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FOOD FROM THE SEA: FOOD FROM THE SEAWEEDS

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The macroscopic plants of the sea other than the sea grasses are called seaweeds, and in botanical terms they are known as "Algae". Depending upon the colour they are categorised into Green algae, Brown algae and Red algae. All of them contain the same vital pigment "Chlorophyll".

Algae have been intimately connected with human beings from time immemorial. They have been used as food, fodder and manure. In Japan at present perhaps six or seven different kinds of seaweeds are used at a single meal.

In Honolulu alone the sale of a particular group of seaweed known locally as "Limu" amounted to 5000 lb. annually.

The seaweeds form an important part of the diet taken by the people of China, Japan and many other countries of the Pacific region. *Ulva*, *Enteromorpha*, *Caulerpa*, *Codium*, *Laurencia*, *Porphyra* are some of the important and the common ones.

These are eaten raw as salads, and cooked as vegetables. Certain fresh or processed varieties are used in the preparation of pickles, soup and porridge. Another variety of seaweed commonly used as food is *Rhodymenia palmata*. It is commonly eaten raw, chewed like gum, eaten with butter or boiled with milk and rye flour.

Porphyra: a red alga is consumed in Japan to the maximum extent and a dish called "Makizushi" is prepared, by wrapping toasted algae around a core of rice that enclose pieces of fish or sometimes vegetables in the centre.

Other important Japanese seaweed preparations are "Amanori" and "Asakusanori".

Prophyra vulgaris and *Gelidium corneum* are cultivated for food in China and Japan. *Undaria* and *Laminaria* are other commonly eaten seaweeds.

Gracilaria edulis, a red alga is eaten in certain parts of Tamil Nadu and is called "Kanji-paasi" (i. e. porridge seaweed).

