

*Syllabus of the Courses Offered and Catered by the Department of Plant Pathology to students of Faculty of Agriculture for the Four Year Degree programme of B. Sc. (Hons.) Agriculture*

**B. Sc Ag Hons 1<sup>st</sup> semester**

**PPA 105      Fundamentals of Plant Pathology I      2 (1+1)**

**Theory**

Important plant pathogenic organisms, different groups: fungi, bacteria, fastidious vesicular bacteria, phytoplasmas, spiroplasmas, viruses, viroids, algae, protozoa, phanerogamic parasites and nematodes with examples of diseases caused by them.

Fungi: general characters, definition of fungus, somatic structures, types of fungal thalli, fungal tissues, modifications of thallus, reproduction (asexual and sexual) Nomenclature, Binomial system of nomenclature, rules of nomenclature, classification of fungi. Key to divisions, sub-divisions, orders and classes.

Bacteria and mollicutes: general morphological characters. Basic methods of classification and reproduction.

Viruses: nature, architecture, multiplication and transmission, Study of phanerogamic plant parasites.

**Practical**

Acquaintance with various laboratory equipments and microscopy. Preparation of media, isolation and Koch's postulates. General study of different structures of fungi. Study of symptoms of various plant diseases. Study of representative fungal genera. Staining and identification of plant pathogenic bacteria. Transmission of plant viruses. Study of phanerogamic plant parasites. Study of fungicides and their formulations. Methods of pesticide application and their safe use. Calculation of fungicide sprays concentrations.

**B. Sc Ag Hons 2<sup>nd</sup> semester**

**PPA 155      Fundamentals of Plant Pathology II      2 (2+0)**

**Theory**

Introduction: Importance of plant diseases, scope and objectives of Plant Pathology. History of Plant Pathology with special reference to Indian work. Terms and concepts in Plant Pathology. Pathogenesis. Cause and classification of plant diseases. Diseases and symptoms due to abiotic causes. Phenomenon of Infection, Pre penetration, penetration and post penetration. Pathogenesis – Role of enzymes, toxin, growth regulators and polysaccharides: Defense mechanism in plants – structural and biochemical (pre

and post infection), Plant disease epidemiology Plant disease forecasting, remote sensing, Principles and methods of plant disease management. Application of Biotechnology in plant disease management-development of disease resistant transgenic plants through gene cloning IDM concept, advantage and importance. Nature, chemical combination, classification, mode of action and formulations of fungicides and antibiotics.

### **B. Sc Ag Hons 3<sup>rd</sup> semester**

#### **PPA 205 Diseases of Field & Horticultural Crops & their Management-I 2 (1+1)**

##### **Theory**

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

Field Crops: Rice: blast, brown spot, bacterial blight, sheath blight and false smut; Maize: leaf spots; Groundnut: early and late leaf spots, rust; Pigeonpea: Wilt and sterility mosaic; Black & Green gram: Cercospora leaf spot and yellow mosaic; Tobacco: Leaf curl and mosaic. Horticultural Crops: Guava: wilt and *Pestalotia* blight ; Banana: Panama wilt and Sigatoka; Papaya: foot rot and mosaic; Cruciferous vegetables: *Alternaria* leaf spot and black rot; Brinjal: *Phomopsis* blight and fruit rot and *Sclerotinia* blight, Bacterial Wilt ; Tomato: damping off, wilt, early and late blight and leaf curl; Okra: Yellow Vein Mosaic; Beans: anthracnose; Ginger: soft rot; Colocasia: *Phytophthora* blight; Coconut: *Pestalotia* leaf spot, wilt and bud rot; Tea: blister blight; Coffee: rust.

##### **Practical**

Identification and histopathological studies of selected diseases of field and horticultural crops covered in theory. Field visit for diagnosis of field problems. Collection and preservation of plant diseased specimens for Herbarium; Note: Students should submit 50 pressed and well-mounted specimens.

### **B. Sc Ag Hons 4th semester**

#### **PPA 256 Diseases of Field & Horticultural Crops & their Management-II 2 (1+1)**

##### **Theory**

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

Field Crops:

Wheat: rusts, loose smut and *Alternaria* blight; Sugarcane: red rot and ratoon stunting; Sunflower: *Alternaria* blight and *Rhizopus* head rot; Mustard: *Alternaria* blight, white rust and downy mildew;

Gram: wilt and *Ascochyta* blight; Lentil: rust, *Stemphylium* blight and wilt; Pea: powdery mildew and rust.

Horticultural Crops:

Mango: anthracnose, malformation and powdery mildew; Citrus: canker; Grape vine: downy mildew, powdery mildew and anthracnose; Potato: early and late blight, leaf roll, mosaic and scab; Cucurbits: downy mildew, powdery mildew and cucumber mosaic virus; Onion and garlic: purple blotch; Chillies: anthracnose and fruit rot and leaf curl; Turmeric: *Taphrina* leaf spot; Coriander: stem gall; Rose: dieback and black leaf spot.

### **Practical**

Identification and histopathological studies of selected diseases of field and horticultural crops covered in theory. Field visit for diagnosis of field problems. Collection and preservation of plant diseased specimens for herbarium.

## **B. Sc Ag Hons 5<sup>th</sup> semester**

**AEPP 306 Principles of Integrated Pest and Disease Management 3 (2+1)**

### **Theory**

Categories of insect pests, IPM: Introduction, history, importance, concepts, principles and tools of IPM. Economic importance of insect pests and pest risk analysis. Methods of detection and diagnosis of insect pest. Calculation and dynamics of economic injury level and importance of Economic threshold level. Introduction to conventional pesticides for the insect pests management. Survey surveillance and forecasting of Insect pest. Development and validation of IPM module. Implementation and impact of IPM (IPM module for Insect pest. Safety issues in pesticide uses. Political, social and legal implication of IPM. Case histories of important IPM programmes.

