

Department of Botany, Govt. Degree College Baramulla (Autonomous)

(NAAC Re-accredited Grade A and CPE status)

Syllabus 7th Semester (4 years Honours Degree Course)

Subject: Botany

Title: Mycology and Applied Plant Pathology (Credits: 4 theory + 2 practical)

Paper 2. BOTC2722M

No. of Contact hours: 64T+64P=128

Course Learning Objectives (CLOs)

By the end of the course, students will be able to:

1. **Describe and classify** fungi based on morphology, reproduction, life cycles, and taxonomic criteria, with examples from major fungal groups.
2. **Explain** the structure, function, and ecological significance of symbiotic associations such as lichens and mycorrhizae, and analyze the applications of fungi in biotechnology, industry, and pharmaceuticals.
3. **Identify and interpret** key concepts in phytopathology, including disease terminology, host–pathogen interactions, disease cycles, and control strategies, including integrated pest management and plant quarantine.
4. **Recognize and evaluate** major fungal plant diseases (with emphasis on some important Kashmir crops), their etiology, symptoms, life cycles, control measures, and economic impact.

UNIT 1: Introduction to Fungi

General characteristics and affinities of Fungi: Thallus organization, Cell wall composition, Nutrition and reproduction.

Classification: Criteria for classification of Fungi; Classification of Fungi proposed by Alexopoulos *et al* (1996); Characteristics of major classes of Fungi.

Characteristic features: Thallus organization, Reproduction and Life cycle with reference to

Chitridomycota (*Synchytrium*)

Zygomycota (*Mucor*)

Ascomycota (*Morchella*)

Basidiomycota (*Puccinia*)

UNIT 2: Symbiotic Associations & Applied Mycology

Symbiotic Associations: Lichens – Classification, Occurrence, General characteristics, Growth forms and Range of thallus organization.

Structure and Reproduction of Mycorrhiza: (Ectomycorrhiza and Endomycorrhiza) and VAM and their significance.

Applied Mycology: Role of fungi in biotechnology, food industry (Flavour and Texture, Fermentation, Baking, Organic acids, Enzymes and Mycoproteins).

Fungal Secondary metabolites: types and applications in Pharmaceutical industry; Mycotoxins, types and their significance.

UNIT 3: Introduction to Phytopathology

Terminology, Symptomology, Etiology, Host-Pathogen relationships, Disease cycles and environmental relationships of important crop diseases in Kashmir.

Prevention and control of plant diseases (physical, chemical and biological); Integrated Pest Management; Plant quarantine.

Viral diseases – Tobacco Mosaic Virus and CMV (Cucumber Mosaic Virus).

Bacterial diseases – Bacterial blight of paddy and Crown gall

UNIT 4: Major plant diseases in Kashmir

Symptoms, life cycle, etiology, control measures and economic impact of:

Late blight of potato (*Phytophthora infestans*), White rust of Crucifers (*Albugo candida*)
Powdery Mildew in Cucurbits (*Erysiphe cichoracearum*),

Paddy Blast (*Magnaporthe oryzae*), Loose Smut of wheat (*Ustilago tritici*) and Covered Smut of Maize (*Ustilago maydis*)

Apple Scab (*Venturia inaequalis*), Leaf Blight of Apple (*Alternaria mali*) and Leaf curl of Peach (*Taphrina deformans*)

Practicals

1. Preparation of culture Media (Potato dextrose Agar (PDA); King's B Medium; Martin's Rose Bengal Agar, and Corn Meal Agar (CMA)).
2. Pathogenicity tests on temperate rosaceous plants (Apple, Pear, Peach), and walnut trees
3. To study symptoms of Bacterial diseases (Leaf Blight of paddy)
4. To study symptoms of Cauliflower Mosaic Virus (CaMV)
5. Fungal Diversity in Kashmir forests – Collection and identification/Demonstration of macro fungal species from local forest areas.
6. Late Blight of Potato – Conduct field surveys and isolate *Phytophthora infestans* from infected potato plants.
7. Rust Diseases in Wheat– Study *Puccinia* species affecting cereal crops.
8. Fire Blight in Pear– Study bacterial infection caused by *Erwinia amylovora*.
9. Soil-Borne Pathogens in Vegetable Crops – Isolate *Fusarium* and *Rhizoctonia* from local fields.
10. Study Brown rot (*Monilinia* spp.), Powdery mildew (*Podosphaera* spp.), and Leaf spot diseases affecting cherry, apricot and plum.

Suggested Readings

1. Agrios, G.N. (1997) *Plant Pathology*, 4th edition, Academic Press, U.K.

2. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). *Introductory Mycology*, John Wiley & Sons (Asia) Singapore. 4th edition.
3. Webster, J. and Weber, R. (2007). *Introduction to Fungi*. Cambridge University Press, Cambridge. 3rd edition.
4. Sethi, I.K. and Walia, S.K. (2011). *Text book of Fungi and Their Allies*, Macmillan Publishers India Ltd.
5. Sharma, P.D. (2011). *Plant Pathology*, Rastogi Publication, Meerut, India.
6. Singh, R.S. (2018). *Plant Diseases*, 10th edition. Meditech, A Division of Scientific International Pvt. Ltd.