

Botany Major: III Semester

Course 5 : Vascular Plants (Pteridophytes, Gymnosperms and Angiosperm Taxonomy)

Practical

02 hours /Week

Credits -1

I. Course Outcomes: On successful completion of this practical course, student shall be able to:

1. Distinguish the Pteridophytes and Gymnosperms based on their morphological, anatomical and reproductive structures.
2. Make systematic classification of plant species using vegetative and floral characters.
3. Identify angiosperm plant species and make herbarium specimens.

II Laboratory/field exercises:

I. Study/ microscopic observation of vegetative, sectional/anatomical and reproductive structures of the following using temporary or permanent slides/specimens/ mounts:

1. Pteridophyta: *Lycopodium* and *Marselia*

2. Gymnosperms: *Cycas* and *Gnetum*

II. Technical description of locally available plant species from the following angiosperm families:

1. Annonaceae 2. Cucurbitaceae 3. Asteraceae 4. Asclepiadaceae

5. Amaranthaceae 6. Euphorbiaceae 7. Arecaceae 8. Poaceae

III. Demonstration of herbarium techniques.

IV. Field trip to a local floristic area/forest (Submission of 30 number of Herbarium sheets of wild plants with the standard system are mandatory).

II Semester
Course 6: Plant Pathology and Plant Diseases
Credits -3

I. Learning Objectives: By the end of this course the learner has:

1. To study various plant pathogens, their survival and dispersal mechanisms.
2. To understand the processes involved in infection and pathogenesis in plants.
3. To study the common diseases of some important field and horticultural crops.

II. Learning Outcomes:

1. Identify major groups of plant pathogens and classify plant diseases.
2. Explain various stages in infection, plant pathogenesis and responsible factors.
3. Elaborate the preventive and control measures for plant diseases.
4. Discuss about some diseases of field crops and their management.
5. Discuss about some diseases of horticultural crops and their management.

III. Syllabus of Theory:

Unit-1: Plant pathogens, survival and dispersal **8 Hrs.**

1. Plant pathology: definition, importance of plant diseases, important famines in world; scope and objectives of plant pathology.
2. Important plant pathogenic organisms with examples of diseases caused by them.
3. Classification of plant diseases based on important criteria.
4. A brief account on survival of plant pathogens.
5. Dispersal of plant pathogens – active and passive processes.

Unit-2: Infection and pathogenesis in plants **8 Hrs.**

1. Infection process – pre-penetration, penetration and post-penetration.
2. Role of enzymes in plant pathogenesis.
3. Role of toxins in plant pathogenesis.
4. Role of growth regulators in plant pathogenesis.
5. Defense mechanisms in plants against pathogens.

Unit-3: Plant disease management **8 Hrs.**

1. Plant disease epidemiology; plant disease forecasting; remote sensing in plant pathology.
2. General principles of plant diseases management.

3. Regulatory methods, cultural methods; biological control and PGPR.
4. Physical methods, chemical methods; host plant resistance.
5. Integrated plant disease management (IDM) – Concept, advantages and importance.

Unit-4: Diseases of field crops

12 Hrs.

Symptoms, etiology, disease cycle and management of major diseases of following crops:

- a) Rice: Blast of rice, bacterial blight and Tungro
- b) Bajra: Downy mildew and Ergot
- c) Pigeon-pea: Phytophthora blight, wilt and sterility mosaic
- d) Groundnut: Tikka leaf spot, rust and root rot

Unit-4: Diseases of horticultural crops

9 Hrs.

Symptoms, etiology, disease cycle and management of major diseases of following crops:

- a) Brinjal: Phomopsis blight and Little leaf
- b) Okra: Powdery mildew and Yellow vein mosaic
- c) Pomegranate: Alternaria fruit spot and Anthracnose
- d) Coconut: Bud rot and Basal stem rot

IV. Text Books:

1. P.D. Sharma (2011) Fundamentals of Plant Pathology, Tata McGraw-Hill Education, New Delhi
2. R.S. Singh and U.S. Singh (2017) Plant Pathology: An Introduction, CRC Press, Boca Raton, Florida, USA
3. R.S. Mehrotra (2008) Plant Pathology, Tata McGraw-Hill Education, New Delhi
4. M. S. Reddy and Gopal Singh (2016) Plant Pathology: Concepts and Laboratory Exercises, Scientific Publishers, Jodhpur, India

V. Reference Books:

1. Agrios, G. N. (2005). Plant Pathology (5th ed.). Academic Press, San Diego, California.
2. Dehne, H. W. (Ed.). (2012). Plant Pathology: From Molecular Biology to Biological Control. Springer, Dordrecht, Netherlands.
3. Dicklow, M. B., & Beaudry, R. M. (Eds.). (2013). Plant Pathology Concepts and Laboratory Exercises (2nd ed.). CRC Press, Boca Raton, Florida.

4. Lucas, J. A. (1998). Plant Pathology and Plant Pathogens. Blackwell Science, Oxford, UK.
5. Lucas, J. A. (1998). Plant pathology and plant pathogens. Blackwell Science, Oxford, UK.
6. Schumann, G. L., & D'Arcy, C. J. (2010). Essential Plant Pathology (2nd ed.). APS Press, St. Paul, Minnesota.
7. Schumann, G. L., and C. D'Arcy (2010). Essential plant pathology. APS Press, St. Paul, MN.
8. Singh, R. P., and U. S. Singh (2020). Plant diseases: Identification, management and challenges. Springer, Singapore.

VI. Suggested activities and evaluation methods:

Unit-1: Activity: Field Survey and making a report on various plant pathogens, their survival and dispersal mechanisms.

Evaluation method: Field reports, presentations and visual documentation based on a rubric.

Unit-2: Activity: Case studies on plant infections and factors contributing to disease development.

Evaluation method: Diagnostic evaluation of case study report for problem-solving and critical thinking skills.

Unit-3: Activity: A survey report on various preventive and control measures for plant diseases practiced by the farmers in their locality.

Evaluation method: Peer review by students on the quality of report.

Unit-4: Activity: Field survey and data collection on diseases of local field crops.

Evaluation method: Assessment of the quality of report bases on a rubric.

Unit-5: Activity: Microscopic observations and making drawings of diseased samples.

Evaluation method: Formative assessment of presentation of findings through visuals/ drawings.

III Semester

Course 6: Plant Pathology and Plant Diseases

Credits -1

I. Course Outcomes: On successful completion of this practical course, student shall be able to:

1. Handle equipment and instruments in plant pathology laboratory.
2. Isolate plant pathogenic microbes.
2. Identify the plant diseases based of histopathological observations.

II. Laboratory/field exercises:

1. Familiarity with general plant pathological laboratory and field equipment.
2. Isolation and Identification of plant pathogenic fungi.
3. Isolation and Identification of plant pathogenic bacteria.
4. Identification of phanerogamic plant parasites.
5. Isolation and Identification of plant pathogenic nematodes.
6. Demonstration of Koch's postulates
7. Identification and histopathological studies of selected diseases of field crops.
8. Identification and histopathological studies of selected diseases of horticultural crops.

III Semester

Course 7: Plant Breeding

Credits -3

I. Learning Objectives: By the end of this course the learner has:

1. To learn the objectives and scope of plant breeding along with reproductive methods in plants.
2. To understand the breeding methods in plant for production of new varieties.
3. To have a comprehensive knowledge on tools and techniques in plant breeding.

II. Learning Outcomes:

1. Compare and contrast the methods of reproduction and also pollination mechanisms.
2. Design appropriate pollination method for a given crop plant.