RANI CHANNAMMA UNIVERSITY, BELAGAVI

DEPARTMENT OF STUDIES IN BOTANY
UNDER THE SCHOOL OF BASIC SCIENCES

M.Sc. in BOTANY
CHOICE BASED CREDIT SYSTEM

IV SEMESTER SYLLABUS

w.e.f.

Academic Year 2016-17 onwards

RANI CHANNAMMA UNIVERSITY PG – SYLLABUS FOR IVth SEMESTER	
NAME AND COURSE: M.Sc. - Botany	
Course Code:	Teaching HRS: 04 hrs/Week

4.1 MYCOLOGY & PLANT PATHOLOGY

MYCOLOGY

Unit-I

Biological features of fungi – structure, mobility life cycle pattern in fungi, vegetative, ultra structure and growth ultra structure of fungal and reproductive structures. Growth forms, hyphal growth, mycelia habit and modification, colony formation, fungal dimorphism , hyphal fusions, growth dynamics, non mycelial forms. Reproduction : Asexual and sexual, mating systems, physiological control of sexual reproduction, fruit body forms, morphogenesis and significance. Dispersal mechanisms and quantification of spores after their release.

Unit-II

Fungal physiology : Nutrition of carbon, nitrogen, mineral, vitamin and growth regulators, metabolism and biosynthesis of carbohydrates (Including chitin) non carbohydrate (organic acids and lipids) and nitrogen (including lysine, amino acids, nucleic acids and proteins) secondary metabolites and their role. Fungal genetics : Fungi as organism for genetic study, genetic markers, isolation and selection of mutants, tetrad analysis. Industrial application of fungal genetics and strain improvements.

Somatic incompatibility – Systems in Ascomycetes and and Basidiomycetes in culture and in nature, parasexuality.

PLANT PATHOLOGY

UNIT-III

Introduction and history of plant pathology – Plant diseases caused by fungi, bacteria, virus and nematodes, The concept of disease in plants, Classifications of plant diseases. Genetic engineering and plant pathology, Significance of plant diseases, Plant diseases and world crop production, Effects of changes in agricultural methods and in human society on the development and spread of plant diseases, Diagnosis of plant disease. Parasitism and disease development –Attack of pathogens: Mechanical force exerted by pathogens in host tissues, Chemical weapons to pathogens, enzymes, Microbial toxins on plant diseases, Growth regulators in plant diseases.

Unit-IV

Plant defense mechanism against pathogens – structural metabolic preexisting biochemical. Environmental effects on infections: Effect of temperature, soil, pH moisture, wind, light, Host – plant nutrition. Herbicides and pesticides. Plant disease epidemiology, The elements of an endemics, Measurement of plant disease, pattern, Comparison, Development, modeling computer simulation, forecasting of plant disease endemics. Management and control of plant diseases: Control methods that exclude the pathogen from the host, Control methods that eradicate the pathogen inoculums. Cultural methods, Biological methods. Environmental factors that cause plant disease. General Chrematistics, Diagnosis, and control, Temperature effects, Moisture effects. Air pollution, nutritional deficiencies in plants. The often Confused Etiology of stress disease.

References

1. Agrios, GN (1951) Plant pathology, 4th edition, Academic press Inc. London Newyork.
2. Horsfall, JG and Cowling, EB (1977-1980) Plant diseases, Vol 1-4, academic press, Newyork.
3. Asada Y. Bushneu, NR ouchi, S, and vance,P (1982) Plant infection, The physiological and Biochemical basis, Springer Verlag, Berlin Newyork.
4. Rangaswamy. D (1988) Disease of crop plant in India, Practice hall India Ltd. New Delhi
5. Kosuge, T and Nester, EN (1984) Plant microbe interactions Molecular and genetic Perspectives, Mac millan, Newyork

Practical-VII

Practicals based on 4.1

MYCOLOGY

1. Vegetative organization in fungi.
2. Asexual reproduction in fungi.
3. Sexual reproduction in fungi.
4. Rhziosphere, Rhzioplane, phylloplane studies of fungi.
5. Fungal physiology – Growth and nutritional studies.

