kappaphycus* among reds and *Sargassum* and *Turbinaria* among browns. The coasts of Gujarat, Kerala and Tamil Nadu have most of the seaweeds described in India (Subba Rao and Mantri, 2006)

Edible seaweeds

Edible seaweed in foods Red macro-algae (*Gracilaria* spp.) are used as a fresh food. Species commonly marketed include *G. coronopifolia*, *G. parvispora*, *G. salicornia* and *G. tikvahiae*, however, these seaweeds have a short postharvest life of about 4 days (Paul and Chen, 2008). Seaweeds are a rich source of phytochemicals having anti-oxidant and antimicrobial properties. Presence of fibres and minerals helps in improving the mineral content reduce the salt content. The adding of seaweeds or their extracts to food products will help in reducing the utilization of chemical preservatives (Gupta and Abu-Ghannam, 2011). Edible seaweeds contain various bioactive compounds with potential health benefits and their use as functional ingredients opens up new prospects for food processing, meat product formulations included. Seaweeds basically contain high proportions of polysaccharides along with various other potentially beneficial compounds such as good-quality protein and essential fatty acids, particularly long-chain n-3 polyunsaturated fatty acids (PUFAs).



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