Bot-412 & 413 PLANT PATHOLOGY Credit Hours: 3(2+1)

THEORY

Introduction of the Course:

The course is designed to provide an adequate knowledge about basic concepts of important plant pathogens and pathogenic diseases, pattern of disease development and disease cycle. It is generally aimed to familiarize students about the identification of major plant pathogens such as bacteria, fungi, nematodes, viruses and other microbes that cause huge economic losses to the farmers.

Course Objectives:

The course is designed:

1. To provide an adequate knowledge about basic concepts of different plant pathogens and their morphological/anatomical characteristics.
2. To acquaint students with basic vocabulary and recent trends in Plant Pathology and to familiarize them with the plant disease management.

Contents:

1. **Introduction**:
   - 1.1.History and classification of plant pathogens and pathogenic diseases.
   - 1.2.Symptoms, causes and patterns of their development.
   - 1.3.Loss assessment and plant pathogen control and systemic resistance.
   - 1.4.Epidemiology and disease forecast.
   - 1.5.The effect of environmental factors on disease development.
2. **Taxonomy:**
   - 2.1.Taxonomic position and classification of economically important plant pathogens.
3. **Viruses**:
   - 3.1.Important Pathogenic diseases of crop plants and fruit trees caused by Viruses.
   - 3.2.Sugarcane mosaic virus disease.
   - 3.3.Cotton leaf curl disease.
   - 3.4.Tobacco Mosaic virus disease.
   - 3.5.Potato virus Y disease.
4. **Fungi**:
   - 4.1.Important Pathogenic diseases of crop plants and fruit trees caused by fungi including Apple scabs etc.
   - 4.2.Rusts (*Puccinia, Phragmidium, Uromyces* etc.).
   - 4.3.Smuts (*Ustilago, Urocystis, Thekaphora* etc.).
   - 4.4.Powdery Mildews (*Erysiphe, Phyllactinia, Microsphaera, Podosphaera* etc).
   - 4.5.Downy Mildews
5. **Bacteria**:
   - 5.1.Blight of cereals and grasses
   - 5. 2.ring rot of Potato 5.3.Crown Gall disease 6. **Nematodes**:
   - 6. 1.Root Knot Disease of Vegetables 6.2.Potato Cyst disease
   - 7. **Economic importance of plant diseases**
   - 8. **Introduction to molecular techniques and their application in Plant pathology Practicals:**

1. Collection, preservation and identification of infected plant specimens based on symptoms
2. Study of important taxonomic characteristics of various plant pathogens
3. Basic pathological cultural techniques for isolation and inoculation. Preparation of media and isolation of different plant pathogens
4. Macroscopic and Microscopic examination of diseased specimens of the type studied
5. Field trips for collection of different plant samples infected with fungal, viral and bacterial pathogens

Teaching-learning Strategies

1. Lectures
    1. Group Discussion
    2. Laboratory work
    3. Seminar/ Workshop **Learning Outcome:**

1. Students are expected to get familiarized with the morphological and systematic knowledge about different plant pathogens.
2. They will be able to describe the concepts of what constitutes disease in plants and identify major principles of plant pathology.
3. This will enable them to employ methods to diagnose and manage a wide range of plant diseases.
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. Agrios, G. N. (2011). *Plant Pathology*, 6th edition. Academic Press, New York, USA.
2. Ahmad, I. and Bhutta, A. R. (2005). *Textbook of introductory Plant Pathology*. Published by National Book Foundation, Islamabad.
3. 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.
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. Hafiz, A. (1986). *Plant Diseases*. Pakistan Agricultural Research Council, Islamabad, Pakistan.
7. Mathew, J. D. (2003). *Molecular Plant Pathology*. Bios Scientific Publishers Ltd. UK.
8. Mehrotra, R. S. and Agarwal, A. (2003). *Plant Pathology*. 2nd Edition. TATA McGrawHill. Pub. Company Ltd. New Delhi.

9. Sambamurty, A. V. S. S. (2006). *A Text Book of Plant Pathology*. I.K. International Pvt. Ltd.
10. Schumann, G. L. and D'Arcy, C. J. (2010). *Essential Plant Pathology*. APS Press. 369 PP.
11. Strange, R. N. (2003). *Introduction to Plant Pathology*. John Willey & Sons, New York.
12. Ravichandra, N. G. (2013). *Fundamentals of Plant Pathology*. Prentice Hall of India Pvt. Ltd.
13. Prell, H. H. and Day, P. (2001). *Plant – Fungal Pathogen Interaction – A Classical and Milecular View*. Springer Verlage.
14. Vánky, K. (2011["2012"]). *Smut fungi of the World*. APS Press, St. Paul, Minnesota, USA.
15. Vánky, K. (2013). *Illustrated Genera of Smut Fungi*, 3rdedn. St. Paul, MN, USA, APS Press.

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