PLANT PATHOLOGY

1. Disease of cereal crops.

a) Blast disease of Rice.
b) Yellow smut of wheat.
c) Loose smut of wheat.
d) Downy mildew of sorghum.
e) Anthraenose of sorghum

2. Disease of plantation crops.

a) Downy mildew of grapes.
b) Leaf rust of coffee.
c) Tikka disease of ground nut.
d) Late blight of potato.

3. Others - a) Bean mosaic disease. b) Sandal spike. c) Tobacco mosaic virus disease. d) Citrus canker. e) Grass root sugarcane f) Root knot of mulberry.

4. Isolation and inculcation of plant pathogens.
5. Estimation of spore production of fungal pathogens of leaves using Haemocytometer method. Air dispersal of plant pathogens – an investigation using rotord sampler.

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4.2 ECOLOGY AND ENVIRONMENTAL BIOLOGY

Unit-I

History and scope of ecology and environmental biology: ecosystem – concept, structure , types, components, functions and dynamics. Energy flow in the ecosystem, tropic levels food chains food web ecological pyramid. Biogeochemical cycle; hydrological cycle, gases nutrient cycle, and sedimentary nutrient cycle. Major terrestrial ecosystem of the world- disserts, grasslands, savanna, tundra, forest.

Unit-II

Population ecology- growth and charecteristics of populationation antality, mortality, life table , age structure, concept of carrying capacity, concept of density dependent and density independent action in population control,. Biotic community- concept, structure , dominanve, fluctuation and succession, ecological niche- intraspecific asnd inter specific interactions allelopathy preadation.-prey relationship.system ecology and ecological models.

Unit-III

Major aquatic ecosystems of the world- fresh water ecosystem, marine ecostem,environmental pollution-sources, major and impact of air, water and soil pollution radioactive pollution disposal and management oil pollution and management. Plant indicators in pollution. Solid and liquid wastre management in tannery, fertilizer , pulp and paper and sugar industries. Noise pollution- assessment , control and management. Global environment problem, ozone depletion, global warming and climatic change

Unit-IV

Biodiversity conservation- definition , importance , biological hotspots , biodiversity loss , magnitude and distribution of biodiversity. biodiversity values- timber, ornamerntal, medicinal. Conservation insitu and exsitu methods. Environmental

management- natural resources, principles of conservation , concept and strategies of sustainable development , environmental impact assessment, principles of remote sensing , application of RS and GIs in environmental management , environmental laws forest conservation act, biological diversity.

References:

1. Muller Dombois J. And Ellenberg, H. (1974) aims and methods of vegetation ecology Wiley , new york.
2. Odum, E.P. 91971) fundamentals of Ecology, saunders, Philadelphia.
3. Kormondy, E. J. (1996) concepts of ecology, prentice hall, India, New Delhi.
4. Foin, T.C. (1976) ecological system and environment, Mifflin, boston.
5. Nobel B.J. and Wright, R.T. (1996) environmental science , prentice hall New Jersey.
6. Lillesand T.M. and Kiefer R.W. (1987) Remote sensing and image interpretation , John Wiley and sons, new York.
7. Agarwal, S.B. and Agarwal, M. (Ed.) (2000) environmental pollution and responses , CKC press , London.
8. Koshoo, T. N. (1991) environmental concept and stragies ashish publ. House, new delhi.
9. Colinvaux P.C. (1993) ecology John Wiley and Sons, New york.

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4.3 PLANT BIOTECHNOLOGY

Unit 1

Introduction: Definition Old and New Biotechnology. An interdisciplinary activity, Scoped and importance, commercial potential, Biotechnology centers in India. Biofertilizers: Introduction, Types, Blue green algae, Sea weeds, Azolla, Vesicular arbuscular mycorrhizal fungi and Rhizobium.

