



INDIRA GANDHI NATIONAL OPEN UNIVERSITY
School of Sciences, Maidan Garhi, New Delhi-110068
Tel no.: 011-29572850; e-mail: jsokhi@ignou.ac.in

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Subject: Thank you for contributing in developing BBYCT-131 & BBYCL-132 courses – reg.

Dear Dr Pooja Gokhale Sinha,

Greetings from IGNOU! Thank you for your contributions in developing the above-mentioned Core Course Botany Paper 1 – Biodiversity (Microbes, Algae, Fungi and Archegoniates) which is a part of B.Sc. UGC CBCS programme being offered by IGNOU from July 2019 Session. The printed blocks are enclosed herewith for your kind perusal and reference. We remain grateful to you for giving your valuable time and sharing your rich experience in the development of these courses.

Thank you once again and we shall look forward to work with you in future for the various endeavours of the University.

Best regards.

Yours sincerely

Jaswant Sokhi

To,

Dr Pooja Gokhale Sinha
Assistant Professor in Botany
G-H 5 & 7, Flat no. 1140
Paschim Vihar
New Delhi-110087



BBYCT-131
BIODIVERSITY
(MICROBES, ALGAE, FUNGI
AND ARCHEGONIATES)

Block

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ALGAE

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Course Design Committee

Dr. A.K. Kavathekar (Retd.)
Department of Botany
Sri Venkateswara College
University of Delhi
New Delhi

Prof. M.S. Nathawat
Director (Ex.)
School of Sciences
IGNOU

Dr. Sneh Chopra (Retd.)
Department of Botany
Kalindi College, University of Delhi
New Delhi

Prof. Vijayshri
Director (Ex.)
School of Sciences
IGNOU

Prof. Jaswant Sokhi
School of Sciences
IGNOU, Maidan Garhi
New Delhi

Prof. Amrita Nigam
School of Sciences
IGNOU, Maidan Garhi
New Delhi

Block Preparation Team

Prof. Jaswant Sokhi
School of Sciences
IGNOU

Dr. A.K. Kavathekar (Retd.)
Department of Botany
Sri Venkateswara College
University of Delhi
New Delhi

Dr. Pooja Sinha Gokhale
Department of Botany
Sri Venkateswara College
University of Delhi
New Delhi

Course Coordinators: Prof. Jaswant Sokhi and Prof. Amrita Nigam

Print Production

Sh. Sunil Kumar
Assistant Registrar (P)
School of Sciences, IGNOU
New Delhi

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ALGAE: INTRODUCTION |

Structure

- | | |
|--|---|
| 5.1 Introduction | 5.5 Ecological Significance of Algae |
| Objectives | Nitrogen Fixation |
| 5.2 General Characteristics | Carbon Sequestration |
| Habitat | Diatomite |
| Habit | Effect of Algae on Soil Fertility and Structure |
| Cell Structure: Prokaryotic and Eukaryotic Forms | Waste Water and Sewage Treatment |
| Plastids | Algal Blooms |
| Photosynthetic Pigments | Toxic Effects of Algae |
| Storage Products | |
| 5.3 Ecology and Distribution | 5.6 Summary |
| Aquatic | 5.7 Terminal Questions |
| Special Habitats | 5.8 Answers |
| Soil and Sub-aerial | 5.9 Glossary |
| 5.4 Algal Associations | 5.10 Further Reading |
| Algal-Plant Associations | |
| Algal-Animal Associations | |
| Algal-Symbiotic Associations | |

5.1 INTRODUCTION

In this unit you would get an overview of algae, their habitat, distribution, morphology and cellular structure. The study of algae is known as Phycology, derived from Greek word *Phykos* meaning seaweed. As a group, algae show a lot of variation in their habit, habitat, morphology, mode of reproduction and life cycles. This diversity of form and structure make them competent to survive in a diverse range of environmental conditions. They are found in habitats such as crevices of rocks, deserts, fresh as well as marine water. Algae can exist as free living organisms and also in symbiotic association with fungi to form lichens.

