
Overview of Algae Phytoplankton: Characterisation, History, Application

Phytoplanktons are the most important biomass producers in global aquatic ecosystems. The organisms populate the top layers of the oceans and freshwater habitats where they receive sufficient solar radiation for photosynthesis. Algae produce approximately 52, 000, 000, 000 tons of organic carbon per year, which is almost 50% of the total organic carbon produced on earth each year. Therefore it appears to be an important biomass producer using atmospheric carbon dioxide and solar energy. Hence there is an increasing quest all over the world to explore microalgae to address various applications in pharmaceutical, nutraceutical and food, textile, aquaculture, biofuel, and carbon dioxide mitigation, bioremediation of heavy metals and for many such prospective industrial and commercial applications.

Algae are the simple photosynthetic aquatic organisms belong to both Eukaryota and Prokaryota. They exist as single-celled organisms to multicellular organisms with fairly complex differentiated from than the single celled ones. These complex forms are distinguished as macroalgae which includes the marine forms such as seaweeds. They are devoid of well differentiated structures such as leaves, roots, flowers, and other organ structures that characterize higher plants.

The history of algae is as old as human civilization, people collected macro algae and seaweeds for food around 2, 500 years ago in China. The use of microalgae by humans dates back 2000 years to the Chinese, who used Nostoc to survive during famine. Japanese also found macroalgae as a food source during the 4th century. Europeans started using seaweeds in their diet from the past 500 years.

During the mid- 17th century Japanese have started cultivating seaweeds for food supplement. Nostoc, Spirulina, and Aphanizomenon species have been exploited for many centuries in Asia, Africa and Mexico as a nutrient-dense food. In the 1940s, microalgae became popular as live feeds in aquaculture. After 1950s, algal biotechnology developed rapidly, starting in Germany and extending into the USA, Israel, Japan, and Italy for producing protein and fat as a nutrition source from algal biomass. Simultaneously the use of microalgae in wastewater treatment and the systematic examination of algae for biologically active substances, particularly for antibiotics was also initiated. During 1960s, the commercial production of Chlorella as a novel health food supplement was a big success in Japan and Taiwan.

In USA, interest grew in developing algae as photosynthetic gas exchangers for long term

Need help with the assignment?

Our professionals are ready to assist with any writing!

[GET HELP](#)

space travel as well. Energy crises during 1970s energized the idea of using microalgal biomass as renewable fuels and fertilizers with an eco-friendly process. At the same time first large-scale Spirulina production plant was established in Mexico and later during 1980s and onwards there were more than 46 large-scale algae production plants in Asia particularly in India, and large commercial production facilities in the USA and Israel were started to operate for microalgae production for protein, fat and for other nutraceutical and pharmaceutical molecules.

Particularly during the last two to three decades, algal biotechnology grew progressively and occupied a key position in scientific world to address various aspects of environment and mankind. Scientific and technological information on algae is accumulating day by day and thus various algologists, ecologists, environmentalists, policy makers and industrialists look forward to explore these tiny wonderful plants for diversified applications in agricultural, food, medicine and for environmental prospective. This radical shift in phycological research has initiated various groups of researchers across the globe to explore the potentials of algae to address various environmental, food and biofuel issues. Currently almost all countries across the continents are using microalgae and macroalgae for various foods, health and other benefits.

Today, more than 40, 000 algal species are known. But so far only few algal forms have been commercially exploited. In this context, isolating newer strains and improving the existing domestic flora, through modern biotechnological approaches, will certainly enhance the algal potential and algae based business. In India, algae have been primarily studied for over a century as a curriculum at Universities and only in the last few decades some research institutes and Universities of repute have taken algal research and development as a matter of serious concern.

The focus on algae as a source of chemicals for food, pharmaceutical, nutraceutical and biofuel uses have changed Indian phycological research from taxonomy & physiological studies to chemical aspects. Central Marine Chemical Research Institute (CSMCRI), Bhavnagar, has pioneered the utilization of seaweed for production of polysaccharides having potential use in Industry. Indian Agricultural Research Institute (IARI), New Delhi and Madurai Kamaraja University of Madurai, Tamil Nadu Agricultural University (TNAU), Coimbatore worked on algal biofertilizers. Central Food Technological Research Institute (CFTRI), Mysore and Murugappa Chettair Research Centre of Chennai have worked extensively on Food applications of Spirulina and Scenedesmus. However CFTRI later continued with research on several microalgae viz. Dunaliella, Haematococcus, Botryococcus and Porphyridium. National Facility on Bluegreen Algae at IARI, New Delhi and National Facility for Marine Cyanobacteria at Triuchinapalli has brought to focus the need in conserving algal biodiversity and ecology. Microalgae are of particular interest because, they can grow rapidly and it is possible to cultivate them in sea or brackish or sewage water resources in marginal lands to produce reasonably high biomass per unit area than by any other higher plants.

Need help with the assignment?

Our professionals are ready to assist with any writing!

GET HELP

gradesfixer.com

Need help with the assignment?

Our professionals are ready to assist with any writing!

GET HELP