



Paper 5a BIOLOGY AND BIOTECHNOLOGY OF ALGAE

M.Sc. va (Students admitted from the academic year 2008-2009)

MCC, Department of Botany

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UNIT I

Introduction to algae; Classification of algae (Silva in Sybil Parker, 1982); Criteria in the classification of algae; Characteristic features of major classes of algae; Phylogeny and interrelationships among algae. Green algae as ancestors of higher plants. Thallus organization, asexual and sexual reproduction of the members of the Cyanophyceae, Chlorophyceae, Charophyceae.

UNIT II

Thallus organization and sexual reproduction of the members of the Phaeophyceae and Rhodophyceae. Structure, reproduction, ecological significance and economic importance of the members of the classes Dinophyceae and Bacillariophyceae. Life-cycles in algae: Haplontic/zygotic life-cycle, Diplontic/gametic life-cycle; Diplohaplontic/Sporic life-cycle; Diplobiontic/sporic life-cycle and Somatic life-cycle.

UNIT III

Identification of algae collected from natural environments; isolation and laboratory culture of microalgae using Bold's basal medium (for growing green algae); Large scale cultivation of microalgae. Composition and uses of selected algal culture media such as BG-II (Blue-green algae), Reimann medium (for freshwater diatom), Guillard's F/2 medium (marine diatoms), Zarrouk's medium (for *Spirulina*).

UNIT IV

Immobilized algae; Industrial uses of marine algae. Methods of macro algae cultivation; Composition preparation and usage of Provosoli's enriched seawater medium (for marine algae). Biotechnological potential of algae: Health food and aqua feed; Recipes with algae.

UNIT V

Algal source of Carotenoids, Amino acids, Fatty acids, Restriction enzymes, Exo-cellular polysaccharides labeled metabolites. Algae as a source of fuels such as methane and Hydrogen; algae as a source of biodiesel. Pharmaceutical uses of algae.

UNIT VI

Algae as biofertilizers. Composition and preparation of Bluegreen algal biofertilizers and the method of application. Liquid seaweed fertilizers: preparation and application. Bioactive compounds; Antimicrobial activity of marine algae. Screening algae for antimicrobial activity. Algae as pollution indicators. Use of algae in treating industrial effluents; Treatment of sewage using algae.

Suggested Reading

- BARSANTI, LAURA AND PAOLO GUALTIERI 2005 Algae-Anatomy, Biochemistry and Biotechnology. Taylor & Francis, London, New York.
- BECKER, E. W. 1994 Microalgae-Biotechnology and microbiology. Cambridge University Press.
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- CHAPMAN, V.L. AND D.L. CHAPMAN 1980 Seaweed and their uses. Chapman & Hall, London.
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- DESIKACHARY, T.V., V. KRISHNAMURTHY AND M.S. BALAKRISHNAN. 1990 Rhodophyta. Madras Science Foundation, Madras.
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- IYENGAR, M.O.P. AND T.V. DESIKACHARY. 1981 Volvocales. ICAR, New Delhi. Lembi, Carole, A. and J. Robert Waaland 1988 Algae and human affairs. Cambridge University Press, Cambridge.
- LOBBAN, C.S. AND M.J. WYNNE (Eds.) The Biology of Seaweeds. Blackwell Scientific Publications, Oxford.
- PAL, B.P., B.C. KUNDU, V.S. SUNDARALINGAM AND G.S. VENKATARAMAN. 1962 Charophyta. ICAR, New Delhi.
- PARKER, SYBIL, P. (Ed. In Chief) 1982 Synopsis and Classification of living organisms. McGraw Hill Book Company, New York.
- PHILIPOSE, M.T. 1967 Chlorococcales. ICAR, New Delhi.
- RAMANATHAN, K.R. 1964 Ulotrichales. ICAR, New Delhi.
- RANDHAWA, M.S. 1939 Zygnemaceae. ICAR, New Delhi.
- SOUTH, G.R. AND A. WHITTICK. 1987 Introduction to Phycology. Blackwell Scientific Publications, Oxford.
- TRIVEDI, P.C. (Ed.) 2001 Algal Biotechnology. Pointer Publishers, Jaipur, India.
- VENKATARAMAN, L. V. AND E. W. BECKER. 1985 Bioiehnology and Utilization of Algae- The Indian Experience. Department of Science and Technology, New Delhi and Central Food Research Institute, Mysore, India.