

Economic Importance of Algae

Human use algae as food, for production of useful compounds as biofilters, to remove nutrients and other pollutants from waste waters to assay water quality, as indicators of environmental quality, in space technology and as research tool in laboratories. Algae are commercially cultivated for pharmaceuticals, food, cosmetics and aquaculture purposes. At present many research laboratories in India and abroad are actively engaged in developing marine products.

Useful or Positive Importance

1. Algae as food: — People of Coastal countries eg. China, Japan, have long been using sea weeds and certain others algae as source of food.
 - Algae contain high ^{amounts} ~~amounts~~ of simple and complex carbohydrates which provides the body with a source of additional fuel.
 - The sulfated complex carbohydrates present in algae are thought to enhance the immune system regulatory mechanism.
 - Algae contain extensive fatty acid profile including Omega 3 and Omega 6. These essential fatty acids also play a key role in the production of energy.
 - Researchers in Japan, Germany and USA have shown that nutritive value and per unit area yield of algae is much more than conventional crops.
 - Porphyra tenera (red algae) is the most important edible sea weed in Japan (umamori or hari bread). It has 30-45% carbohydrates, besides vit. A, B, C and Niacin.

- Ulva, Sargassum, Laminaria etc. are used as salad. Ulva in Europe is called 'Sea lettuce'.
- Chlorella is richer in proteins, lipids and vitamins and also grows more quickly than porphyra. The nutritional value of Chlorella is comparable to mixture of Soybean and spinach.
- Spirulina is a fast growing non toxic blue green alga (cyanobacterium) rich in proteins, vitamin B complex and minerals. Nowadays biscuits fortified with powdered Spirulina have become very popular.

2. Algae as fodder: →

Sargassum and Macrocystis (largest alga) are used as food for marine as well as domestic animals.

Besides Ascophyllum, Fucus, Laminaria are processed to form cattle feed. In China Sargassum is used as fodder and Rhodospira in France.

3. Algae in Industry: —

Many products of commercial and pharmaceutical importance have been derived from algae. Agar, ~~Carrageenan~~ Carrageenan, alginates and diatomite are some important commercial products of algal origin.

(A) Agar - Agar: — A jelly like substance called agar-agar is a complex polysaccharide (phycocolloid) extracted in water from certain species belonging to Codium, Gracilaria and Gigartina and some other genera. This is produced and stored in their cell walls along cellulose. It is gel containing galactose and sulphate. The greatest use of agar is in food, pharmaceuticals and cosmetic industry.

(B) Agar-agar is used as base in culture media for algae, fungi, bacteria and tissues. Also used as stabilizer or emulsifier in food, cosmetics, leather and pharmaceutical industries.

Agar consist of a mixture of agarose and agaropectin. Agarose is predominant component of agar, is a linear polymer made of repeating monomeric units of agarobiose. Agarose is used in gel electrophoresis.

(B) Carrageenin or Caragheen:-

Chemically very much like agar and occurs as cell wall polysaccharide esterified with sulphate. Usually extracted from Chondrus crispus and used in pharmaceuticals emulsifiers, textile, leather cosmetics and brewing industries.

(C) Alginates:-

These are salts of alginic acid (phycocolloids) found in the cell wall of phaeophyceae eg - Fucus, Laminaria, Macrocystis, Lessonia, Cytoseria etc.

Flame proof fabrics as well as plastic articles are prepared from alginates. Alginic acid can stop bleeding and thus used as highly efficient gauze in internal operations. Also used as gelling agent in confectionery, dental creams, paints and ice cream.

(D) Diatomite:-

It is a rock like deposits formed from siliceous frustules (cell walls) of past diatoms (diatomaceous earth). As it is fire proof so used in preparation of high temperature furnaces. Also used

in insulation of refrigerators, sound proof rooms in packing, Corrosive chemicals etc.

(E) Furori:-

A type of glue known as furori, is obtained from Cladophora furcata. It is used in cosmetic industry for hair curling and dyeing preparations. It is also an important paper and textile sizing agents.

4. Minerals:- →

Kelp ash is a rich source of iodine, the average yield is 15 kg per ton. About 7% of total world production of iodine is obtained from kelp in Japan.

Bromine is obtained from red algae such as Polysiphonia, Rhodomenia etc.

Many important minerals like copper, iron, zinc, cobalt, vanadium, magnesium, boron and chromium are present in high proportions in seaweeds.

5. Medical Use:-

Antibiotic chlorocillin is obtained from Chlorella. It is crystalline and active at 120°C.

Extracts of Cladophora and Lyngbya kills strain of Pseudomonas and Mycobacterium.

Nitella causes death of mosquitoes in ponds and hence use in control of malaria.

Tse-ko-Toi Tsoi, an antihelminthic drug is prepared from green alga, Digenea simplex in South China.

Some algae are used in the treatment of diseases of kidney, urinary bladder and lungs etc.

6. 9th Agriculture: -

Myxophycean members e.g. Nostoc, Anabaena, etc. Convert atmospheric N_2 into nitrogen compounds, which are absorbed by higher plants.

→ A nitrogen fixing blue green algae Anabaena azollae is found in symbiotic association in leaves of a bryophytic member Azolla in rice field.

Sea weeds is rich in K, P trace ~~alt~~ elements and growth substances are used as fertilizers by Coastal peoples e.g. Fucus, Lycophyllum etc.

7. Sewage disposal: -

Sewage oxidation ponds have been created for its complete oxidation into mineral compounds. Such ponds support luxuriant growth of unicellular algae e.g. Chlorella, Chlamydomonas, Scenedesmus etc. These help in bacterial decomposition by providing O_2 .

8. Algae in Biological research: -

Recent knowledge of photosynthesis is based on research carried on Chlorella (Unicellular green algae).

Harmful or Negative importance: →

Water Bloom: → Some blue green and green algae grows over the surface of water bodies in abundance, especially in rainy season and cause water bloom.

Disease: →

Parasitic algae like Cephaleuros (green algae) cause red rust of tea, coffee and Magnolia etc.

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