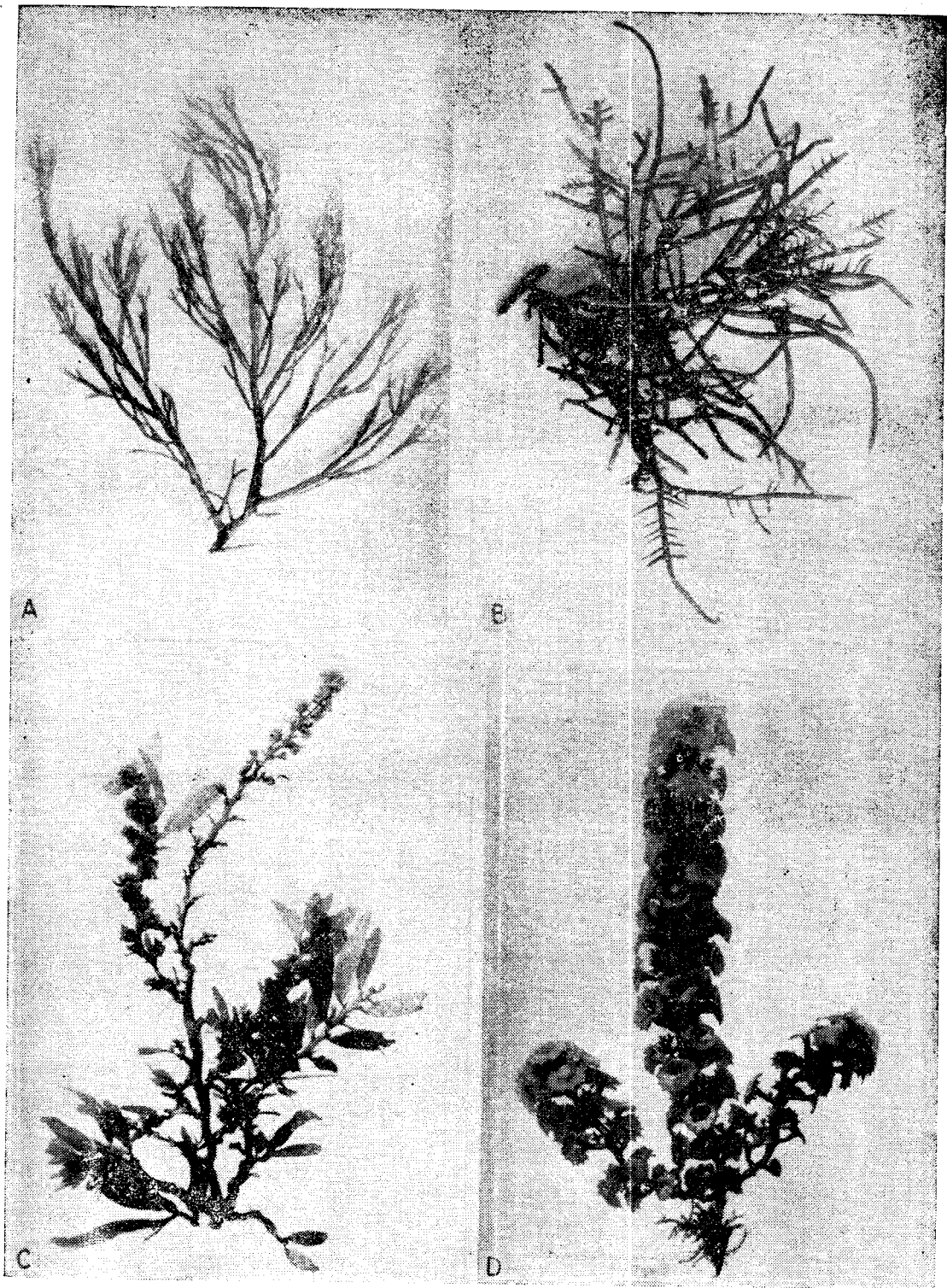


Fig. 1. Agar-agar yielding seaweeds. A. *Gracilaria edulis*; B. *Gelidiella acerosa*. Algin yielding seaweeds; C. *Sargassum wightii*; D. *Turbinaria ornata*.

Porphyra which is very popular in Japan is available in India, at Madras, Mahakapatnam, Cape Comerin and Colachel.

Now we will consider the nutritive value of these seaweeds. The seaweeds are rich in proteins, vitamins and mineral constituents. Green and red algae are rich in proteins ranging from 20.12 to 25.48 g/100 gm. Seaweeds are rich in vitamins B₁, C and E. A yellow green alga by the name *Nitzschia* is very rich in vitamin A and is probably the main source of this vitamin found in liver oils of many fishes. The vitamin 'C' content in a brown seaweed called *Sargassum myriocysium* exceeds that of lemon. Vitamins 'A', B₁, and B are found in many algae and the amounts present in them are generally higher than those of other vegetables and animal matter.

Chlorella", a green alga was studied extensively when the need for greater supplies of food arose, but till now *Chlorella* species growing in fresh water only have been studied in detail. As *Chlorella* can convert carbondioxide into oxygen, it serves as a source of food as well as oxygen. So a *Chlorella* culturing tank is considered to be of much use to astronauts, it will be a source of food and oxygen for them during their space journey. Attempts are now being made in some countries like Japan and America to develop continuous culture of this alga. *Chlorella* contains about 50% proteins (on dry weight basis) and 20% each of carbohydrates and lipids and 8% - 10% ash. The protein of *Chlorella* contains all the aminoacids which

are essential for the nutrition of human beings and animals.

To-day, seaweeds are used to augment food supplies only to a small extent in Europe and North America. In India also utilization of seaweeds as food is limited, though the natural resources are plentiful.

Just as in land plants, they require certain environmental conditions for proper growth and establishment in the sea. The topography, physical nature of the seabed, salinity, currents, tidal action and other factors of the marine environment vary in different parts of the coast line and as a result much marked changes occur in the distribution and abundance of different kinds of seaweeds.

Most of the seaweeds are beautifully coloured and attached to rocks, and also grow on other plants as epiphytes. Along the coast line of India, rocky coral formations occur in Tamil Nadu and Gujarat states and in the vicinity of Bombay, Ratnagiri, Goa, Karwar, Vizhinjam, Varkala, Visakhapatnam and few other places like Chilka and Pulicat lakes and Lakshadweep and Andaman and Nicobar islands where these algae are abundant.

These seaweeds are useful as a secondary food item also wherein extracts from the seaweeds may be added to various other food items.

Agar-agar, Algin are colloidal carbohydrates accumulated in the cell walls of red algae like *Gracilaria* and *Gelidiella* and brown algae like *Sargassum* and *Turbinaria* respectively. They are added to some food

items, confectionary, dairy industries, sweets, jellies, jams, desserts, ice-cream industries, as emulsifiers, gel formers and base products. Certain brown weeds yield compounds like mannitol and iodine;

Seaweeds being used as manure is a common practice in coastal areas throughout the world. They contain high percentage of water soluble potash and other minerals which are readily absorbed by the land plants. Recent studies have shown that the carbohydrates and other chemicals present in seaweeds act as soil conditioners by increasing moisture retaining capacity of the soils and also control certain plant diseases.

In field trials conducted at the Central Marine Fisheries Research Institute to study the effect of *Hypnea* compost on Bhindi plant (*Hibiscus esculentus*) 73% increase in yield was observed. By the use of this compost remarkably encouraging results were also obtained with tuber crops such as sweet potato, tapioca and other vegetable and garden plants. In certain coastal areas, weeds washed ashore are utilized as manure for coconut plantations.

In India, systematic investigations on the problems related to utilization of the seaweed resources have been commenced only in the post war period. In the past two decades, the Central Marine Fisheries Research Institute has been conducting investigations on the seaweed resources and has developed extraction techniques for agar and algin.

The time may not be very far off when we shall also be seeing seaweed preparations on our dining tables.

Courtesy: All India Radio, Calicut.