Economic Importance of Algae

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INTRODUCTION

- The photoautotrophic algae are the major producers of organic materials and they play a key role at the base of food chain in aquatic and semi-aquatic habitats.
- The algae constitute a source of base food wherein their chemical extracts have a potential in manufacture of synthetic food and other useful products.

INTRODUCTION

- Some times the algae are labeled as phycotoxins as they secrete certain toxins which cause poisoning.
- Certain algae also play "nuisance role" wherein they tend to block water supply canals or filtration units due to eutrophication of reservoirs and connecting tubes or canals.

1. PRIMARY PRODUCERS

- Algae are the main oxygen producers in aquatic areas. They are also useful in decreasing water pollution by releasing oxygen.
- 10% of total photosynthesis carried out by plants is carried out by the algae.

•ALGAE AS FOOD & FODDER

- Algae species are used as food in several countries and in several forms.
- Algae species have proteins, vitamins(A, B, C and E), lipids and minerals.
- Laminaria species is the important edible seaweed in japan and the food item (kombu) is prepared from it.

- Aonori from Monostroma; Asakusa Nori from Porphyra are prepared in different countries. Porphyra has 35% protein, 45% carbohydrates,vitamins B & C.
- Nostoc is used as food material in south America.

- Many seaweeds such as Fucus, Laminaria, Ascophyllum and Sargassum are usedd as fodder.

- Rhodymenia palmata is used as food for sheep in narvey.

- Laminaria saccharina, Pelvitia, Ascophyllum,etc. species are used as food for cattle.

ALGAE IN INDUSTRY

- Many products of commercial and pharmaceutical importance have been derived from algae.
- ***Agar-Agar:-***
- Agar is obtained commercially from species of Gelidium, Gracilaria and condrus.
- Japan and South East Asia are the main production centers of Agar.
- The greatest use of agar is in food, Pharmaceutical and cosmetic industry.
- It is used for almost a century as stiffening agent in culture media.

•Carrageenan:-

- Carrageenan is obtained from the cell walls of Chondrus crispus and Gigartina stellata.
- Carrageenan is used in stabilisation of emulsions in paints and cosmetics. In alcohol and sugar industry it is used as a clearing agent.
- It is also utilised in the textile, leather and brewing industries.

•ALGINATE

- These are salts of algainic acid which occur in the cell wall of the brown algae belonging to the order Laminariales.
- Alginate are non-toxic and viscous and readily form gel, useful as thickner, emulsifier and gelling agent.
- Flame proof fabrics are also prepared from alginates.

•ALGAE AS BIOFERTILIZERS

- Many algae increase the water holding capacity besides the addition of their chemical constituent in the soil.
- In India, Turbinaria is used around palm tree while as sea weeds are used as compost.

- **The species of Nostoc, Syctonema, Aulosira, Lyngobya, Microcoleus, Aphanothece, Anabaena, etc. Most of these can fix atmospheric nitrogen and increase the soil fertility.**

- **Due to their mucilaginous sheath, they are able to prevent soil erosion by binding the soil particles firmly.**

- **Blue-green algae are treated as bio-fertilizers from olden days.**
- **Nostoc, Oscillatoria, scytonema, Spirulina, etc. are used as fertilizers to rice fields.**
- **Cultivation of Spirulina is gaining importance as feed for fish, poultry and cattle.**


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•ALGAE IN MEDICINES

- **Many algae such as chlorella, Polysiphonia, Laminaria synthesis antibiotic substances.**
- **Antibiotic Chlorellin is extracted from Chlorella Vulgaris, which inhibits the growth of certain bacteria and a few algae.**
- **Some algae, like Gelidium are used for treatment of Kidney, Bladder and Lung diseases.**

- **Gelidium is also useful in stomach disorders.**

- **Brown algae mainly used in manufacture of varios Goitre medicines due to their high Iodine content.**

- Sea weeds are a good source of a number of vitamins.
- The Diatom is fairly rich in vitamin A , Riboflavin is present in good amount in Prophyra.
- Rhodomela are rich in Thiamine.

• *ALGAE AS A SOURCE OF RENEWABLE ENERGY*

- **In recent times, Hydrogen is used as a renewable fuel as it causes no pollution and forms water in contact with oxygen.**

- **Water is subjected to Photolysis, which leads to splitting of water molecules into –**
  - **Oxygen**
  - **Electrons**
  - **Hydrogen ions**

- Hydrogen ions are converted into Hydrogen gas which can be collected and used as a fuel.

- Several algae like Chlamidonas and Oscillatoria possess the enzyme Hydrogenase which can be gainfully employed for the production of Hydrogen from water.