Unit 2

Industrial Biotechnology: Introduction, Industrial microbial products: Alcohol production (Beer), Antibiotics production (penicillin), production of Vitamins (Vitamin B12), production of Single Cell Protein, Algal protein: (Spirulina) Fungal protein: (Mushroom) and economic aspects. Plant Tissue Culture: Introduction. Importance of plant tissue culture, Basic requirements for tissue culture laboratory, composition of tissue culture medium. Culture of plant tissues, Regeneration of plants, Root culture, meristem culture, Anther culture, Pollen culture. Role of tissue culture technology in crop improvements.

Unit 3

Biofuels: Introduction, Production of biogas, Structure of biogas plant, Biochemistry of methane production, Biogas research in India, Uses of biogas. Plant Biotechnology Introduction, Somatic hybrids and cybrids, cytoplasmic gene transfer, gene transfer, Advantage and Limitations.

Unit 4

Genetic Engineering: Introduction, Genetic Engineering of microorganisms, Vectors of gene cloning direct transformations, Microinjection, Nuclear transplantation, Isolation and cloning plasmid and Mitochondrial genes. Transgenic plants with nif genes. Improvement of seed proteins, production of disease free and disease resistant plants.

REFERENCES:

1. Glazer, A.N and Nikaido. H. 1995. Microbial Biotechnology. W.H.Freeman And co. New York.
2. Gliek Barnard and Pasternak, Jack.J.1996. Molecular Biotechnology principles and application of recombinant DNA: Pavan publishers. New Delhi.
3. Kumar.H.C. 1992. Text book on Biotechnology. East west press. New York.
4. Walker.J.M and Gingold. W.B. 1989. Molecular Biology and Biotechnology. 2nd edition. Royal Society of chemistry, London.
5. Keshav Trehan.1990. Biotechnology. Wiley Eastern/td. New Delhi.
6. Gaurd.R.S. Gupta.G.D and Gukhade.S.B.2000. Practical Biotechnology: Nirali park ashan publishers. Pune. 33
7. Firn.R.K and Prave.P Biotechnology. 1988. Hanser Publisher publication. New York.
8. Dube.H.C.1991. Fungi and Biotechnology. Todays and tomorrow's Printer and Publishers. New Delhi.
9. Stanbury.P.F and Whitaker.A. 1985. Principles and Fermentation technology pergaman press. Oxford.
10. Wiseman.A.1987. Hand book of enzyme Biotechnology. Ellis Horwood ltd. New York
11. Tejovathi.G, Vimala.Y and Rekha Bhadauria, 1996. A practical manual for plant Biotechnology. CBS publishers and distributors. New Delhi.
12. Narayanan. L.M., Selva Raj, A.M., Mani.A and Arumugam.N.1998. Molecular Biology and Genetic Engineering. Saras publication. Nagercoil. India.
13. Colin Ratledge and Bjorn Kristainsen.2004. Basic Biotechnology. Cambridge University press London.
14. Snyder.L. and Champness, W. 1997. Molecular Genetics of Bacteria. American Society for microbiology. Washington DC.
15. Asenjo, J.A.1990. Separation process in Biotechnology. Marcel Dakker, New York.

PRACTICAL-VIII

Practicals based on 4.2

1. Water Analysis:

a. Estimation of BOD and COD

b. Estimation of PO4, SO4 and NO3.

c. Estimation of Major Cations- Na, K, Ca, Mg and Salinity

2. Effect of DDT and other pesticides on primary production.

3. Effect of Industrial effluent/Heavy metals on seed germination and seedling growth.

4. Estimation of Chlorophyll, Proline, Ascorbic acid in leaves of plants growing in polluted and unpolluted areas.

a. Sampling and identification of air spora.

b. Estimation of heavy metal content of road side plants.

c. Field excursion to an industrial area to assess environmental impact.

Practicals based on 4.3

1. Basic laboratory principles and techniques
2. Equipments and instruments.
3. Culture media: Simple media, Synthetic media, Complex media, Semi defined media, Special media, Enriched media.
4. Culture of Mushroom.
5. Mass culture of Spirulina.
6. Plant tissue culture techniques.
7. Isolation of DNA from plant materials.
8. Production of Synthetic Seeds.
9. Preparation of Wines from Grapes.
10. Experiment to demonstrate biogas production.