Economic Importance of Algae

Algae includes a wide range of prokaryotic and eukaryotic marine and fresh water organisms, all of which engage in the process of photosynthesis. These are economically important in many ways. It can be used as a food source, as fodder, in fish farming, and as a fertilizer. It also plays a key role in alkaline land reclaiming, soil binding, and is used in a variety of commercial products. They are also harmful in many ways.

1. Algae as Food

Algae have been in use as human food for centuries in various parts of the world, e.g., Scotland, Ireland, Norway, Sweden, North and South America, China, and Japan. They are taken in various ways according to the choice and taste of the people. Algae may be taken as a salad, cooked with meat or eaten as vegetable, fried with meat etc.

Some are added for flavour to various dishes, while extract from others is taken as a beverage. Their nutritional value is quite high, as they contain a good amount of proteins, carbohydrates, fats and vitamins, specially A, B, C and E.

Mostly marine species are used and they belong to Chlorophyceae, e.g., Ulva lactuca (Sea lettuce), Enteromorpha compressa, Caulerpa racimosa, Phaeophyceae e.g., Laminaria saccharina, Sargassum sp., Durvillea sp., Rhodophyceae e.g., Porphyra tenera, P. umbilicalis, P. laciniata, Chondrus crispus (Irish moss), Gracilaria sp. and Cyanophyceae e.g., Nostoc sp.

These are widely used in Japan and south east Asian countries. Some of the important preparations of algae are Aonori from Monostroma, Kombu from Laminaria and Asakusa-Nori from Porphyra tenera. Similarly, Laminaria is widely cultivated in Japan and China. It is cultivated more like a crop plant. Chlorella is also used extensively. The salient feature of Chlorella is that the cell is rich in protein and vitamin contents (Single cell protein, SCP). It contains all the amino acids known to be essential for the nutrition of human being as well as animals.

It contains vitamins C, pro-vitamin A, thiamine, riboflavin, pyridoxine, niacine, pantothenic acid, folic acid, inositol and p-amino benzoic acid. The minerals present, in order of contents, are phosphorous, potassium, magnesium, sulphur, iron, calcium, manganese, copper, zinc and cobalt.

2. Algae as Fodder

The sea weeds as fodder have been widely used in many countries like Norway, Sweden, Denmark, Scotland, America, China and New Zealand. In Norway, Rhodymenia palmate has come to be known as 'Sheep's weed' since sheep are very fond of this particular alga. Laminaria saccharine, Ascophyllum sp., Sargassum sp. and Fucus sp., are equally liked by the cattles.
In many countries factories have been established to process the seaweed into suitable cattle-feed. Eggs, from hens fed on sea weed meal, have an increased iodine content while increased butter-fat content of milk is reported from cattle whose diet is supplemented with sea-weed meal.

3. Algae in Pisciculture

Algae, both floating and attached forms, marine as well as fresh water, provide the primary food for fish and other aquatic animals. In many countries pond culture for fishes has been taken up and they are fed with various forms of algae.

Species of the green algae, the diatoms and some blue-greens are most widely eaten up by the fishes.

It is now known that several vitamins found in fish can ultimately be traced to the phytoplankton's on which they feed. So, directly or indirectly, the algae form the source of food for fishes. At the same time, these algae keep the water habitable for fishes by absorbing the carbon dioxide and enriching water with oxygen by the photosynthetic activity.

4. Algae as Fertilizer

The large brown and red algae are used as organic fertilizers, especially in the coastal areas. The weed is used either directly or as a seaweed meal. A concentrated extract of seaweed is also sold as a liquid fertilizer. However, the greatest utility of the algae, as a friend to the farmers, are members of the class **Cyanophyceae** for their capacity to **fix atmospheric nitrogen** and thus enriching the soil. In the paddy fields they have been seen to produce an effect almost similar to that of manuring with 30 kg. of ammonium sulphate per acre (Watanabe, 1959).

Aulosira fertilissima, the common blue-green algae of the Indian rice fields is found to add 47.6 lb. of nitrogen fixed /acre/crop (Singh, 1962). At the same time there is a considerable increase in the total organic matter content of the soil. In India, the nitrogen-fixing blue-green algae play an important role in maintaining the fertility of the rice fields.

5. Reclamation of alkaline 'usar' land :

In India, vast tracts of land cannot be cultivated for crops because of high alkalinity of the soil, commonly known as 'usar' soil. The 'usar' lands would be cultivable, if their pH could be lowered, and organic contents and the water holding capacity of the soil increased. Exactly all these functions are carried out by the blue-green algae.
During the rainy season the blue-green algae, notably species of Nostoc, Scytonema, Anabaena and Aulosira, grow in plenty. According to R. N. Singh (1950), these algae can be of use in the reclamation of the 'usar' lands. The process involves a series of successive growth of the algal crop in a water-logged condition.

(After a year of such reclamation, the pH fell from 9.5 to 7.6, organic contents increased from 36.5% to 59.7%, nitrogen contents from 30% to 38.4%; exchangeable calcium from 20% to 33% and water holding capacity of the soil is also increased by 40%. In such a **'reclaimed'** land, the transplanted paddy crop grew with a yield of 715-907 kg/acre. This method of reclamation is now being practiced widely.)

6. Binding of soil particles :

Algae act as an important binding agent on the surface of the soil. Disturbed or burnt soils are soon covered with a growth of green and blue-green algae thus reducing the danger of erosion.

7. Algae used in space research :

Chlorella is being used in space research. Chlorella has been found very suitable for keeping the air in space vehicles pure on long interplanetary flights. The stale air in which the carbon dioxide has been concentrated is fed into a flood-lit container containing a mixture of water and nutrient chemicals and Chlorella.The alga restores oxygen into the space vehicle by its photosynthesis.