ALGAE: ORGANIZATION, REPRODUCTION AND CLASSIFICATION

Structure

- | | |
|---|--|
| <p>5.1 Introduction</p> <p>Objectives</p> <p>6.2 Range of Organization</p> <p>Structure of an Algal Cell:</p> <p>Prokaryotic and Eukaryotic forms</p> <p>Morphology</p> <p>6.3 Reproduction</p> <p>Vegetative Reproduction</p> <p>Asexual Reproduction</p> <p>Sexual Reproduction</p> <p>Origin and Evolution of Sex in Algae</p> <p>Life Histories</p> | <p>6.4 Classification</p> <p>Division Cyanophyta</p> <p>Division Glaucophyta</p> <p>Division Rhodophyta</p> <p>Division Chlorophyta</p> <p>Division Euglenophyta</p> <p>Division Dinophyta</p> <p>Division Apicomplexa</p> <p>Division Cryptophyta</p> <p>Division Heterokontophyta</p> <p>6.5 Summary</p> <p>6.6 Terminal Questions</p> <p>6.7 Answers</p> <p>6.8 Glossary</p> <p>6.9 Further Reading</p> |
|---|--|

6.1 INTRODUCTION

Algae are a heterogeneous group of plants that share common characters such as they are thallophytes, possess photosynthetic pigments, synthesize a range of storage products viz. starch, laminarin, paramylon, fructosan and others. They lack typical differentiation into root, stem and leaves and possess chlorophyll *a* as their primary photosynthetic pigment. Reproductive cells in algae are not covered. Algae being photosynthetic autotrophs were classified as plants earlier. However, due to absence of protective cells around their reproductive organs, they are no longer classified as plants, and have been placed in the kingdom Protista along with Protozoa. The study of algae is termed as Phycology or Algology. The term Phycology is derived from the Greek word *phykos*, which means seaweeds.

ALGAE: MORPHOLOGY AND LIFE CYCLES

Structure

7.1 Introduction	7.3 Summary
Objectives	7.4 Terminal Questions
7.2 Morphology and Life Cycles	7.5 Answers
<i>Nostoc</i>	7.6 Glossary
<i>Chlamydomonas</i>	7.7 Further Reading
<i>Oedogonium</i>	
<i>Vaucheria</i>	
<i>Fucus</i>	
<i>Polysiphonia</i>	

7.1 INTRODUCTION

In Unit 6 you have learnt about the basic characteristic features of algae, their distribution, types of thalli, modes of reproduction and different systems of their classification. The body of an alga is called thallus as it is not differentiated into true root and shoot system. Thallus shows a lot of morphological and anatomical variations. It may range from single celled or colonial forms, to multicellular forms that may be filamentous uniseriate or branched; or complex and highly differentiated multicellular thallus. In colonial forms, a cell divides and the daughter cells remain together enclosed in a mucilaginous mass to form a colony of cells, e.g., *Volvox*. Division of a cell continuously in the same plane, with daughter cells sticking together, results in a row of cells forming a filament, e.g., *Oscillatoria*. Some of the cells of a filament divide only once by a vertical plane followed by transverse divisions repeatedly and produce a branched filament. Further, when all the cells of a filament undergo divisions in cross and vertical planes it results in a sheet of one or more cells in thickness. Such multicellular thallus may show complicated differentiation as in seaweed types of specialised sporulating structures that help in the process of reproduction.

ALGAE: ECONOMIC IMPORTANCE

Structure

- | | |
|------------------------------|-----------------------------|
| 8.1 Introduction | 8.7 Industrial Applications |
| Objectives | 8.8 Medicinal uses |
| 8.2 Source of Nutrition | 8.9 Algal Companies |
| 8.3 Source of Animal Feed | 8.10 Other Effects |
| 8.4 Treatment of Wastewaters | 8.11 Summary |
| 8.5 Biofertilizer | 8.12 Terminal Questions |
| 8.5.1 Seaweed | 8.13 Answers |
| 8.5.2 Blue Green Algae | 8.14 Glossary |
| 8.6 Source of Energy | 8.15 Further Reading |

8.1 INTRODUCTION

Algae are important both for environment and human beings. In Japan, Taiwan, China and Hong Kong some species of algae are part of daily meal. There are large industries in these countries for farming algae on commercial scale. These countries also export various algal products. In this unit, you would study about the vast potential of algae as a source of human food, animal feed, biofertilizers, energy, pharmaceutical and other products. The economic value of algae is being realised in our country and various useful products of algae both for our country and for export purposes are being produced at commercial scale.

Objectives

After studying this unit, you will be able to:

- ❖ give examples of economically important algae;
- ❖ list algal species that are edible and mention their nutritional value;
- ❖ describe different algal products and their uses;
- ❖ explain the use of algae in wastewater treatment, as biofertilizer, as source of energy, in industry and as medicines; and
- ❖ Describe various effects of algae on humans and the ecosystem.