Introduction and concept of IDM, Phases of IDM, Strategies adopted for IDM, Disease risk analysis and crop loss assessment. Management of Host, pathogen and environment. ; Principles of IDM : Avoidance, Eradication, Protection, Host resistance and Therapy; Methods and implementation of IDM. Host plant resistance, cultural, mechanical, physical, legislative, biological and chemical control. Ecological management of crop environment. Different aspects of Plant biosecurity, biosafety and preventive measures. Integrated disease management practices on Rice, Potato, Groundnut, Jute, Mustard, Wheat, Vegetable crops, Pulses, Major fruit trees.

## **Practical**

Methods of diagnosis and detection of various insect pests, and plant diseases, Methods of insect pests and plant disease measurement, Assessment of crop yield losses, calculations based on economics of IPM, Identification of biocontrol agents, different predators and natural enemies. Mass multiplication of *Trichoderma*, *Pseudomonas*, *Trichogramma*, NPV etc. Identification and nature of damage of important insect pests and diseases and their management. Crop (agro-ecosystem) dynamics of a selected insect pest and diseases. Plan & assess preventive strategies (IPM module) and decision making. Monitoring of crops attacked by insect, pest and diseases. Performance study of hot water treatments of fruits and vegetables. Awareness campaign at farmers field.

## **B. Sc Ag Hons 4th semester**

**EC 263            Chemicals and biofungicides in Plant Disease Management    3(2 +1)**

### **Theory**

Chemicals in plant disease control, viz., fungicides, bactericides, nematicides and antiviral chemicals. History and development of chemicals, advantages and disadvantages of chemicals.

Chemical nature, characteristics and classification of fungicides. Formulation of different fungicides-types, uses, advantages, adjuvant, stickers and spreaders. Mode of action, compatibility and application of different fungicides and phytotoxicity of fungicides.

Chemical nature, characteristics and mode of action and application of different antibiotics. Antibiotics resistance in Plant pathogens.

New molecules in plant disease management.

Biofungicides including botanicals: types, mode of actions, application, formulation and shelf life. Quality issues. Problems and prospects.

General account of plant protection appliances. Development of fungicidal resistance.

### **Practical**

Acquaintance with formulation of different fungicides and plant protection appliances. Studies on fungicides application equipment-types of sprayers, dusters and nozzles. Poisoned food technique. Preparation of different concentrations of chemicals based on active ingredients against pathogens; Minimum inhibitory concentration (MIC) of different antibiotics against plant pathogenic bacteria. Isolation of biocontrol agents, extraction of bioactive plant extracts, testing, mass production and formulation.

## B. Sc Ag Hons 6th semester

**EC 363      Detection and diagnosis of plant diseases      3 (2+1)**

### Theory

Plant diseases – definition, Symptoms and Signs, Causes of plant diseases, Disorder, abiotic factors and its impact on plant health, Biotic vs. abiotic plant problems.

Outlines of serological and nucleo-based techniques for detection of different plant pathogens.

Fungal disease diagnosis symptomatology, Koch's postulate, Different isolation and purification techniques of fungal pathogens, inoculation techniques of fungal pathogens. Different techniques of preservation of microorganisms.

Symptoms of bacterial diseases, Isolation of bacteria from rhizosphere, phyllosphere and diseased samples, specific media, Bacterial stains and staining methods. Different inoculation techniques of bacteria.

### Practical

Method to prove koch's postulates with fungal and bacterial pathogens, Mechanical/ sap inoculation techniques for viral disease. Pure culture techniques, use of selective media to isolate pathogens. Preservation of plant pathogens and disease specimens, use of haemocytometer, micrometer, camera lucida for micrometric studies of fungal pathogens. Field trips for development of keys for diagnosis of diseases and assessment of disease severity.

## 7<sup>th</sup> Semester

**AG 401      Rural Agricultural Work Experience and Agro-industrial Attachment  
(RAWE & AIA)      20 (0+20)**

RAWE & AIA is one of the integral part of under-graduate programme comprising major two phases:

- (a) Village attachment training programme
- (b) Agro-industrial attachment

The week-wise activities along with credit hours for RAWE & AIA are given below:

Sl. No.	Activities	No. of weeks	Credit Hours
1	General orientation & on-campus training by different faculties	1	14
2	Village attachment	8	
3	Unit attachment in Univ. / College. / KVK / Research Station attachment	5	
4	Plant clinic	2	2

5	Agro-Industrial attachment	3	4
6	Project Report Preparation, Presentation and Evaluation	1	
<b>Total</b>		<b>20</b>	<b>20</b>



**Theory**

Etiology, symptoms, mode of spread, epidemiology and integrated management of diseases of the following vegetables, ornamental and spice crops: tomato, brinjal, chilli, bhindi, cabbage, cauliflower, radish, knol-khol, pea, beans, beet root, onion, garlic, fenugreek, ginger, potato, turmeric, pepper, cumin, cardamom, coriander, marygold, chrysanthemum, dahlia, jasmine, rose, tuberose, gerebera, anthurium. Important post-harvest diseases of vegetables and ornamental crops and their management.

**Practical**

Observations of symptoms, causal organisms and host parasitic relationship of important diseases, examination of cultures of important pathogens of vegetables, ornamental and spice crops in field as well as in protected cultivation.