PLANT PATHOLOGY

Path 1101 Fundamentals of Plant Pathology (2 + 1)

Theory

Plant Pathology- Importance of plant diseases- Definition, Scope - Objectives- History of Plant Pathology-Terms and concepts in Plant Pathology- Classification of plant diseases. Important plant pathogenic organisms- Fungi, bacteria, fastidious vascular bacteria, virus, viroids, phytoplasma, spiroplasma, algae, protozoa, nematodes, phanerogamic parasites with examples of disease caused by them. Diseases due to abiotic causes. Causes/ factors affecting disease development: disease triangle and tetrahedron. Fungi- definition, characters, somatic structures, Modern concept of nomenclature and classification, Classification of kingdom Fungi: Stramenopila and Protozoa. Bacteria, Viruses and Mollicutes. Morphology, classification, reproduction, transmission, dispersal and survival. Parasitism, Variability of plant pathogens. Defense mechanism in plants. Pathogenesis. Role in disease development Enzymes, Toxins, Growth regulators.

Practical

Acquaintance with lab equipments and Procedures. Collection and preservation of specimens. Media preparation. Isolation of plant pathogens and proving pathogenicity. Symptoms of fungal bacterial, viral and phytoplasmal diseases. Study of representative genera of fungi. Staining and identification of plant pathogenic bacteria. Transmission of plant viruses. Study of phanerogamic parasites.

Lecture schedule

1. Plant Pathology – introduction – importance of plant diseases

2. History of Plant Pathology- International and national importance.

3-4 Causes of plant diseases, Terms and concepts in Plant Pathology– bacteria, fungi, viruses, viroids, phytoplasmas, fastidious vascular bacteria, parasites, pathogens, biotrophs, hemibiotrophs, necrotrophs.

5-6 Pathogenicity, pathogenesis, disease triangle, disease tetrahedron, virulence, infection, inoculum, invasion, colonisation, inoculum potential, symptoms, incubation period.

7-8 Disease cycle, disease syndrome, monocyclic diseases, polycyclic diseases, alternate host, collateral host. Predisposition, physiological race, biotype, symbiosis, mutualism, antagonism

9-10 Defence mechanism in plants

11-12 Pathogenesis- enzymes, toxins and growth regulators in plant disease development

13-14 Types of parasitism and variability in plant pathogens

15-17 Survival and dispersal of plant pathogens

18-19 General characters of fungi, classification and phylogenetic relationships of fungi, methods of reproduction

Mid Term Examination

20. The general characteristics and life cycle of protozoans (Kingdom Protozoa) in Phyla Mycetozoa, Acrasida and Plasmodiophorea

21. Kingdom Straminopila (Chromista): characters and life cycles of representative genera under Hypochytriomycota, Oomycota and Labyrinthulomycota.

22. General characters, taxonomy, somatic structures, reproduction, life cycle and plant pathological significance of *Pythium, Phytophthora*

23. General characters, taxonomy, somatic structures, reproduction, life cycle and plant pathological significance of *Albugo, Sclerophthora, Peronosclerospora, Peronospora & Plasmopara*.

24. General characters, taxonomy, somatic structures, reproduction, life cycle and plant pathological significance of phyla Chytridiomycota and Zygomycota. *Rhizopus* and *Mucor.*

25. General characters, taxonomy, somatic structures, reproduction, life cycle and plant pathological significance of phylum Ascomycota – *Taphrina & Yeasts*

26. General characters, taxonomy, somatic structures, reproduction, life cycle and plant pathological significance of *Erysiphe, Aspergillus, Penicillium*

27. General characters, taxonomy, somatic structures, reproduction, life cycle and plant pathological significance of *Claviceps, Chaetomium, Ascobolus, Sclerotinia.*

28. General characters, taxonomy, somatic structures, reproduction, life cycle and plant pathological significance of phylum Basidiomycota. - *Puccinia*, *Melampsora*,*Uromyces*.

29. General characters, taxonomy, somatic structures, reproduction, life cycle and plant pathological significance of *Ustilago, Tilletia, Neovossia, Sphacelotheca ,Tolyposporium*.

30. General characters, taxonomy, somatic structures, reproduction, life cycle and plant pathological significance of anamorphic fungi - *Colletotricum, Alternaria, Cercospora, Pestalotia, Botryodiplodia* and *Diplodia.*

31. General characters, taxonomy, somatic structures, reproduction, Anamorphic fungi, life cycle and plant pathological significance of *Corticium, Fusarium, Helminthosporium, Pyricularia, Sclerotium, Rhizoctonia, Phyllosticta, Phoma, Trichoderma and Verticillium.*

32. Morphological Characters and classification of phytopathogenic bacteria.

33. Symptoms of bacterial diseases, mode of entry, reproduction and spread.

34. Virus – definition, nature, properties, classification, virus – vector relationships.

35. Common symptoms of virus, viroid and phytoplasmal diseases of crops.

36. Characters of algal and phanerogamic plant parasites – symptoms.

Practical schedule

1. Common symptoms of plant diseases caused by fungi, bacteria, virus and phytoplasmal diseases

2. Common laboratory equipments and techniques

3. Collection and preservation of plant disease specimen

4. Isolation of plant pathogens and pathogenicity testing

5. Transmission studies for viral disease symptom expression.

6. Microscopic slide culture, common media and mountants used in mycology.

7. Staining and identification of plant pathogenic bacteria

8. Study of characters, symptoms, host parasite relationships and systematic position of organisms belonging to Kingdom Protozoa.

9. Study of characters, symptoms, host parasite relationships and systematic position of fungi belonging to phylum Oomycota- *Pythium , Phytophthora*.

10. Study of characters, symptoms, host parasite relationships and systematic position of fungi belonging to white Rust – *Albugo*

11. Study of characters, symptoms, host parasite relationships and systematic position of fungi belonging to downy mildews – *Plasmopara, Peronospora*

12. Study of characters, symptoms, host parasite relationships and systematic position of fungi belonging to phylum Zygomycota- *Rhizopus*

13. Study of characters, symptoms, host parasite relationships and systematic position of fungi belonging to phylum Ascomycota. *Aspergillus, Penicillum, Saccharomyces, Taphrina*

14. Study of characters, symptoms, host parasite relationships and systematic position of powdery mildews

15. Study of characters, symptoms, host parasite relationships and systematic position of rusts and smuts

16. Study of characters, symptoms, host parasite relationships and systematic position of edible macro fungi and the anamorphic fungi

17. Study of phanerogamic plant parasites

18. Practical Examination

Suggested Readings

1. Agrios, G.N. 2005. Plant Pathology. (5 th Ed.). Elsevier Academic Press.882p. 89

2. Alexopoulos, C.J., Mims, C.W. and Blackwell, M. 2014. Introductory Mycology (4 thEd.).Wiley India Pvt Ltd. 833p

3. Jayaraman, J. and Verma, J. P. 2002.Fundamentals of Plant Bacteriology (Reprint, 2015).Kalyani publishers, New Delhi

4. Pelczar, M.J., Chan, E.C.S. and Krieg, N.R. 1986. Microbiology. Tata Mc Graw- Hill Publishing Company Ltd , New Delhi.

5. Ravichandra, N.G. 2013. Fundamentals of Plant Pathology. PHILearning Pvt Ltd. 639p.

6. Webster, J. and Weber, R. W. S.2007. Introduction to Fungi.(3 rd Ed.).Cambridge University press.817 p.

7.H C Dube.,2015. An introduction to fungi (4^{th} Ed.). Scientific publishers (India). 603p.