Bot.Sp-05 FUNGAL DISEASES OF CEREAL CROPS Credit Hours: 3(2+1)
THEORY

Introduction of the Course:

The course is organized to provide basic concepts of Fungal Diseases of cereal crops and identification of different plant pathogens, their comparative study, disease cycle, Economic Importance of different fungal pathogens and control measures.

Course Objectives:

The course is designed:

1. To provide an adequate knowledge about basic concepts and identification of plant pathogens
2. To give an insight into important fungal diseases of cereal crops and their management.

Contents:

1. **Introduction**:
   - 1.1. Comparative study of the different Fungal pathogen groups with representative examples, including Rusts, Smuts, Powdery Mildews, Downy Mildews, Soil Born and Air Born Fungal pathogens, Spots, Blights, Wilts, Damping off and Rots etc.
   - 1.2. Importance and symptoms of various cereal crop diseases;
   - 1.3. disease cycle
   - 1.4. Plant-Fungal Interactions
2. **Cereal crop pathogens**
   - 2.1. The Oomycetes, Downy mildews
   - 2.2. Chytrid & Zygomycota pathogens
   - 2.3. Ascomycota pathogens, Structures & Functions, Sexual and asexual ascomycetes, conidial structures and identification, Powdery Mildews
   - 2.4. Basidiomycota: Rusts, Smuts; Taxonomy, Biology, Host Range, Life Cycle and Ecology, Basidiomycetes pathogens, Structures & functions
3. **Fungi in the Air:**
   - 3.1. Airborne pathogens
   - 3.2. Foliar diseases
4. **Soil borne Fungal Pathogens**
5. **Economic Importance**:
   - 5.1. Fungal pathogens of cereal crops (Wheat, Maize, Oat, Barley etc.)
6. **Adaptations for Pathogenicity:**
   - 6.1. Obligate vs. opportunistic pathogens,
   - 6.2. Fungal Pathogens in Row Crops & Perennial Crops,
7. **Control of Fungal Diseases:**
   - 7.1. Mycotoxins
   - 7.2. Whetzel's principles of plant disease control
   - 7.3. Cultural controls
   - 7.4. Chemical Control of Fungal Diseases

Practicals:

1. Maintenance and preservation of cultures of pathogenic fungi
2. Identification of various types mentioned in the syllabus form fresh specimens, preserved specimens and prepared slides
3. Study of morphology and reproductive structures of the types mentioned in theory (Specimens/prepared slides)
4. Recognition of disease symptoms and keys for pathogen identification

5. Isolation of pathogens and their Characterization
6. Field trips for collection of different plant samples infected with fungal pathogen.

Teaching-learning Strategies

1. Lectures
2. Group Discussion
3. Laboratory work
4. Seminar/ Workshop

Learning Outcome:

1. Students are expected to get familiarized with the morphological and systematic knowledge of different plant pathogens.
2. They will be able to describe the concepts of what constitutes disease in cereal crops and identify major principles of fungal plant pathology.
3. This will also enable them to employ methods to diagnose and manage a wide range of fungal diseases of cereal crops.
4. The obtained knowledge shall also enable the students to describe aspects of integrated pest management and to explain the impact of plant diseases on human affairs.

Assessment Strategies:

1. Lecture Based Examination (Objective and Subjective)
2. Assignments
3. Class discussion
4. Quiz
5. Tests

Recommended Readings:

1. Ahmad, S., Iqbal, S.H. and Khalid, A.N. (1997). *Fungi of Pakistan*. Sultan Ahmad Mycological Society Pakistan, Department of Botany, University of Punjab, Lahore, Pakistan.
2. Agrios, G. N. (2011). *Plant Pathology*, 6th edition. Academic Press, New York, USA.
3. Alexopoulos, C.J., Mims, C.W. and Blackwell, M. (1996). *Introductory Mycology* (4thed.). John Wiley & Sons, Inc. ISBN0-471-52229-5
4. Braun, U. and Cook, R.T.A. (2012). *Taxonomic Manual of the Erysiphales (Powdery Mildews)*. ISBN: 978-90-70351-89-2.
5. Cummins, G.B. and Hiratsuka, Y. (2003). *Illustrated Genera of Rust Fungi*. Third ed. The American Phytopathological Society. APS Press, St. Paul, MN.
6. Schumann, G.L. and D'Arcy, C.J. (2010). *Essential Plant Pathology*. APS Press. 369 PP.
7. Vánky, K. (2011["2012"]). *Smut fungi of the World*. APS Press, St. Paul, Minnesota, USA.
8. Vánky, K. (2013). *Illustrated Genera of Smut Fungi*, 3rdedn. St. Paul, MN, USA, APS Press.
9. Webster, J. and Weber, R.W.S. (2007). *Introduction to Fungi* (3rded.). Cambridge University Press. ISBN: 0-521-01483-2.

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