• *ALGAE AS EXPERIMENTAL MATERIAL*

- **Algae provide valuable experimental materials for research work in Plant Physiology, Genetics and Bio-chemistry.**

- **A loat of researches in genetics and Cytology have been carried out on Acetabularia.**

- **Chlorella has been intensively used for studying the path of carbon during Photo – synthesis.**
- **Valvonia and Halicystis are especially suitable for experiments on membrane permeability.**
- **Blue-green algae are used in studies on nitrogen fixation.**

- ***DISPOSAL OF SEWAGE***

- **Waterborne domestic and industrial waste is called sewage.**

- **It contains material in soluble and suspended form.**

- **Some species like Chlamydomonas, Scenedesmus, Chlorella, Pondorhina, Euridina, etc. are living in sewage water.**

- They are mainly useful to clean the water by releasing oxygen.
- They also modify the carbonate material in the water into N, P, K fertilizers.

8. USE OF ALGAE AS DIATOMITE

- Diatomite is fossilized remains of diatoms. Diatoms are single-celled aquatic algae which are in the form of petri dish.
- It is used in car paint, roof insulation, wall insulation, cosmetics and bath products.

7. ALGAE IN LAND RECLAMATION

- Algae act as binding agent.
- Algae help in reducing the pH of alkaline soils and increasing the water holding capacity of these soils.

Figure of alkaline soil

6. ALGAE AS FERTILIZER

- Due to presence of P, K, Ca, and some trace elements , the sea weeds are used as fertilizers.
- Chara is used to overcome calcium deficiency in the fields.
- Fucus is used as manure.

3. ALGAE AS SOURCE OF IODINE

- The marine algae are rich in iodine and several other important minerals.
- By feeding the milk cattle and hens with algae, iodine quantity of the milk and eggs may sufficiently be increased.

HARMFUL ASPECTS OF ALGAE

1. CONTAMINATION OF WATER RESERVOIRS

- The algae grows abundantly in water reservoirs meant for domestic purposes.
- This affects the filtration process and brings bad taste to water due to decay of dead algal plants.
- Such algae include members of cyanophyta and chlorophyta.

2. WATER BLOOMS

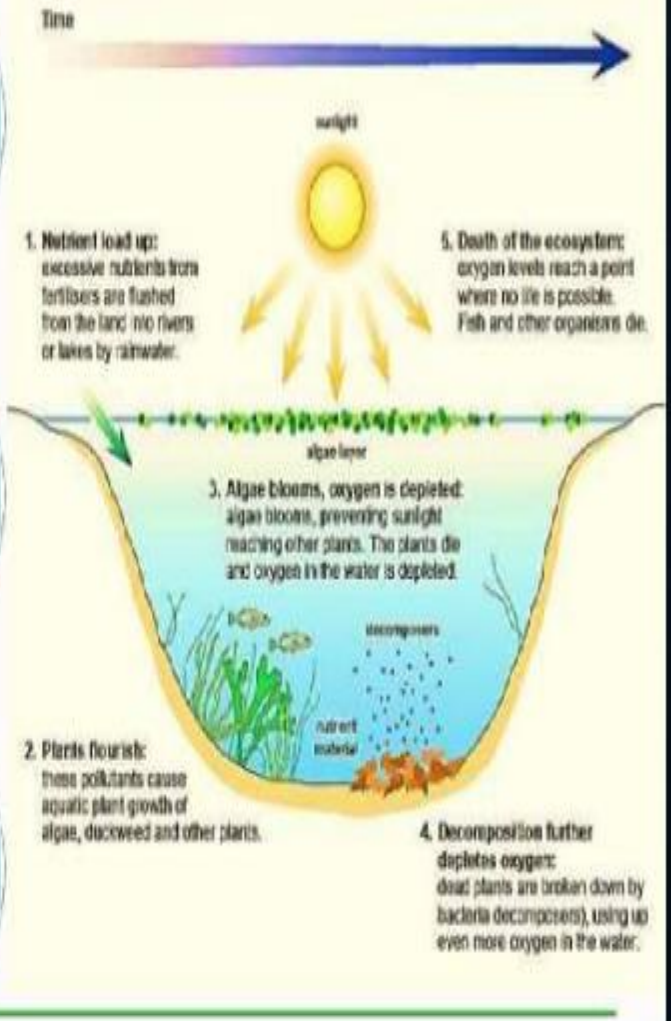
- Sometimes algal plants grow abundantly and form quit apparent bodies called water blooms.
- These bodies deplete the oxygen contents of the water during night time.
- Emit bad smell and secrete certain poisonous substances harmful to aquatic animals.

WATER BLOOM

3. DEATH TO LIVING ORGANISMS

- Algae causes eutrophication in ponds and lakes. It causes death of aquatic animals.
- The death of cattles occur by drinking the infected water.
- Due to thick layer of algae on surface of water, photosynthesis does not occur.

Eutrophication Process in 5 Stages



A B

A and B depicitng the huge deposition of algae in stagnant water bodies causing problems of water flow thus, affecting irrigation channels

4. DISEASES IN HUMAN BEINGS

- The contaminated water causes stomach disorder in human beings.
- Similarly some algae are responsible for respiratory disorders, skin diseases and other algae causes allergies.

5. PARASITIC ACTIVITIES

- Some algae are parasites on other plants and animals as well.
- Most of these belong to the Rhodophyta (red algae).


Thank
you!!